

4.8 NOISE

This section describes the existing and future noise conditions in the vicinity of the project, and presents an evaluation of the significance of project-generated noise and of environmental noise on the project. It is based on a noise impact analysis completed by Rosen, Goldberg & Der, acoustical consultants, which is included as Appendix H of this EIR.

A. Existing Setting

1. Methodology

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

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

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

The maximum instantaneous noise level (L_{max}) is often used to identify the loudness of a single event such as a car pass-by or airplane flyover. L_{eq} (equivalent noise level) is used to express the average noise level. The L_{eq} can be measured over any length of time but is typically reported for periods of

15 minutes to 1 hour. The background noise level is the sound level during the quietest moments, usually generated by steady sources such as distant freeway traffic. It can be quantified with the L_{90} , or the sound level exceeded 90 percent of the time.

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

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

2. Regulatory Setting

a. California Environmental Quality Act

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

b. State Building Code

The State of California's Building Code (Appendix Chapter 12, Section 1208A) has requirements for control of environmental noise intrusion into new residential construction. For outdoor noise intrusion, the code states that interior noise levels due to external sources shall not exceed a CNEL of 45 dBA in any habitable room. If the windows must remain closed in order to meet the required noise level, an alternate means of ventilation such as air-conditioning must be provided.

The State building code also has requirements for airborne and impact noise isolation between adjacent dwelling units. The airborne and impact sound isolation requirements are typically handled in the architectural design phase and are beyond the scope of this environmental noise analysis.

c. State Land Use Compatibility Guidelines

The Governor's Office of Planning Research publishes land use compatibility guidelines for various land uses. According to the guidelines, residential development, such as duplexes, are considered "normally acceptable" if exposed to a CNEL of 60 dBA or less. A CNEL of 55 to 70 dBA is "Conditionally Acceptable" which means that development should only be undertaken after a detailed noise analysis that identifies needed noise insulation. A CNEL of 70 to 75 dBA is considered "Normally Unacceptable." Normally unacceptable means that "construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation included in the design."

d. City of Oakland Noise Element

The City of Oakland Noise Element has compatibility guidelines for various types of land uses that are expressed in terms of the L_{dn} or CNEL. In general, the City guidelines are comparable to the State guidelines, with some minor variations. For example, according to the Noise Element, "Normally Unacceptable" means that "the noise exposure is significantly more severe so that unusual and costly building construction is necessary to insure adequate performance of activities."

e. City of Oakland Noise Ordinance

Section 17.120.050 of the City's Municipal Code serves as the City's Noise Ordinance and specifies noise level standards which apply to different aspects of the project. Construction noise is addressed in Section 17.120.050(H) of the code. There are different standards for short-term construction operations (less than 10 days) and long-term operations. The limits for construction noise received on residential uses are shown in Table 7.

TABLE 7 **CITY OF OAKLAND CONSTRUCTION NOISE STANDARDS AT RECEIVING PROPERTY LINE, DBA¹**

Receiving Land Use	Daily	Weekends
	7:00 a.m. to 10:00 p.m.	9:00 a.m. to 8:00 p.m.
Less than 10 days		
Residential	80	65
Commercial, Industrial	85	70
More than 10 days		
Residential	65	55
Commercial, Industrial	70	60

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

TABLE 8 **CITY OF OAKLAND OPERATIONAL NOISE STANDARDS AT RECEIVING PROPERTY LINE, DBA¹**

Receiving Land Use	Cumulative number of minutes in a one-hour period	Daytime	Nighttime
		7:00 a.m. to 10:00 p.m.	10:00 p.m. to 7:00 a.m.
Residential and Civic	20	60	45
	10	65	50
	5	70	55
	1	75	60
	0	80	65

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

Noise from residential air-conditioning units and refrigeration systems is addressed in Section 17.120.050(I). This equipment must not generate an exte-

rior noise level greater than 50 dBA. For the purposes of this analysis, it is assumed that this standard is applied at the nearest residential property line.

Noise from other occupant activities such as domestic power tools and gardening equipment is addressed by Section 17.120.050(A). Table 8 contains the standards for these sources. For steady, continuous noises, the noise limit is 60 dBA during the day and 45 dBA at night. In the event the measured ambient noise level exceeds the standard, the noise level limit shall be adjusted so as to equal the ambient noise level.

