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5.5 NOISE

Hydrogen Energy International LLC (HEI or Applicant) is jointly owned by BP Alternative Energy North America Inc. and Rio Tinto Hydrogen Energy LLC. HEI is proposing to build an Integrated Gasification Combined Cycle power generating facility called Hydrogen Energy California (HECA or Project) in Kern County, California. The Project will produce low-carbon baseload electricity by capturing carbon dioxide (CO_2) and transporting it for CO_2 enhanced oil recovery (EOR) and sequestration (storage)[1].

The 473-acre Project Site is located approximately 7 miles west of the outermost edge of the city of Bakersfield and 1.5 miles northwest of the unincorporated community of Tupman in western Kern County, California, as shown in Figure 2-1, Project Vicinity.

The Project Site is near a hydrocarbon-producing area known as the Elk Hills Field. The Project Site is currently used primarily for agricultural purposes. Existing surface elevations vary from about 282 feet to 291 feet above mean sea level.

The Project will gasify petroleum coke (petcoke) (or blends of petcoke and coal, as needed) to produce hydrogen to fuel a combustion turbine operating in combined cycle mode. The Gasification Block feeds a 390-gross-megawatt (MW) combined cycle plant. The net electrical generation output from the Project will provide California with approximately 250 MW of low-carbon baseload power to the grid. The Gasification Block will also capture approximately 90 percent of the carbon from the raw syngas at steady-state operation, which will be transported to the Elk Hills Field for CO_2 EOR and Sequestration. In addition, approximately 100 MW of natural gas generated peaking power will be available from the Project.

The Project Site and linear facilities comprise the affected study area and are entirely located in Kern County, California. These Project components are described below.

Major on-site Project components will include, as shown on Figure 2-5, Preliminary Plot Plan:

- Solids Handling, Gasification, and Gas Treatment
  - Feedstock delivery, handling and storage
  - Gasification
  - Sour shift/gas cooling
  - Mercury removal
  - Acid gas removal

- Power Generation
  - Combined-cycle power generation
  - Auxiliary combustion turbine generator

1 This carbon dioxide will be compressed and transported via pipeline to the custody transfer point at the adjacent Elk Hills Field, where it will be injected. The CO_2 EOR process involves the injection and reinjection of carbon dioxide to reduce the viscosity and enhance other properties of the trapped oil, thus allowing it to flow through the reservoir and improve extraction. During the process, the injected carbon dioxide becomes sequestered in a secure geologic formation. This process is referred to herein as CO_2 EOR and Sequestration.

- Electrical switching facilities

- Supporting Process Systems
  - Natural gas fuel systems
  - Air separation unit (ASU)
  - Sulfur recovery unit/Tail Gas Treating Unit
  - Zero liquid discharge (ZLD) units for process and plant waste water streams
  - Carbon dioxide compression
  - Raw water treatment plant
  - Other plant systems

The Project also includes the following offsite facilities, as shown on Figure 2-7, Project Location Map:

- **Electrical Transmission Line –** An electrical transmission line will interconnect the Project to Pacific Gas & Electric's (PG&E) Midway Substation. Two alternative transmission line routes are proposed; each alternative is approximately 8 miles in length.

- **Natural Gas Supply –** A natural gas interconnection will be made with PG&E or So Cal Gas natural gas pipelines, each of which are located southeast of the Project Site. The natural gas pipeline will be approximately 8 miles in length.

- **Water Supply Pipelines –** The Project will utilize brackish groundwater supplied from the Buena Vista Water Storage District (BVWSD) located to the northwest. The raw water supply pipeline will be approximately 15 miles in length. Potable water for drinking and sanitary use will be supplied by West Kern Water District to the southeast. The potable water supply pipeline will be approximately 7 miles in length.

- **Carbon Dioxide Pipeline –** The carbon dioxide pipeline will transfer the carbon dioxide captured during gasification from the Project Site southwest to the custody transfer point. Two alternative carbon dioxide pipeline routes are proposed; each alternative will be approximately 4 miles in length.

The Project components described above are shown on Figure 2-8, Project Location Details, which depicts the region, the vicinity, the Project Site and its immediate surroundings.

All temporary construction equipment laydown and parking, including construction parking, offices, and construction laydown areas, will be located on the Project Site.

In accordance with California Energy Commission (CEC) regulations, this section describes the existing noise environment on site and in the vicinity of the Project Site, and assesses potential noise impacts associated with the Project. Noise-sensitive receptors that may be affected by noise are identified, as well as the laws, ordinances, regulations, and standards (LORS) that regulate noise levels at those receptors. The following discussion describes the results of a detailed site reconnaissance, sound level measurements, acoustical calculations, and assessment of potential noise impacts

5.5.1 Affected Environment

5.5.1.1 Fundamentals of Acoustics

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to typical environmental noise exposure levels is annoyance. The responses of individuals to similar noise events are diverse, and influenced by many factors, including the type of noise, the perceived importance of the noise, its appropriateness to the setting, the time of day, the type of activity during which the noise occurs, and the noise sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and amplitude. Frequency describes the sound's pitch (tone) and is measured in cycles per second (Hertz [Hz]), and amplitude describes the sound's pressure (loudness). Because the range of sound pressures that occur in the environment is extremely large, it is convenient to express these pressures on a logarithmic scale that compresses the wide range of pressures into a more useful range of numbers. The standard unit of sound pressure measurement is the decibel (dB).

Hz is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. When the drum skin vibrates 100 times per second it generates a sound pressure wave that is oscillating at 100 Hz, and this pressure oscillation is perceived by the ear/brain as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz are within the range of sensitivity of the healthy human ear.

As mentioned above, sound levels are expressed by reference to a specified national/international standard. This report refers to two acoustical quantities: (1) sound power level is used to express the sound energy radiated from a source; and (2) sound pressure level is used to describe sound at a specified distance or specific receptor location. In expressing sound power as a dB level, the standard reference sound power is 1 picowatt. In expressing sound pressure level on a logarithmic scale, sound pressure is compared to a reference value of 20 micropascals. These terms are different and should not be confused. Sound power level is a measure of the inherent acoustic power radiated by a source, whereas sound pressure level depends on not only the power of the source, but also the distance from the source and on the acoustical characteristics of the space surrounding the source (absorption, reflection, etc.).

Outdoor sound levels decrease logarithmically as the distance from the source increases. This decrease is due to wave divergence, atmospheric absorption, and ground attenuation. Sound radiating from a source in a homogeneous and undisturbed manner travels in spherical waves. As the sound waves travel away from the source, the sound energy is dispersed over a greater area, decreasing the sound pressure of the wave. Spherical spreading of the sound wave reduces the noise level at a rate of 6 dB per doubling of distance.

