Section 3.9
Noise

This section describes local noise standards that are applicable to the proposed project and examines whether the Phase II project components would result in exceedance of those standards or would otherwise result in noise impacts as defined by CEQA. All facets of the Phase II project are analyzed for noise concerns, with particular concentration on the components that make the most noise, such as the two additional compressors totaling 5,900 horsepower at the compressor station. Key issues include examining the distance between noise-making components and the nearest place where people live or work, and discussing measures that can reduce noise to acceptable levels.

LGS retained the acoustical consulting firm of Hoover & Keith to evaluate noise impacts associated with the proposed project. The results of the Hoover & Keith analysis are provided in the report entitled *Kirby Hills Gas Storage Project – Acoustical Assessment of an Expansion Project at the Existing Natural Gas Storage Facility*, dated May 4, 2007 (Hoover & Keith 2007). This report is included in the amended CPCN application and will be available on-file with the CPUC.

Terminology

Below are brief definitions of acoustical terms used in this section.

- **Sound.** A vibratory disturbance created by a vibrating object, which—when transmitted by pressure waves through a medium such as air—is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Ambient Noise.** All-encompassing noise associated with a given environment, being usually a composite of sounds from all sources, near and far with no particular dominant sound.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-Pascals.
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.

- **Equivalent Sound Level (Leq).** The average of sound energy occurring over a specified period. In effect, Leq is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period.
- **Day-Night Level (Ldn).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the A-weighted sound levels occurring between 7:00 p.m. and 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m.

Ldn and CNEL values rarely differ by more than 1 dB. As a matter of practice, Ldn and CNEL values are considered to be equivalent and are treated as such in this assessment. In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving sound level.

Environmental Setting

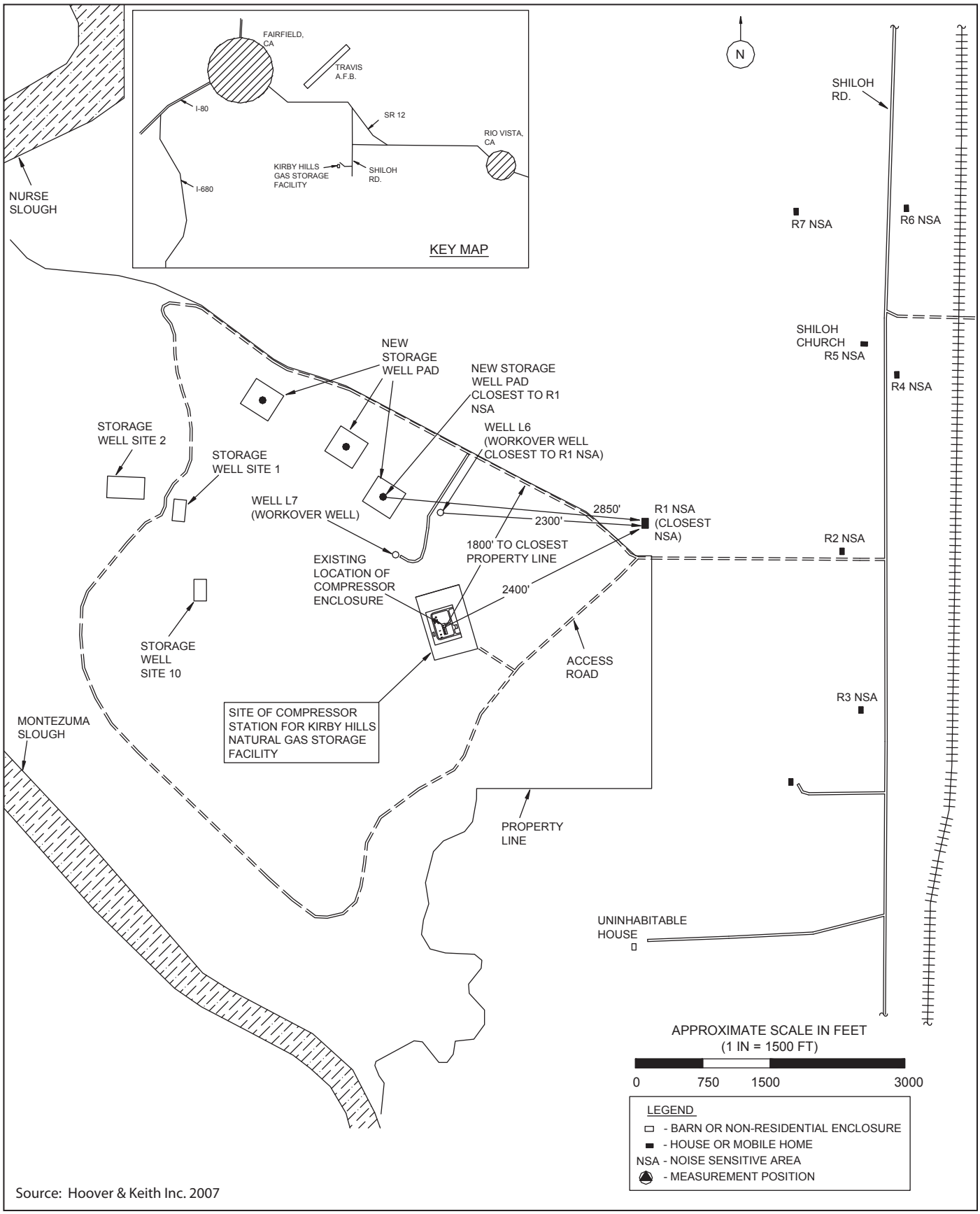
Land Uses and Receptors Sensitive to Noise in the Project Vicinity