The City also addresses vibration and states that all activities, except those located within the M-40 zone, or in the M-30 zone more than four hundred (400) feet from any legal residentially occupied property, shall be so operated as not to create a vibration which is perceptible without instruments by the average person at or beyond any lot line of the lot containing such activities. Ground vibration caused by motor vehicles, trains, and temporary construction or demolition work is exempted from this standard. (Section 17.120.060)

3. Existing Noise Environment

Major noise sources that affect the project site are vehicular traffic on I-580 and to a lesser extent, traffic on Keller Avenue. Noise measurements were made on and around the project site to quantify the existing noise environment. The measurements included one 24-hour noise measurement and six short term, 15-minute measurements. The noise measurement locations are shown in Figure 19.

The short-term measurements were made at locations that represent the noise exposure of the proposed buildings as well as some existing homes on Greenridge Drive and Sanford Street. The short term measurement results were correlated with simultaneous measurements at the long-term monitoring location to determine the DNL at the short-term measurement locations. Table 9 shows the results of the measurements. Figure 20 shows the hourly plot of the measured noise levels.

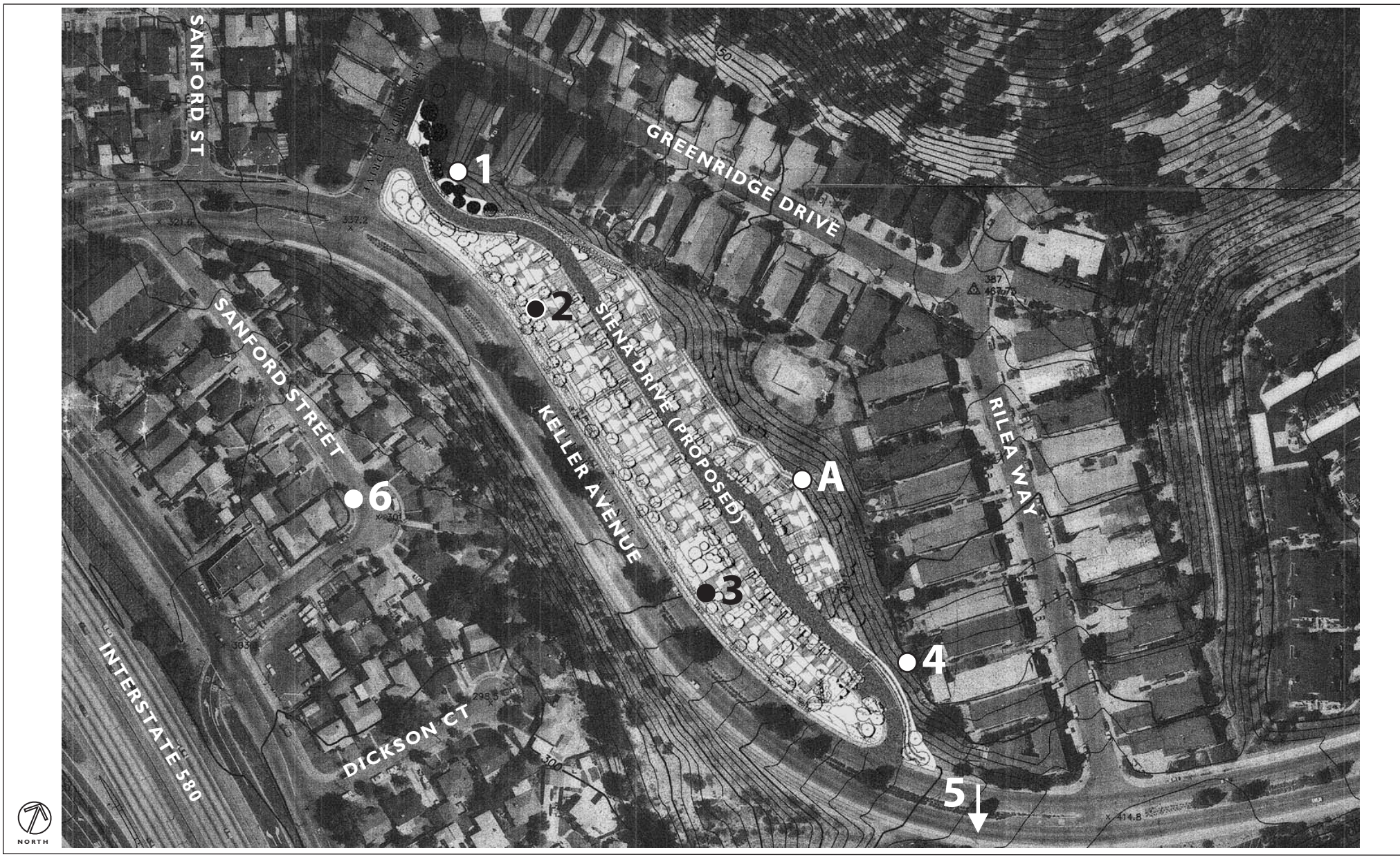


FIGURE 19

NOISE MEASUREMENT LOCATIONS

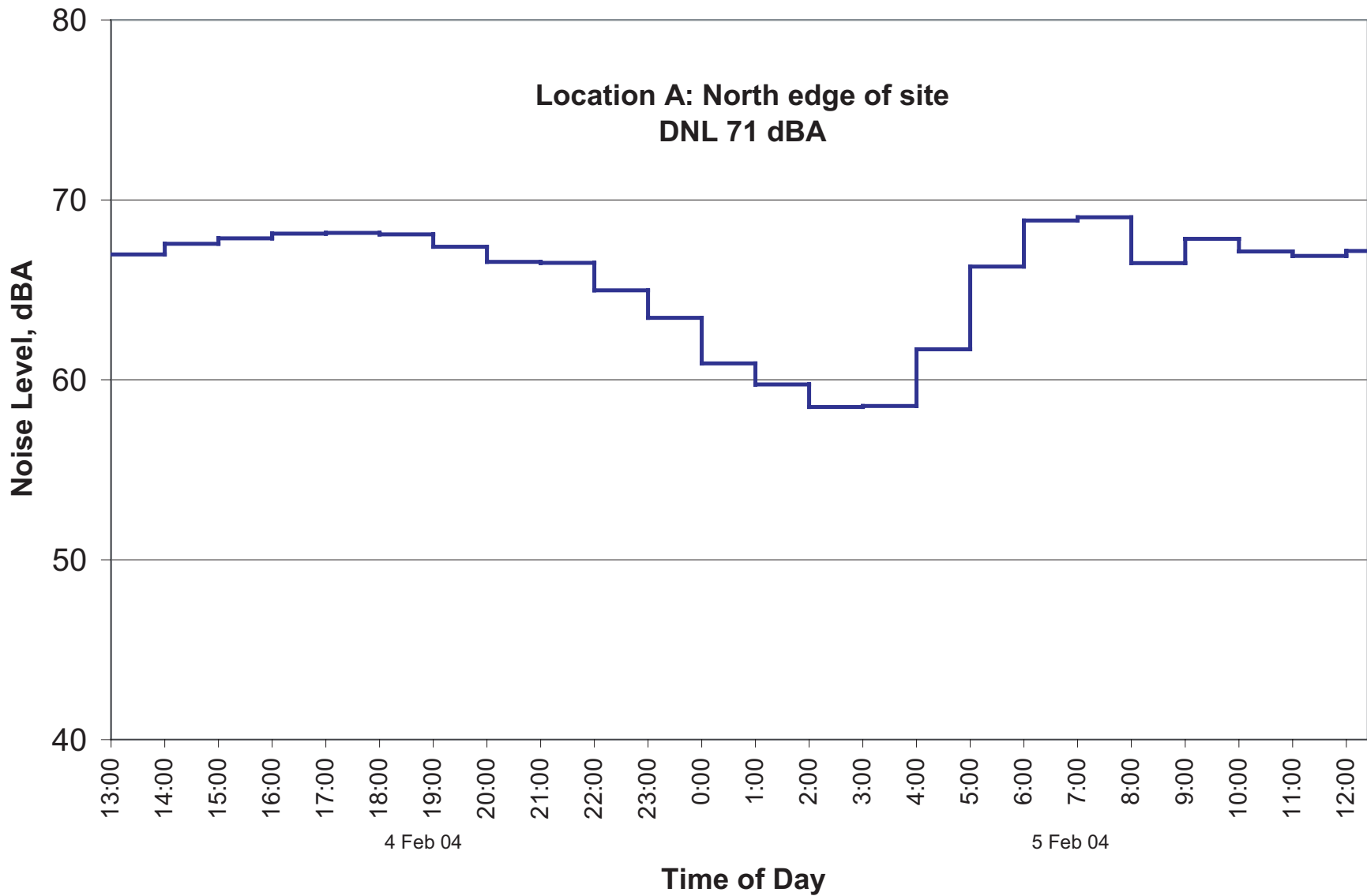


FIGURE 20

LONG-TERM NOISE MEASUREMENT RESULTS

TABLE 9 EXISTING ENVIRONMENT: SHORT-TERM NOISE MEASUREMENT RESULTS

	Location	Time	Leq	A-weighted Sound Level, dBA			
				L10	L50	L90	DNL*
1	West corner of site, 15' down hill from existing fence	1:25 p.m. – 1:40 p.m.	66	67	65	64	70
2	Keller Ave, west half of site, at proposed set-back	1:50 p.m. – 2:10 p.m.	68	71	66	63	72