Atmospheric absorption also influences the sound levels received by an observer. The greater the distance traveled, the greater the influence of the atmosphere and the resultant fluctuations. Atmospheric absorption becomes important at distances greater than 1,000 feet. The degree of absorption varies depending on the frequency of the sound, as well as the humidity and temperature of the air. For example, atmospheric absorption is lowest (i.e., sound carries further) at high humidity and high temperatures; and lower frequencies are less readily absorbed (i.e., sound carries further) than higher frequencies. Over long distances, lower frequencies become dominant as the higher frequencies are more rapidly attenuated. Turbulence, gradients of wind, and other atmospheric phenomena also play a significant role in determining the degree of attenuation. For example, certain conditions such as temperature inversions can channel or focus the sound waves and result in higher noise levels than would otherwise result from simple spherical spreading.

Sound from a tuning fork contains a single frequency (a pure tone), but most sounds that one hears in the environment do not consist of a single frequency but rather a broad band of many frequencies differing in sound level. Because of the broad range of audible frequencies, methods have been developed to quantify these values into a single number. The most common method used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that is reflective of human hearing. Human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This process of discriminating frequencies based on human sensitivity is termed “A-weighting,” and the resulting dB level is termed an “A-weighted” decibel (dBA). A-weighting is widely used in local noise ordinances and state and federal guidelines. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve. Unless specifically noted, the use of A-weighting is always assumed with respect to environmental sound and community noise even if the notation does not show the “A.”

In terms of human perception, a sound level of 0 dBA is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. This threshold is the reference level against which the amplitude of other sounds is compared. Normal speech has a sound level of approximately 60 dBA. Sound levels above about 120 dBA begin to be felt inside the human ear as discomfort, progressing to pain at still higher levels. Humans are much better at discerning relative sound levels than absolute sound levels. The minimum change in the sound level of individual events that an average human ear can detect is about 1 to 2 dBA. A 3 to 5 dBA change is readily perceived. An increase (or decrease) in sound level of about 10 dBA is usually perceived by the average person as a doubling (or halving) of the sound’s loudness.

Because of the logarithmic nature of the dB unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound’s intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB. However, about a 10-decibel increase is required to double the perceived intensity of a sound, and it is interesting to note that a doubling of the acoustical energy (a 3 dB increase) is at the lower limit of readily perceived change.

5.5.1.2 Noise Metrics

Although dBA may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most ambient environmental noise includes a mixture of noise from nearby and distant sources that creates an ebb and flow of sound, including some identifiable sources, plus a relatively steady background noise in which no particular source is identifiable. A single descriptor called the equivalent sound level (L_{eq}) is used to describe sound that is either constant or changing in level over a period of time. L_{eq} is the energy-mean dBA during a measured time interval. It is the “equivalent” constant sound level that would have to be produced by a given constant source to equal the acoustic energy contained in the fluctuating or time-varying sound level measured during the interval. The L_{eq} is the “base” metric used to establish other measures of environmental noise, such as the Day-Night Average Sound Level (L_{dn}) or the Community Noise Equivalent Level (CNEL).

In addition to the energy-average level, it is often desirable to know the acoustic range of the noise source being measured. This range is indicated through the maximum L_{eq} (L_{max}) and minimum L_{eq} (L_{min}). These values represent the root-mean-square maximum and minimum noise levels measured during the monitoring interval. The L_{min} value obtained for a particular monitoring location is often called the acoustic floor for that location.

To describe the time-varying character of environmental noise, the statistical or percentile noise descriptors L_{10}, L_{50}, and L_{90} may be used. These descriptors are the noise levels equaled or exceeded during 10 percent, 50 percent, and 90 percent of the measured time interval. Sound levels associated with L_{10} typically describe transient or short-term events, such as car and truck pass-bys. Sound levels are higher than this value only 10 percent of the measurement time. L_{50} represents the median sound level during the measurement interval. Levels will be above and below this value exactly one-half of the measurement time. L_{90} is the sound level exceeded 90 percent of the time, and is therefore often used to describe ambient noise conditions because it typically represents generators of continuous sound and the aggregate of distant background environmental noise. For this reason, L_{90} is a key criterion metric used by the CEC to define noise during the quietest periods of the day and night.

The Day-Night or L_{dn} represents the average sound level for a 24-hour day, and is calculated from the L_{eq} by adding a 10 dB penalty to sounds that occur during the night period (10:00 p.m. to 7:00 a.m.). The L_{dn} is the descriptor of choice for nearly all federal, state, and local agencies throughout the United States to define acceptable land use compatibility with respect to noise.

Within the state of California, the CNEL is sometimes used. CNEL is similar to L_{dn}, except that an additional 5 dB penalty is applied to sounds that occur during the evening hours (7:00 p.m. to 10:00 p.m.). Because of the time-of-day penalties associated with the L_{dn} and CNEL descriptors, the L_{dn} or CNEL dBA value for a continuously operating sound source during a 24-hour period will be numerically greater than the dBA value of the 24-hour L_{eq}. Thus, for a continuously operating noise source producing a constant noise level operating for periods of 24 hours or more, the L_{dn} will be 6 dB higher than the L_{eq} value. To provide a frame of reference, common sound levels are presented in Table 5.5-1, Sound Levels of Typical Noise Sources and Noise Environments (A-Weighted Sound Levels).

Table 5.5-1
Sound Levels of Typical Noise Sources and Noise Environments
(A-Weighted Sound Levels)

Noise Source (at Given Distance)	Scale of A-weighted Sound Level in Decibels	Noise Environment	Human Judgment of Noise Loudness (Relative to a Reference Loudness of 70 Decibels*)
Military Jet Take-off with After-burner (50 feet)	140	Carrier Flight Deck	–
(Civil Defense Siren (100 feet)	130	–	–
Commercial Jet Take-off (200 feet)	120	–	**Threshold of Pain** *32 times as loud
Pile Driver (50 ft)	110	Rock Music Concert	*16 times as loud
Ambulance Siren (100 feet) Newspaper Press (5 feet) Power Lawn Mower (3 feet)	100	–	**Very Loud** *8 times as loud
Propeller Plane Flyover (1,000 feet) Diesel Truck, 40 mph (50 feet) Motorcycle (25 feet)	90	Boiler Room Printing Press Plant	*4 times as loud
Garbage Disposal (3 feet)	80	High Urban Ambient Sound	*2 times as loud
Passenger Car, 65 mph (25 feet) Living Room Stereo (15 feet) Vacuum Cleaner (3 feet)	70	–	**Moderately Loud** *70 dBs (Reference Loudness)
Air Conditioning Unit (100 feet) Normal Conversation (5 feet)	60	Data Processing Center Department Store	*1/2 as loud
Light Traffic (100 feet)	50	Private Business Office	*1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban Ambient Sound	**Quiet** *1/8 as loud
Soft Whisper (5 feet)	30	Quiet Bedroom	Very Quiet
	20	Recording Studio	
	10	–	Extremely Quiet
	0	–	Threshold of Hearing

Source: Compiled by URS from various published sources and widely used references such as Harris, 1998; Berger, 2004; and Beranek, 1988.