Noise-sensitive receptors are individuals or groups of individuals who are sensitive to high noise levels, such as individuals associated with residences, schools, playgrounds, and hospitals. The analysis focuses on noise associated with construction and operation of the Phase II project. The primary construction noise sources include general construction activity and well drilling. Primary operational noise sources include the permanent compressor station. The areas surrounding the project site are generally agricultural with isolated rural residences and a church.

Figure 3.9-1 shows the location of the residences and a church in the Phase II project area. Table 3.9-1 summarizes the distance between the primary noise sources (compressors and well-drilling sites) and the noise-sensitive uses.

Existing Noise Conditions

The Phase II project area is rural; it supports grazing lands, a few associated residences, and a church. The noise environment is defined mainly by noises generated by distant transportation; local traffic; and wind, including wind turbine generators. The windy conditions in the Phase II project area and vicinity



Source: Hoover & Keith Inc. 2007

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Jones & Stokes

Figure 3.9-1
Kirby Hill Gas Storage Facility: General Area Layout Showing the Location of the Nearby NSAs, Location of the Station and other Areas of Interest

produce a somewhat elevated ambient noise condition that increases with wind speed.

Table 3.9-1. Distances to Noise-Sensitive Uses

Use	Distance to Permanent Compressor (feet)	Distance to Nearest Well Drilling Site (feet)
R1	2,400	2850
R2	4,540	5,190
R3	4,720	5,800
R4	5,780	5,930
R5	5,680	5,680
R6	6,910	6,670
R7	6,050	5,620

Note:

Other residences located to the east of the compressor site are more than 5 miles from the compressor site; however, they are located adjacent to the PG&E intertie pipeline alignment near the metering station.

The workover well is located approximately 2,300 feet from R1.

As described in the previous PEA for the Kirby Hills I project (Jones & Stokes 2005), noise monitoring was not conducted for the proposed project; however, monitoring was conducted for the Shiloh I Wind Plant Project (CPUC 2005), which is located in the same general area as the proposed project. The minimum nighttime hourly Leq noise level measured was 45 dBA. Measured CNEL values were in the range of 58 to 69 dBA. The wind farm noise assessment (CPUC 2005) concludes that the ambient noise levels were higher than expected, possibly due to self-generated noise caused by wind blowing across the noise meter microphone windscreen. For this assessment the ambient background sound level was conservatively assumed to be 45 Ldn, which is consistent with a quiet, rural environment.

Regulatory Setting

No federal or state noise standards are applicable to the project.