3	Keller Ave, east half of site, at proposed set-back	1:35 p.m.– 1:50 p.m.	67	70	64	61	71
4	East corner of site, 8' down hill from existing fence	1:25 p.m. – 1:40 p.m.	68	69	67	66	72
5	Sequoyah Community Church, 8' from edge of curb, 5' above grade	12:50 a.m. – 1:00 p.m.	66	69	63	60	70
6	7971 Sanford Street, at curb, 5' above grade	1:15 p.m. – 1:30 p.m.	57	59	57	55	61

* Estimate of DNL based on comparison of Short-term measurements with results of Long-term measurements

B. Standards of Significance

The proposed project would result in a significant noise impact if it would:

- ◆ Expose persons to or generate noise levels in excess of standards established in the Oakland general plan or applicable standards of other agencies (e.g., OSHA);
- ◆ Violate the City of Oakland Noise Ordinance (Oakland Planning Code Section 17.120.050) regarding operational noise;
- ◆ Violate the City of Oakland Noise Ordinance (Oakland Planning Code Section 17.120.050) regarding construction noise, except if an acoustical analysis is performed and all feasible mitigation measures imposed, including the standard City of Oakland noise measures adopted by the Oakland City Council on January 16, 2001;

- ◆ Violate the City of Oakland Noise Ordinance (Oakland Municipal Code Section 8.18.020) regarding nuisance of persistent construction-related noise;
- ◆ Create a vibration which is perceptible without instruments by the average person at or beyond any lot line containing vibration-causing activities not associated with motor vehicles, trains, and temporary construction or demolition work, except activities located within the (a) M-40 zone or (b) M-30 zone more than 400 feet from any legally occupied residential property (Oakland Planning Code Section 17.120.060);
- ◆ Generate interior Ldn or CNEL greater than 45 dBA for multi-family dwellings, hotels, motels, dormitories and long-term care facilities (and may be extended by local legislative action to include single family dwellings) per California Noise Insulation Standards (CCR Part 2, Title 24);