Notes:
– = no specific noise environment identified
mph = miles per hour

5.5.1.3 Existing Conditions

Project Site Description

The Project Site is located on a 473-acre tract in unincorporated Kern County at an approximate latitude of 35°19'50" North and longitude 119°23'12" West. Land uses adjacent to the Project Site consist of Adohr Road and agricultural uses to the north; Tupman Road, agricultural uses, and other land use to the east; agricultural uses and an irrigation canal to the south; and a residence, structures (used for grain storage and organic fertilizer production), agricultural uses, and the Dairy Road right-of-way (ROW) to the west-northwest. The western border of the Tule Elk State Natural Reserve is located approximately 1,700 feet to the east of the Project Site. The Kern River and California Aqueduct are located south of the Project Site. A small number of noise-sensitive residential receptors are located approximately 0.5 to 2.0 miles from the Project Site, and are comprised of widely scattered farmhouses. The nearest single-family residences are located approximately 370 feet to the northwest, and 1,400 feet to the east of the Project Site. There are no hospitals, libraries, schools, places of worship, or other facilities where quiet is an important attribute within this area.

Ambient Noise Level Survey

An ambient noise level survey was conducted March 2 through March 4, 2009 in the vicinity of the Project Site. Additional data were collected on April 28, 2009. The purpose of the survey was to quantify noise exposure in the project environs, with emphasis on locations of noise-sensitive receivers that may be impacted by project construction, operation, or project-related transportation. The survey consisted of three long-term (greater than 25-hours continuous data) (denoted as “LT”) and six short-term measurement locations (denoted as “ST”). Short-term measurements included two consecutive ten-minute measurements at each location during the day (7:00 a.m. – 7:00 p.m.), evening (7:00 p.m. – 10:00 p.m.) and night (10:00 p.m. – 7:00 a.m.). The selected measurement sites consisted of noise-sensitive receivers located near the Project Site, or along the primary transportation corridor, and one site located along a proposed linear route for the purpose of assessing potential construction-related impacts. The selected sites are considered to be representative of the ambient noise environment in the vicinity of the Project. Short-term measurements at each long-term measurement site were conducted in order to verify the accuracy of long-term measurement data, and to document ambient noise sources particular times of the day, evening, and night. Field measurement data sheets can be found in Appendix K-1.

LT1/ST1: This location is approximately 480 feet northwest of the Project Site’s nearest boundary, 3,400 feet northwest of the center of the Project Site, and is representative of the nearest noise sensitive receptor. There are two residences located near the measurement site, consisting of one single-family residence and a mobile home. Long-term measurements were conducted near the east residence (mobile home). Noise levels at this location are representative of ambient noise levels at both residences. Long-term noise monitoring at LT1 was conducted from 2:00 a.m. on March 3, 2009 until 3:00 a.m. on March 4, 2009.

The hourly L_{eq} values at LT1 ranged from 35 dBA to 58 dBA. The average hourly L_{eq} was 49 dBA. The hourly L_{90} values ranged from 26 dBA to 52 dBA and the average hourly L_{90} over the period was 40 dBA. The lowest average L_{90} over a consecutive 4-hour period for the entire 25-hour measurement was from 2:00 a.m. until 6:00 a.m. The average L_{90} during that period was 31 dBA. Table 5.5-2 displays the results of the measurements from LT1.

Table 5.5-2
25-Hour Sound Level Measurement at LT1
(dBA)

Date and Time (Hour-Ending)	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
3/3/09 3:00	34.6	53.4	27.3	33.4	30.5	28.8
3/3/09 4:00	37.2	51.9	27.1	38.7	31.4	29.3
3/3/09 5:00	40.0	54.3	28.1	44.3	33.5	30.2
3/3/09 6:00	43.2	59.7	32.4	47.2	38.1	35.2
3/3/09 7:00	56.2	76.7	36.1	58.8	51.7	43.5
3/3/09 8:00	56.7	77.3	45.8	58.8	54.3	49.8
3/3/09 9:00	53.3	66.5	45.6	55.5	51.5	48.7
3/3/09 10:00	57.1	76.6	47.6	57.9	54.3	51.3
3/3/09 11:00	54.1	76.3	38.9	55.6	50.2	45.3
3/3/09 12:00	54.0	72.7	40.1	57.2	50.9	45.7
3/3/09 13:00	46.8	60.9	34.3	49.6	44.9	40.8
3/3/09 14:00	53.6	66.0	38.1	56.6	52.4	47.1
3/3/09 15:00	54.6	66.9	39.8	57.3	53.2	48.0
3/3/09 16:00	56.5	64.8	35.5	60.1	54.8	48.5
3/3/09 17:00	58.3	66.3	42.1	62.0	57.0	50.2
3/3/09 18:00	56.7	81.8	36.2	60.2	53.8	42.9
3/3/09 19:00	45.3	61.2	25.7	49.8	35.5	27.8
3/3/09 20:00	37.0	55.5	24.3	41.7	29.6	26.4
3/3/09 21:00	50.1	59.4	35.2	53.5	48.6	39.8
3/3/09 22:00	49.9	61.3	36.9	53.4	47.9	42.6
3/3/09 23:00	54.8	73.8	40.1	58.8	50.5	45.0
3/4/09 0:00	54.1	65.3	42.4	57.2	52.8	46.2
3/4/09 1:00	44.8	53.5	38.0	47.6	43.6	40.5
3/4/09 2:00	38.3	53.5	28.0	41.2	35.2	29.8
3/4/09 3:00	40.6	55.9	28.4	44.1	37.3	30.6

Source: URS Corporation, 2009.

Notes:
Measurements conducted on March 3 and 4, 2009.
Measurement Location: N 35°20'18.8", W 119°23'32.4"
Community Noise Equivalent Level = 58 dBA.
º = degrees
' = minutes
" = seconds
dBA = A-weighted sound pressure level
L_{10} = noise levels equaled or exceeded 10 percent of a stated time
L_{50} = noise levels equaled or exceeded 50 percent of a stated time
L_{90} = noise levels equaled or exceeded 90 percent of a stated time
L_{EQ} = Equivalent Sound Level
L_{MAX} = root-mean-square maximum noise level
L_{MIN} = root-mean-square minimum noise levels
N = north
W = west

Six short-term measurements were completed at this location with two 10-minute measurements occurring consecutively during daytime hours, evening hours and nighttime hours. The average daytime L_{eq} at ST1 was 43 dBA, and the average daytime L_{90} was 37 dBA. The average evening L_{eq} at ST1 was 46 dBA, and the average evening L_{90} was 41 dBA. The average nighttime L_{eq} at ST1 was 32 dBA, and the average nighttime L_{90} was 28 dBA. Noise sources during the short-term surveys consisted of distant traffic noise, barking dogs, birds, aircraft, agricultural equipment, and farm animals. ST1 sound-level measurement data are displayed in Table 5.5-3.