Solano County

Policy 4 in the Solano County Noise Element relates to the proposed project and states the following:

> The introduction of any fixed point, permanent, non-residential, noise-emitting land use (industrial, commercial, public, etc.) shall be prohibited if the projected noise emission level will exceed one or more of the following:
>
> a. 50 dBA CNEL as measured at the boundary of a nearby residential zone.
>
> b. 60 dBA CNEL as measured at the boundary of a nearby commercial zone, business zone (personal service, offices), or noise-sensitive industrial or manufacturing zone (research, communications, etc). (San Joaquin County 1992.)

The Noise Element also identifies maximum allowable noise levels from construction equipment. The maximum allowable noise levels vary by equipment type; they are in the range of 75 to 80 dBA for most equipment and as high as 95 dB for pile-driving equipment.

Impact Analysis

Significance Criteria

Criteria for determining the significance of noise impacts were developed based on questions contained in the environmental checklist form in Appendix G of the State CEQA Guidelines. Based on the checklist questions, a project may have a significant effect on the environment if it would result in:

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

The potential increase in noise from the project also is considered in determining significance. As noted above, research into the human perception of changes in sound level indicates the following (White 1975):

- A 3-dB change is barely perceptible,
- A 5-dB change is a noticeable difference, and
- A 10-dB change is perceived as being twice or half as loud as the original condition.

These and other factors relating to the duration, frequency, and tonal content of project-related noise are considered when evaluating the significance of changes in sound levels. Therefore, for project operations, a project-related increase of 5 dBA above the ambient sound level at nearby sensitive receptors was used as the threshold for a substantial increase. For the purposes of assessing significance impacts under CEQA, "the boundary of a nearby residential zone" is taken to be the location within a property where primary frequent human use occurs (i.e., where the residential structure is located.)

Impacts

As noted in Chapter 2, *Project Description,* the following APMs will be incorporated into the construction contract specifications to reduce and control noise generated from construction-related activities.

- Restrict construction within 1,000 feet of occupied dwelling units to daytime hours between 7 a.m. and 7 p.m. on weekdays, Saturdays, and nonholidays, unless written approval is obtained from the resident.
- Ensure that all construction equipment has sound-control devices no less effective than those provided on the original equipment. No equipment will have an unmuffled exhaust.
- Implement appropriate additional noise-reducing measures, including but not limited to:
  - Changing the location of stationary construction equipment,
  - Shutting off idling equipment,
  - Rescheduling construction activity, and
  - Notifying nearby residents in advance of construction work.

IMPACT 3.9-1: EXPOSURE OF NOISE-SENSITIVE LAND USES TO NOISE FROM CONSTRUCTION ACTIVITIES OTHER THAN WELL DRILLING

Construction activities would result in temporary increases in noise levels in the area of construction activity. Primary noise-generating activities would include

excavation, grading, scraping, and compaction activities. Vehicles traveling to and from construction sites also may affect noise in the area, but to a lesser degree. The magnitude of construction-noise impacts would depend on the type of construction activity, the noise level generated by various pieces of construction equipment, the duration of the activity, the distance between the activity and noise-sensitive receptors, and shielding effects from local barriers and topography. Noise increases from pipeline installation typically would last no more than a few days at any given location. Noise from construction of other project components would occur over several weeks. Table 3.9-2 shows Leq values for various types of construction equipment that may be used during construction.

A reasonable worst-case assumption is that the three loudest pieces of equipment would operate simultaneously and continuously over at least a 1-hour period. The combined sound level of three of the loudest pieces of equipment listed in Table 3.9-2 (scraper, truck, and bulldozer) is 92 dBA, measured at a distance of 50 feet. Table 3.9-3, which assumes this combined-source noise level, summarizes predicted noise levels at various distances from an active construction site. These predicted construction noise levels include the effects of acoustical absorption by the ground but do not include the effects of shielding from structures or topography.

Table 3.9-2. Noise Emission Levels Typical for Construction Equipment

Equipment	Typical Noise Level (dBA) 50 Feet from Source
Backhoe	80
Bulldozer	85
Grader	85
Loader	85
Roller	75
Scraper	89
Truck	88

Source: Federal Transit Administration 1995.