- ◆ Result in a 5 dBA permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- ◆ Conflict with state land use compatibility guidelines for all specified land uses for determination of acceptability of noise;¹
- ◆ Be located within an airport land use plan and would expose people residing or working in the project area to excessive noise levels; or
- ◆ Be located within the vicinity of a private airstrip, and would expose people residing or working in the project area to excessive noise levels.

C. Impacts and Mitigation Measures

The proposed project is not within an airport land use plan or in the vicinity of a private airstrip, so no impacts would occur.

¹ Source: State of California, Governor's Office of Planning and Research, General Plan Guidelines, 2003 (Appendix C, Figure 2)

1. Traffic Noise

Impact NOISE-1: Traffic from the proposed project could increase local traffic noise levels. (Less than Significant)

According to a traffic analysis, the proposed project would generate approximately 306 daily trips. This corresponds to 24 vehicle trips in the morning peak hour and 32 vehicle trips in the evening peak hour. This increase in traffic would change traffic noise levels by less than 1 dBA on the streets that serve the project. In the future, cumulative traffic increases caused by growth in the area will increase noise from the nearby roads, Keller Avenue and Mountain Boulevard, by up to 2 dBA.

The project's internal roadway, Siena Drive, will be within 25 feet of the some of the backyards of existing residences on Greenridge Drive. The noise contribution from traffic on Siena Drive would be less than 1 dBA at these backyards due to the relatively low number of new vehicular trips and existing noise from I-580. Traffic noise changes due to the project and cumulative growth is considered a less than significant impact.

Mitigation: None required.