Table 5.5-3
Short-Term Sound Level Measurements at ST1
(dBA)

Date and Measurement Ending Time (10-minute Measurements)	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
3/2/09 23:11	29.8	48.8	25.4	31.3	28.5	27.1
3/2/09 23:22	34.5	52.2	26.4	36.3	32.1	29.2
3/3/09 12:14	43.8	57.3	34.3	46.2	41.3	38.2
3/3/09 12:25	42.4	52.7	31.0	45.4	41.3	36.6
3/3/09 21:20	45.8	61.4	37.2	49.0	44.2	40.5
3/3/09 21:31	46.5	57.4	38.4	49.2	44.9	42.0

Source: URS Corporation, 2009.

Notes:
Measurements conducted on March 2 and 3, 2009.
Measurement Location: N 35°20'18.8", W 119°23'32.4"
º = degrees
' = minutes
" = seconds
dBA = A-weighted sound pressure level
L_{10} = noise levels equaled or exceeded 10 percent of a stated time
L_{50} = noise levels equaled or exceeded 50 percent of a stated time
L_{90} = noise levels equaled or exceeded 90 percent of a stated time
L_{EQ} = Equivalent Sound Level
L_{MAX} = root-mean-square maximum noise level
L_{MIN} = root-mean-square minimum noise levels
N = north
W = west

LT2/ST2: The LT2/ST2 location is approximately 1,400 feet northeast of the Project Site and 4,500 feet northeast of the center of the Project Site. There are two single-family residences located at this measurement site. Long-term measurements were conducted on the northwestern side of the residence (closest to the proposed project). Long-term noise monitoring at LT2 was conducted from 6:00 p.m. on March 2, 2009 until 7:00 p.m. on March 3, 2009.

The hourly L_{eq} values at LT2 ranged from 42 dBA to 61 dBA. The average hourly L_{eq} was 52 dBA. The hourly L_{90} values ranged from 25 dBA to 37 dBA, and the average hourly L_{90} over the period was 29 dBA. The lowest average L_{90} over a consecutive 4-hour period for the entire 25-hour measurement was from 1:00 a.m. until 5:00 a.m. The average L_{90} during that period was 30 dBA. Table 5.5-4 displays the measurement results at LT2.

Table 5.5-4
25-Hour Sound Level Measurement at LT2
(dBA)

Date and Time (Hour-Ending)	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
3/2/09 19:00	50.8	74.9	26.8	42.0	32.6	28.8
3/2/09 20:00	49.7	73.2	26.1	41.9	31.7	27.9
3/2/09 21:00	48.6	71.8	23.6	34.6	27.9	25.5
3/2/09 22:00	47.7	72	23.8	39.0	29.4	25.8
3/2/09 23:00	46.4	71.8	24.5	48.6	37.5	26.2
3/3/09 0:00	45.8	72.4	28.3	47.1	35.0	30.3
3/3/09 1:00	45.5	72.8	32.5	38.4	35.6	33.7
3/3/09 2:00	41.9	69.2	30.3	35.4	33.3	32.0
3/3/09 3:00	46.7	72.8	25.5	35.3	30.5	27.8
3/3/09 4:00	51.3	79.0	28.3	35.1	31.6	30.0
3/3/09 5:00	51.5	75.2	28.6	49.9	43.3	31.6
3/3/09 6:00	58.2	80.4	30.6	56.9	43.4	34.4
3/3/09 7:00	60.6	78.4	31.4	62.0	45.8	35.6
3/3/09 8:00	53.8	76.0	32.5	51.7	43.1	37.2
3/3/09 9:00	55.4	84.0	29.4	45.4	38.5	33.6
3/3/09 10:00	53.8	76.9	27.4	45.7	34.9	30.3
3/3/09 11:00	51.7	74.5	26.0	48.6	32.4	28.0
3/3/09 12:00	54.0	79.0	26.9	43.9	31.7	28.5
3/3/09 13:00	54.3	76.9	26.2	49.0	31.5	27.8
3/3/09 14:00	52.5	72.7	26.1	46.7	32.1	28.2
3/3/09 15:00	56.2	86.2	27.7	41.0	32.8	29.0
3/3/09 16:00	59.6	77.9	24.7	57.8	33.8	27.5
3/3/09 17:00	57.8	78.3	24.1	55.6	33.4	25.8
3/3/09 18:00	57.8	80.3	23.3	57.1	36.0	25.3
3/3/09 19:00	57.2	85.7	23.0	46.0	32.1	25.2

Source: URS Corporation, 2009.

Notes:
Measurements conducted on March 2 and 3, 2009.
Measurement Location: N 35°19'58.7", W 119°22'21.0"
Community Noise Equivalent Level = 61 dBA
º = degrees
' = minutes
" = seconds
dBA = A-weighted sound pressure level
L_{10} = noise levels equaled or exceeded 10 percent of a stated time
L_{50} = noise levels equaled or exceeded 50 percent of a stated time
L_{90} = noise levels equaled or exceeded 90 percent of a stated time
L_{EQ} = Equivalent Sound Level
L_{MAX} = root-mean-square maximum noise level
L_{MIN} = root-mean-square minimum noise levels
N = north
W = west

Six short-term measurements were completed with two 10-minute measurements occurring consecutively during daytime, evening, and nighttime hours. The average daytime L_{eq} at ST2 was 50 dBA, and the average daytime L_{90} was 26 dBA. The average evening L_{eq} at ST2 was 53 dBA, and the average evening L_{90} was 41 dBA. The average nighttime L_{eq} at ST2 was 48 dBA, and the average nighttime L_{90} was 34 dBA. Audible noise sources during the short-term noise measurements consisted of distant traffic, wildlife, and aircraft. ST2 sound-level measurement data are displayed in Table 5.5-5.

Table 5.5-5
Short-Term Sound Level Measurements at ST2
(dBA)

Date and Measurement Ending Time (10-minute Measurements)	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
3/3/09 0:10	42.4	61.5	32.2	37.1	35.3	34.0
3/3/09 0:21	52.5	79.4	31.9	39.4	35.7	33.9
3/3/09 13:24	51.4	72.4	24.8	44.0	29.2	26.6
3/3/09 13:41	48.0	75.2	24.2	36.6	28.7	25.9
3/3/09 20:22	53.4	75.1	38.5	55.8	48.3	43.0
3/3/09 20:33	52.5	73.5	33.7	52.8	44.4	38.9

Source: URS Corporation, 2009.

Notes:
Measurements conducted on March 3, 2009.
Measurement Location: N 35°19'58.7", W 119°22'21.0"
° = degrees
' = minutes
" = seconds
dBA = A-weighted sound pressure level
L_{10} = noise levels equaled or exceeded 10 percent of a stated time
L_{50} = noise levels equaled or exceeded 50 percent of a stated time
L_{90} = noise levels equaled or exceeded 90 percent of a stated time
L_{EQ} = Equivalent Sound Level
L_{MAX} = root-mean-square maximum noise level
L_{MIN} = root-mean-square minimum noise levels
N = north
W = west

LT3/ST3: This location is approximately 5,400 feet northeast of the Project Site's nearest boundary, and 9,900 feet northeast of the center of the Project Site. The primary purpose for this location is to determine existing noise levels along Stockdale Highway. The site is located 15 feet south of Stockdale Highway (23 feet south of the highway centerline), approximately 4,400 feet west of Morris Road. Short-term measurements were completed at the same location as LT3. Long-term noise monitoring at LT3 was conducted from 7:00 p.m. on March 2, 2009 until 8:00 p.m. on March 3, 2009.