Table 3.9-3. Estimated Construction Noise in the Vicinity of Active Construction Sites

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Calculated Sound Level (dBA)
50	0	0	92
100	-6	-2	85
250	-14	-4	74
300	-16	-5	72
400	-18	-6	69
500	-20	-6	66
600	-22	-7	64
700	-23	-7	62
800	-24	-7	61
900	-25	-8	60
1,000	-26	-8	58
1,200	-28	-9	56
1,400	-29	-9	55
1,600	-30	-9	53
1,800	-31	-10	52
2,000	-32	-10	50
2,500	-34	-10	48
3,000	-36	-11	46

Notes:

Calculations are based on Federal Transit Administration 1995.

These calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

Table 3.9-3 indicates that, under the worst-case construction noise assumption, construction noise could exceed the Solano County construction noise standard of 75 dBA within about 250 feet of an active construction site. Because there are no noise sensitive land uses located within 250 feet of any proposed construction, this impact is considered less than significant. No mitigation is required.

IMPACT 3.9-2: EXPOSURE OF NOISE-SENSITIVE LAND USES TO VIBRATION FROM CONSTRUCTION ACTIVITIES

Because there are no noise sensitive land uses in the Phase II area and because to high impact equipment (i.e. pile drivers) is expected to be used, vibration from pile driver is not expected to be perceptible at any noise sensitive land uses. This impact is therefore considered to be less than significant. No mitigation is required.

IMPACT 3.9-3: EXPOSURE OF NOISE-SENSITIVE LAND USES TO NOISE FROM WELL DRILLING ACTIVITIES

Three new well pad sites containing 15 injection and withdrawal wells will be constructed in the Kirby Hills. The sites are not visible from surrounding areas and are located over 2,300 feet from the nearest noise-sensitive use (NSA R1, the former duck club). The wells will be directionally drilled from the well pads into the storage formation.

Well drilling is proposed to be conducted on a 24-hour basis for 12 or more weeks. The results of the noise analysis (Hoover & Keith 2007) indicate that the maximum noise level of drilling operations at the new storage wells will be equal to or less than 45.6 Ldn at the nearest NSA (R1). Noise from the workover well is predicted to be 43.8 Ldn. Accordingly, the noise from well drilling is not predicted to result in a perceptible increase in noise and or an exceedance of the County's noise standard of 50 CNEL. This impact is therefore considered less than significant, and no mitigation is required.

IMPACT 3.9-4: EXPOSURE OF NOISE-SENSITIVE LAND USES TO NOISE FROM OPERATION OF THE PERMANENT COMPRESSOR FACILITY

The noise report prepared by Hoover & Keith (Hoover & Keith 2007) indicates the new compressor units are predicted to produce a noise level at the nearest NSA (R1) of 45.0 Ldn. This predicted noise level assumes that all noise control measures indicated in the report are implemented as part of APM N-2. The report also states that the existing compressors produce a noise level of 44.0 Ldn at the nearest NSA (R1). Assuming an ambient noise level of 45 Ldn, the following is summary of the noise analysis for the compressors.

- Ambient noise level (no compressors operating): 45 Ldn
- Prediction noise from existing compressor units: 44.0 Ldn
- Noise with ambient and existing compressor units (existing conditions baseline): 47.5 dBA (45 dBA plus 44.0 dBA)
- Noise from new compressor units: 45.0 dBA
- Noise from all units combined with ambient noise: 49.4 dBA (45.0 plus 47.5)
- Increase above ambient: 1.9 dB (49.4 minus 47.5)

This analysis indicates that operation of the new compressors is not predicted to result in a perceptible increase in noise and or an exceedance of the County's noise standard of 50 CNEL as long as appropriate noise control measures are implemented. This impact is therefore considered less than significant. Implementation of APM N-2 would ensure that the noise control measures are implemented.

Applicant Proposed Measures and Mitigation Measures

LGS will implement APMs N-1 and N-2 (described in Chapter 2, *Project Description*) as part of the proposed project to avoid and minimize potentially significant noise impacts. Therefore, no mitigation is required.