2. Operational Noise

Impact NOISE-2: The operation of the proposed project could increase noise levels in the proposed project area. (Less than Significant)

One typical source of noise from residential projects is heating, ventilation and air-conditioning systems (HVAC). Common residential air-conditioners include condensing units that are outdoors and can be noisy. The other equipment, such as the heater and fans would be located indoors and not expected to generate noise outdoors. According to the project applicant the project will not include air-conditioning. No other significant operational noise is expected. Regardless, mechanical equipment would be required to

comply with the City's noise ordinance. Noise from mechanical equipment is considered a less than significant impact.

Mitigation: None required.

3. Construction Noise

Impact NOISE-3: Construction noise would impact nearby existing residential land uses. It is likely that construction noise would exceed the City's quantitative standards for long-term construction noise at nearby residences during most phases of construction. (Significant)

Noise from construction would occur sporadically as individual units or groups of units are constructed. Depending on the conditions of different areas of the site, construction activities could include grading, earthmoving, drilling or concrete mixing. The proposed project would not require any pile driving. Table 10 shows maximum potential noise levels from the heavy machinery required for some common construction activities.

Noise from the first phase would be loudest during grading and construction of Siena Drive when activities are close to Greenridge Drive and Keller Avenue. At these locations, existing homes are within 25 to 50 feet of the roadway. Maximum noise levels would range from 88 to 94 dBA. The outdoor use area of the homes above the site (just below the intersection of Greenridge Drive and Rilea Way) and other buildings would be exposed to maximum levels of 82 dBA. Homes below the site on Sanford Street and Dickson Court would be exposed to maximum levels of 76 dBA.

Phases two, three and four would include the construction of eight, twelve and twelve units, respectively. Phase one is expected to last from June 2005 to June 2006, phase two from June 2006 to June 2007, and phase three from June 2007 to June 2008. Building construction noise during these three phases would include diesel powered vehicles, stationary compressors, power tools

TABLE 10 **NOISE LEVELS OF CONSTRUCTION EQUIPMENT**

Equipment	Noise level at 50 feet, dBA
Backhoe	85
Concrete mixer	85
Dozer	88
Dump truck	88
Generator	76
Jackhammer	88
Paver	89
Pneumatic tools	85
Portable air compressor	81
Pump	76
Scraper	88

and regular hand tools. This type of equipment typically emits maximum sound levels of 81 to 88 dBA at 50 feet. This corresponds to noise levels in excess of 80 dBA at homes above the site and levels of 69 to 76 dBA at homes below the site. As the building shells are completed and work goes indoors, noise levels would be reduced by 10 to 15 dBA.

The City noise ordinance sets a limit of 65 dBA for long term residential construction between 7 a.m. and 7 p.m. The limit is reduced to 55 dBA on weekends between 9 a.m. and 8 p.m. All construction activities resulting from the proposed project have the potential to exceed the City's noise ordinance limits. Therefore, the proposed project shall be required to implement the construction noise mitigation measures adopted by the Oakland City

Council, which are presented below. The applicant and contractor shall be required to implement these mitigation measures throughout the duration of construction activity. If these mitigation measures are implemented, the project would be considered to be in compliance with the Noise Ordinance.

Mitigation Measure NOISE-3a: The project sponsor shall require construction contractors to limit standard construction activities as required by the City Building Department. Such activities are generally limited to between 7:00 a.m. and 7:00 p.m. Monday through Friday, with extreme noise generating activities greater than 90 dBA limited to between 8:00 a.m. and 4:00 p.m. Monday through Friday, with no extreme noise generating activity permitted between 12:30 p.m. and 1:30 p.m. No construction activities shall be allowed on weekends until after the building is enclosed, without prior authorization of the Building Services Division, and no extreme noise generating activities shall be allowed on weekends and holidays.

Mitigation Measure NOISE-3b: To reduce daytime noise impacts due to construction, the project sponsor shall require construction contractors to implement the following measures:

- ◆ Equipment and trucks used for project construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds, wherever feasible).
- ◆ Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible.

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

Effectiveness of mitigation measure: Relocation of noisy equipment would provide about 12 dB of noise reduction (relocation from perimeter of site to center of site). A temporary shed could provide up to 15 dB of noise reduction. A barrier would provide 5 to 8 dB of reduction.

If noisy activities such as use of power saws are done indoors instead of outdoors than the noise would be reduced by 10 to 15 dB as it travels from inside buildings to the outdoors. The noise associated with grading and other outdoor activities would not be affected.