The hourly L_{eq} values at LT3 ranged from 50 dBA to 69 dBA. The average hourly L_{eq} was 62 dBA. The hourly L_{90} values ranged from 28 dBA to 46 dBA, and the average hourly L_{90} over the period was 35 dBA. The lowest average L_{90} during a consecutive 4-hour period for the entire 25-hour measurement lasted from 7:00 p.m. until 11:00 p.m. The average L_{90} over that time-period was 30 dBA. Table 5.5-6 displays the long-term measurement results from LT3.

Table 5.5-6
25-Hour Sound Level Measurement at LT3
(dBA)

Date and Time (Hour-Ending)	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
3/2/09 20:00	59.4	86.0	28.9	52.9	38.8	32.4
3/2/09 21:00	55.4	81.9	27.1	38.7	34.9	31.4
3/2/09 22:00	58.8	85.0	24.0	45.6	32.7	27.5
3/2/09 23:00	60.5	85.9	27.0	51.2	37.4	29.9
3/3/09 0:00	56.7	86.1	31.4	45.9	41.6	35.1
3/3/09 1:00	50.2	77.6	37.5	48.1	44.0	40.0
3/3/09 2:00	53.6	79.9	38.7	47.4	44.2	41.8
3/3/09 3:00	51.7	79.8	31.2	43.6	39.1	34.7
3/3/09 4:00	55.9	85.4	31.6	41.4	38.9	37.0
3/3/09 5:00	60.6	83.0	36.6	54.4	42.4	38.7
3/3/09 6:00	68.7	85.1	38.4	72.9	53.3	45.7
3/3/09 7:00	68.8	84.3	35.0	73.5	50.7	39.4
3/3/09 8:00	65.5	85.5	36.3	63.0	45.1	39.3
3/3/09 9:00	64.4	86.3	31.9	61.0	42.4	34.5
3/3/09 10:00	66.6	88.1	31.4	63.0	41.0	35.0
3/3/09 11:00	65.2	88.9	32.2	60.4	38.2	33.9
3/3/09 12:00	66.5	87.2	32.4	62.8	38.5	34.4
3/3/09 13:00	64.8	86.6	31.4	59.1	37.0	32.7
3/3/09 14:00	65.6	86.9	32.9	60.9	38.6	35.2
3/3/09 15:00	64.8	86.8	30.7	62.0	38.3	35.3
3/3/09 16:00	68.6	85.3	30.9	71.4	42.9	33.5
3/3/09 17:00	69.1	86.9	30.6	72.8	46.3	33.9
3/3/09 18:00	68.0	87.4	26.7	70.2	46.1	33.2
3/3/09 19:00	65.0	87.6	26.0	59.0	36.9	29.2
3/3/09 20:00	60.5	82.9	25.0	50.9	37.5	28.3

Source: URS Corporation, 2009.

Notes:
Measurements conducted on March 2 and 3, 2009.
Measurement Location: N 35°21'17.2", W 119°22'24.5"
Community Noise Equivalent Level = 70 dBA.
º = degrees
' = minutes
" = seconds
dBA = A-weighted sound pressure level
L_{10} = noise levels equaled or exceeded 10 percent of a stated time
L_{50} = noise levels equaled or exceeded 50 percent of a stated time
L_{90} = noise levels equaled or exceeded 90 percent of a stated time
L_{EQ} = Equivalent Sound Level
L_{MAX} = root-mean-square maximum noise level
L_{MIN} = root-mean-square minimum noise level
N = north
W = west

Six short-term measurements were completed with two consecutive 10-minute measurements occurring during daytime, evening, and nighttime hours. The average daytime L_{eq} at ST3 was 65 dBA, and the average daytime L_{90} was 35 dBA. The average evening L_{eq} at ST3 was 56 dBA, and the average evening L_{90} was 25 dBA. The average nighttime L_{eq} at ST3 was 59 dBA, and the average nighttime L_{90} was 30 dBA. Short-term sound-level measurement data from ST3 are displayed in Table 5.5-7.

Table 5.5-7
Short-Term Sound Level Measurements at ST3
(dBA)

Date and Measurement Ending Time (10-minute Measurements)	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
3/2/09 22:33	55.5	80.7	27.6	47.8	31.4	29.8
3/2/09 22:49	63.3	88.7	27.5	54.2	34.8	30.4
3/3/09 14:45	65.9	85.9	32.8	65.1	40.0	34.7
3/3/09 14:58	64.4	82.8	32.3	61.6	38.6	34.7
3/3/09 19:12	52.5	76.2	24.0	45.5	28.6	25.3
3/3/09 19:25	58.5	79.8	23.2	54.9	29.2	24.9

Source: URS Corporation, 2009.

Notes:
Measurements conducted on March 2 and 3, 2009.
Measurement Location: N 35°21'17.2", W 119°22'24.5"
º = degrees
' = minutes
" = seconds
dBA = A-weighted sound pressure level
L_{10} = noise levels equaled or exceeded 10 percent of a stated time
L_{50} = noise levels equaled or exceeded 50 percent of a stated time
L_{90} = noise levels equaled or exceeded 90 percent of a stated time
L_{EQ} = Equivalent Sound Level
L_{MAX} = root-mean-square maximum noise level
L_{MIN} = root-mean-square minimum noise level
N = north
W = west

ST4: ST4 is located approximately 3,550 feet east of the Project Site's nearest boundary, and 6,600 feet east of the center of the Project Site, at the northern extent of the Tule Elk State Natural Reserve. Short-term ambient noise-level measurements were completed along Station Road near the Tule Elk State Natural Reserve. Short-term ambient noise-level measurements were completed on March 2 and 3, 2009. Six short-term measurements were completed with two 10-minute measurements occurring back-to-back during daytime hours, evening hours, and nighttime hours. Weather conditions, including gusty winds, had an adverse effect on the original night-time ambient measurement results. An additional 1-hour-and-15-minute short-term ambient noise level measurement was completed on April 28, 2009 during weather conditions acceptable for noise measurements.

Table 5.5-8 displays the results of all of the ambient noise-level measurements completed at ST4. The results from the April 28, 2009 noise measurement are the results that are used in the analysis phase of the proposed Project. The L_{eq} was 41 dBA, and the L_{90} was 37 dBA.