In general, a barrier needs to block the line of site from the construction equipment to the receiver. Due to site geometry, this would be most effective for homes that are at or above the elevation of the project site. In those cases, the barrier would need to be located so as to block the construction equipment from view.

Mitigation Measure NOISE-3c: To further mitigate potential extreme noise generating construction impacts, a set of site-specific noise attenuation measures shall be completed under the supervision of a qualified acoustical consultant. Prior to commencing construction, a plan for such measures shall be submitted for review and approval by the City to ensure that maximum feasible noise attenuation will be achieved. These attenuation measures shall include as many of the following control strategies as feasible:

- ◆ Erect temporary plywood noise barriers around the construction site, to shield adjacent uses;

Effectiveness of mitigation measure: Noise levels over 90 dBA would occur only when grading is closest to the north and east property lines (within about 50 feet of residences). A barrier could provide 5 to 8 dB of reduction.

Again, the effectiveness of a barrier will depend on the juxtaposition of neighboring properties and construction equipment.

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

Effectiveness of mitigation measure: Not applicable; noise from indoor activities would not exceed 90 dBA at residences.

- ◆ Evaluate the feasibility of noise control at the receivers by temporarily improving the noise reduction capability of adjacent buildings.

Effectiveness of mitigation measure: Feasible measures include replacement of existing windows with new, sound rated windows or installation of plywood covers over exiting windows. This measure can provide 5 to 10 dB of additional reduction but requires that windows remain closed. For this measure to be effectively implemented, the affected residences should be able to get fresh air into the affected rooms to allow for a habitable interior environment. This can be achieved through some form of mechanical ventilation such as air-conditioning. This aspect should be reviewed by a mechanical engineer.

- ◆ Monitor the effectiveness of noise attenuation measures by taking noise measurements.

Mitigation Measure NOISE-3d: Prior to the issuance of each building permit, along with the submission of construction documents, the project sponsor shall submit to the City Building Department a list of measures to respond to and track complaints pertaining to construction noise.

These measures shall include:

- ◆ A procedure for notifying the City Building Division staff and Oakland Police Department;

- ◆ A plan for posting signs on-site pertaining to permitted construction days and hours and complaint procedures and who to notify in the event of a problem;
- ◆ A listing of telephone numbers (during regular construction hours and off-hours);
- ◆ The designation of an on-site construction complaint manager for the project;
- ◆ Notification of neighbors within 300 feet of the project construction area at least 30 days in advance of pile-driving and/or other extreme noise-generating activities about the estimated duration of the activity; and
- ◆ A preconstruction meeting shall be held with the job inspectors and the general contractor/on-site project manager to confirm that noise mitigation and practices (including construction hours, neighborhood notification, posted signs, etc.) are completed.

Significance After Mitigation: Less Than Significant

With the completion of an acoustical analysis and implementation of these noise mitigation measures, the project's construction noise impacts are considered to be less than significant.

4. Land Use Compatibility

Impact NOISE-4: Future noise from I-580 and Keller Ave will exceed the State's "normally acceptable" noise level goal of a CNEL of 60 dBA at the residential buildings along these roadways. The noise level will also exceed the State Building Code threshold of a DNL of 60 dBA for new construction. (Significant)

The proposed project site is currently exposed to a DNL of 70 to 72 dBA. In the future, noise levels along local roadways would not be expected to increase the DNL at the project site. Future increases in I-580 traffic would increase the DNL by less than 1 dB . According to the State's Land Use

Compatibility Guidelines, a DNL of 70 to 72 dBA is considered “normally unacceptable”. Furthermore, the State building code requires that an acoustical study be prepared if noise levels exceed a DNL of 60 dBA on site. Existing and future roadway noise affecting the proposed project site is therefore considered a potentially significant impact.

Mitigation Measure NOISE-4: Sound-rated building construction shall be used to achieve acceptable indoor noise levels as per the State Building Code and City’s Noise Element.

The specification of these treatments shall be developed during the architectural design of the buildings. In general, rooms along the perimeter of the site will require sound rated windows. All residential units in the project will require mechanical ventilation to allow for air circulation while windows are closed for noise control. An acoustical consultant shall review the architectural design and prepare a report for submission to the building department prior to issuance of building permits. The report shall identify the constructions (i.e. window sound ratings) that will enable the project to meet the City and State building code requirements.

Significance After Mitigation: Less than Significant

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