Table 5.5-8
Short-Term Sound Level Measurements at ST4
(dBA)

Date and Measurement Ending Time	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
3/3/09 13:59	51.4	73.8	27.3	38.7	31.4	29.2
3/3/09 14:11	51.3	75.9	26.5	34.1	29.8	28.4
3/3/09 19:49	33.4	55.4	23.4	35.7	31.3	27.4
3/3/09 20:03	48.0	71.2	29.6	44.1	36.0	32.7
4/28/09 2:00*	41.1	56.2	33.6	43.4	39.9	36.9

Source: URS Corporation, 2009.

Notes:
Measurements conducted on March 2 and 3, 2009 and April 28, 2009.
Measurements conducted on March 2 and 3, 2009 are 10 minutes in length
*Measurement conducted on April 28, 2009 is 1 hour and 15 minutes in length
Measurement Location: N 35°20'00.3", W 119°21'55.0"
º = degrees
' = minutes
" = seconds
dBA = A-weighted sound pressure level
L_{10} = noise levels equaled or exceeded 10 percent of a stated time
L_{50} = noise levels equaled or exceeded 50 percent of a stated time
L_{90} = noise levels equaled or exceeded 90 percent of a stated time
L_{EQ} = Equivalent Sound Level
L_{MAX} = root-mean-square maximum noise level
L_{MIN} = root-mean-square minimum noise level
N = north
W = west

ST5: This location is approximately 3,000 feet southeast of the Project boundary and 5,000 feet southeast of the center of the Project Site, in the vicinity of a single-family residence. Short-term ambient noise-level measurements were completed along Tupman Road near the residence. Measurements were not conducted at the residence due to the presence of domestic animals. Short-term ambient noise-level measurements were completed on March 3, 2009. Six short-term measurements were completed with two consecutive 10-minute measurements conducted during daytime, evening, and nighttime hours. Adverse weather conditions, including gusty winds, had an effect on the original nighttime ambient measurement results. An additional 1-hour-and-15-minute short-term ambient noise-level measurement was completed on April 28, 2009 in weather conditions acceptable for noise measurements.

Table 5.5-9 displays the results of all of the ambient noise-level measurements completed at ST5. The results from the April 28, 2009 noise measurement are the results that are used in the analysis phase of the proposed Project. The L_{eq} was 62 dBA, and the L_{90} was 33 dBA.

Table 5.5-9
Short-Term Sound Level Measurements at ST5
(dBA)

Date and Measurement Ending Time	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
3/3/09 15:24	57.3	82.4	21.2	47.9	27.7	23.5
3/3/09 15:35	62.8	83.1	21.0	59.0	38.9	24.5
3/3/09 20:49	55.0	79.8	29.5	49.0	38.9	34.2
3/3/09 21:00	38.5	52.0	27.2	41.9	36.2	31.9
4/28/09 2:00*	61.7	93.1	29.5	43.3	36.6	33.0

Source: URS Corporation, 2009.

Notes:
Measurements conducted on March 3, 2009 and April 28, 2009.
Measurements conducted on March 3, 2009 are 10 minutes in length
*Measurement conducted on April 28, 2009 is 1 hour and 15 minutes in length
Measurement Location: N 35°19'09.8", W 119°22'36.6"
º = degrees
' = minutes
" = seconds
dBA = A-weighted sound pressure level
L_{10} = noise levels equaled or exceeded 10 percent of a stated time
L_{50} = noise levels equaled or exceeded 50 percent of a stated time
L_{90} = noise levels equaled or exceeded 90 percent of a stated time
L_{EQ} = Equivalent Sound Level
L_{MAX} = root-mean-square maximum noise level
L_{MIN} = root-mean-square minimum noise level
N = north
W = west

ST6: This location is approximately 10,500 feet northwest of the Project Site and 13,300 feet northwest of the center of the Project Site. Short-term ambient noise-level measurements were completed during daytime hours along Freeborn Road near a single-family residence. Two consecutive short-term 10-minute ambient noise-level measurements were completed on March 3, 2009. Sound-level measurements were completed at ST6 because of daytime construction of linears taking place in the vicinity of residences located on Freeborn Road.

Table 5.5-10 displays the results of both of the short-term ambient noise-level measurements completed at ST6. The average L_{eq} from the two measurements was 60 dBA, and the L_{90} was 24 dBA.

Table 5.5-10
Short-Term Sound Level Measurements at ST6
(dBA)

Date and Measurement Ending Time	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
3/3/09 16:00	35.2	51.2	24.7	39.1	30.9	28.0
3/3/09 16:12	30.1	46.7	22.5	33.3	28.3	24.9

Source: URS Corporation, 2009.
Notes:
Measurements conducted on March 3, 2009.
Measurements conducted on March 3, 2009 are 10 minutes in length
Measurement Location: N 35°20'36.3", W 119°25'44.8"
º = degrees
' = minutes
" = seconds
dBA = A-weighted sound pressure level
L_{10} = noise levels equaled or exceeded 10 percent of a stated time
L_{50} = noise levels equaled or exceeded 50 percent of a stated time
L_{90} = noise levels equaled or exceeded 90 percent of a stated time
L_{EQ} = Equivalent Sound Level
L_{MAX} = root-mean-square maximum noise level
L_{MIN} = root-mean-square minimum noise level
N = north
W = west

Meteorological Conditions

Weather conditions appropriate for outdoor noise measurement existed on March 2, 2009. Evening temperatures averaged 70 degrees Fahrenheit (°F). The average relative humidity was 56 percent. The average wind speed was 1 to 2 miles per hour. Nighttime temperatures averaged 65°F. The average wind speed was 1 to 2 miles per hour. The average relative humidity was 53 percent.

Weather conditions appropriate for outdoor noise measurement existed during the daytime and evening on March 3, 2009. During the daytime, the temperature averaged 66°F. The average relative humidity was 40 percent. Winds were calm. During evening hours on March 3, 2009, the average temperature was 72°F. The average relative humidity was 40 percent. The average wind speed was 2.5 miles per hour.

Weather conditions not suitable for outdoor noise measurement were encountered during nighttime measurements on March 3, 2009. Wind speeds averaged 11 miles per hour with gusts to 18 miles per hour. These conditions exceeded the wind conditions necessary for accurate noise measurements. Nighttime temperatures averaged 70°F. The average relative humidity was 40 percent.

Additional measurements were made at noise-sensitive receptor sites ST4 and ST5 on April 28, 2009 under weather conditions more acceptable for noise measurements. Only nighttime measurements were completed as daytime and evening measurements conducted March 2 and 3, 2009 were conducted under weather conditions acceptable for noise measurements. The average temperature was 50°F. The average relative humidity was 50 percent. Wind speed averaged 2 miles per hour.

Instrumentation

The 25-hour continuous ambient noise level measurements at LT1, LT2, and LT3 were completed using Larson Davis Model 820 American National Standards Institute (ANSI) Type 1 Integrating Sound Level Meters (SLM). The SLMs were calibrated before and after the measurements. The SLMs at LT1 and LT2 were mounted to fences approximately 5 feet above ground in order to simulate the average height of the human ear. The SLM at LT3 was mounted to a telephone pole roughly 5 feet above ground, as well. All short-term measurements were completed using a Bruel and Kjaer Model 2250 ANSI Type 1 Integrating SLM. The sound-level meter was mounted on a tripod roughly 5 feet above ground. The sound level meter was calibrated before and after the measurements. Certification of calibration for all meters and the Larson Davis CAL200 that was used to calibrate all sound level meters is provided in Appendix K-1. All SLMs were equipped with windscreens during the measurement periods.

5.5.1.4 Local Land Use and Noise Sources

The area surrounding the Project Site is comprised primarily of agricultural uses. Land uses adjacent to the Project Site consist of Adohr Road and agricultural uses to the north; Tupman Road, agricultural uses, and other land use to the east; agricultural uses and an irrigation canal to the south; and a residence, structures (used for grain storage and organic fertilizer production), agricultural uses, and the Dairy Road ROW to the west/northwest. The western border of the Tule Elk State Natural Reserve is located approximately 1,700 feet to the east of the Project Site. The Kern River and California Aqueduct are located south of the Project Site. A small number of noise-sensitive residential receptors are located approximately 0.5 to 2.0 miles from the Project Site, and are comprised of widely scattered farmhouses. The nearest single-family residences are located approximately 370 feet to the northwest and 1,400 feet to the east of the Project Site.

The primary noise sources at LT1 were noises associated with residential activity, including dogs, wildlife including birds, and intermittent vehicular traffic. The primary noise source at LT2 was traffic along Station Road, and the primary noise source at LT3 was traffic along Stockdale Highway. No operations of agricultural equipment were noted during the measurement period, and wildlife activity, other than birds, was minimal. Due to the limited activity, the documented noise levels are considered to be representative of the quietest annual periods.

5.5.1.5 Noise Level Design Goals

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and that such impacts be eliminated or mitigated to the extent feasible. Section XI of Appendix G of CEQA Guidelines (California Code Regulations, Title 14, Appendix G) sets forth characteristics that may signal a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1. 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.

2. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

3. Substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

4. Substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

California Energy Commission

The CEC guidelines, in applying item 3 above, state that the area of impact to be studied should include areas where the noise of the project plus the background exceeds the existing background levels by 5 dBA or more at the nearest Noise Sensitive Activity (NSA), including those receptors that are considered a minority population. In previous findings, CEC has considered it reasonable to assume that an increase in background noise levels up to 5 dBA in a residential setting is considered insignificant; an increase of more than 10 dBA in a residential setting is considered significant. For projects where the increase is between 5 and 10 dBA, the level of an impact depends on the particular circumstances of a case. Factors to be considered in determining the significance of an impact for this +5 to +10 dB situation include:

- Resulting noise level;
- Duration and frequency of the noise;
- Number of people affected;
- Land use designation of the affected receptor sites; and
- Public concern or controversy as demonstrated at workshops or hearings, or by correspondence.

Noise due to construction activities is usually considered to be insignificant in terms of CEQA compliance if:

- Construction activity is temporary;
- Use of heavy equipment and noisy activities is limited to daytime hours; and
- All industry-standard noise abatement measures are implemented for noise producing equipment.

CEC uses the above method and threshold to protect the most sensitive populations, including any minority population.

California Department of Transportation (Caltrans)

Based on Federal Highway Administration (FHWA) (23 CFR 772) and California Department of Transportation (Caltrans) (Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects, 2006), traffic noise impacts for new highway construction projects occur when the predicted noise level, in terms of peak-traffic noise hour, approaches the Noise Abatement Criteria (66 dBA for residential areas) or when a substantial noise increase occurs. In the State of California, a substantial noise increase is defined as when the project's predicted worst-hour design-year noise level exceeds the existing worst-hour noise level by 12 dBA.

In identifying traffic noise impacts, primary consideration is given to exterior areas. In situations where there are no exterior activities, or where the exterior activities are far removed from the roadway or physically shielded in a manner that prevents an impact on exterior activities, an interior criterion of 52 dBA is used as the basis for determining noise impacts.

Local

The Noise Element of the Kern County General Plan, Section 3.2, states:

> *Implementation Measures…*
>
> *F) Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB L_{DN} and interior noise levels in excess of 45 dB L_{DN}.*

As discussed in the General Plan, an exterior noise level up to 65 dBA L_{DN} is compatible with residential land uses. Because of the weighting and averaging nature of the L_{DN}, a constant noise source produces an L_{DN} approximately 6 dBA higher than its hourly L_{eq}. Therefore, constant noise sources producing exterior noise levels up to 58 dBA L_{eq} are compatible with residential land uses based, on the Noise Element of the Kern County General Plan.

The Ordinance Code of Kern County has been reviewed, including Section 8.36, Noise Control, and there are no specific noise limits for stationary or temporary construction noise sources that are applicable to the Project. Additional details on the Kern County standards are given in Technical Appendix K-2, Section 5.3; the entire Kern County Noise Element is found in Attachment A to Appendix K-2.

Summary of Design Goals

Operations

Generally, the design basis for noise control is the minimum, or most stringent, noise level required by any of the applicable LORS. Therefore, facility operational noise from this Project is evaluated against the CEC limit, where the Project noise level is considered insignificant if it does not exceed the ambient background noise level (L_{90}) by 5 dB or more at the nearest sensitive receptor, as detailed below.

The ambient background noise levels and the associated Project design noise levels necessary to comply with CEC guidelines are shown in Table 5.5-11.

Table 5.5-11
Receptor Ambient Sound Levels and CEC-Related Design Goals

Noise Sensitive Receptor	Label	Measured, Late-night L_{90} ambient conditions, (dBA)	CEC's Late-Night L_{90} +5 dB Standard, (dBA)
LT1/ST1	Ackerman	31	36
LT2/ST2	Adams	30	35
LT3/ST3	Along Stockdale Highway	30	35
ST4	Tule Elk Reserve	37	42
ST5	Along Tupman Road	33	38
ST6[a]	Freeborne Road	Not applicable	Not applicable

Source: HECA Project, 2009.

Note: This location is representative of the linear facility construction activities. Thus, no nighttime ambient data were obtained here. Given this location's distance from the Project Site, (more than 2 miles), if noise compliance is achieved at the other, closer locations, then compliance would be expected at ST6 also, and the late-night criterion is deemed as not applicable here.

Traffic

Project traffic noise levels will be evaluated according to Caltrans' Traffic Noise Analysis Protocol and the Kern County General Plan. Specifically, a substantial noise increase would occur when the Project's predicted worse-hour design-year noise level exceeds the existing worst-hour noise level by 12 dBA (L_{eq} h) or more.

5.5.2 Environmental Consequences

Noise will be produced during construction of the Project as well as during operation of the compressors, cooling towers, combustion turbines, and auxiliary support equipment. Potential noise impacts from both on-site and off-site activities are assessed in this section.

5.5.2.1 Construction Noise

Main Facility Construction

The construction schedule has been estimated on a single-shift, 5-day basis, beginning at 6 a.m. Monday through Friday. Additional hours and/or a second shift may be necessary to make up schedule deficiencies or to complete critical construction activities. During Project startup and testing, some activities may continue up to 24 hours per day, 7 days per week. The construction process for the Project will be expected to generate noise during the following phases:

- Site Preparation
- Excavation
- Foundation Placement
- Project and Building Construction
- Exterior Finish and Cleanup

Equipment used during the construction process will differ from phase to phase. In general, heavy equipment (bulldozers, dump trucks, and concrete mixers) will be used during excavation and concrete-pouring activities. Most other phases involve the delivery and erection of the equipment and building components. The installation of piles (driven, augered, or vibrated) for some foundations may be needed on the Project, but insufficient information is available at this stage of Project development to ascertain what type of piling may be employed.

Noise levels of construction equipment typically used for this type of project are presented in Table 5.5-12, Individual Equipment Noise Levels Generated by Project Construction. The equipment presented herein is not used in every phase of construction. Further, equipment used is not generally operated continuously, nor is the equipment necessarily operated simultaneously.

Table 5.5-12
Individual Equipment Noise Levels Generated by Project Construction

Equipment Type	Equip-ment Noise Level at 50 feet, dBA	Estimated Equipment Noise Level at Each Receptor Location[a], dBA					
		LT1/ST1 (480 feet [0.09 mi] NW of Project)	LT2/ST2 (1,400 feet [0.27mi] E of Project)	LT3/ST3 (5,400 feet [1.02 mi] NNE of Project)	ST4 (3,550 feet [0.67 mi] E of Project)	ST5 (3,000 feet [0.57 mi] SE of Project)	ST6 (10,500 fee t [1.99 mi] WNW of Project)
		Atten[b]= 20 dB	Atten[b]= 29 dB	Atten[b]= 42 dB	Atten[b]= 38 dB	Atten[b]= 37 dB	Atten[b]= 47 dB
Trucks	88	68	59	46	50	51	41
Crane	83	63	54	41	45	46	36
Roller	74	54	45	32	36	37	27
Bulldozers	85	65	56	43	47	48	38
Pickup Trucks	60	40	31	18	22	23	13
Backhoes	80	60	51	38	42	43	33
Jack Hammers	88	68	59	46	50	51	41
Pile Drivers	101	81	72	59	63	64	54
Rock Drills	98	78	69	56	60	61	51
Pneumatic Tools	85	65	56	43	47	48	38
Air Compressor	81	61	52	39	43	44	34
Compactor	82	62	53	40	44	45	35
Grader	85	65	56	43	47	48	38
Loader	85	65	56	43	47	48	38

Sources: USEPA, 1971; FTA, 2006; and HECA Project, 2009.

Notes:

[a] Distances shown are from the nearest site boundary line to each receptor structure (not necessarily the same as the representative monitoring location). This analysis assumes that an example piece of any given type of construction equipment could be, as a worst case, at or near any site boundary line during the various Project construction phases.

[b] This is the attenuation due to distance for sound propagating from 50 feet from each equipment type to the nearest indicated receptor location.

Project Site average sound levels for each phase of construction (from USEPA 1971, FTA 2006, and HECA Project 2009) are presented in Table 5.5-13, Aggregate Estimated Noise Levels Generated by Phase for the Project Construction Activities. This analysis takes into account the expected number of construction equipment items, their nominal usage factors, and the average sound emissions factor for each. The highest site-average sound levels (89 to 91 dBA) are associated with Foundation and Site Clearing phases of the construction schedule[2].

Table 5.5-13
Aggregate Estimated Noise Levels Generated by Phase for the Project Construction Activities

Construction Phase	Aggregate Activity Level at 50 feet, dBA	Estimated Construction Activity Noise Level at Each Receptor Location[a], Leq/L_{dn}[b]dBA					
		LT1=ST1 (3,420 feet [0.65 mi] NW of Project)	LT2=ST2 (4,490 feet [0.85mi] E of Project)	LT3=ST3 (9,870 feet [1.9 mi] NNE of Project)	ST4 (6,610 feet [1.3 mi] E of Project)	ST5 (5,010 feet [0.95 i] SE of Project)	ST6 (13,340 f eet [2.5 mi] WNW of Project)
		Atten[c]= 37 dB	*Atten[c]= 39 dB*	*Atten[c]= 46 dB*	*Atten[c]= 42 dB*	*Atten[c]= 40 dB*	*Atten[c]= 49 dB*
Site Clearing	91	54/60	52/58	45/51	49/55	51/57	42/48
Excavation	83	46/52	44/50	37/43	41/47	43/49	34/40
Foundation	89	52/58	50/56	43/49	47/53	49/55	40/46
Pile Installation[d]	101	64/70	62/68	55/61	59/65	61/67	52/58
Building Construction	80	43/49	41/47	34/40	38/44	40/46	31/37
Finishing	60	23/29	21/27	14/20	18/24	20/26	11/17

Sources: USEPA, 1971; FTA, 2006; and HECA Project, 2009.

Notes:

[a] Distances shown are from the Project construction activity centroid to each receptor location. This analysis, which differs from the equipment analysis, assumes that the aggregation of construction equipment for each phase will predominantly be at the centroid of the Project Site during the overall construction schedule. Note that the size of the Project Site provides additional distance attenuation benefits to each receptor location.

[b] An L_{DN} calculation was made by adding 6 dB to the receptor L_{eq} value under the very unlikely worst-case premise of 24-hour construction at a constant level of activity. See also Section 2.10 for further information on Project Construction.

[c] This is the attenuation due to distance for sound propagating from 50 feet from each phase's equipment aggregation to the nearest indicated receptor location. Note that this analysis only considers spherical spreading loss, and no other attenuation effects.

[d] Pile installation is a subset of the Foundation Phase and would only be expected to last 4 to 6 months within the overall Foundation Construction Phase. For conservative analysis, the worst-case, impact-type pile driving was assumed.

The noise levels presented in Tables 5.5-12 and 5.5-13 use the equipment-specific and phase-aggregate sound levels, respectively, at 50 feet from the construction activity to predict the noise levels at the nearest noise-sensitive receptor locations that surround the Project Site. Noise associated with the construction of the Project will be attenuated by a variety of mechanisms. The most significant of these is the diversion of the sound waves with distance (attenuation by

[2] Excluding consideration for pile installation which is a short-term sub-set of the Foundation Phase.

divergence). This attenuation mechanism results in a 6 dB decrease in the sound level with every doubling of distance from the source. For example, the 83 dBA average sound level associated with excavation (Table 5.5-13) will be attenuated to 77 dBA at 100 feet, 71 dBA at 200 feet, and 65 dBA at 400 feet. Attenuation for atmospheric absorption, earthen berms, or ground effects were not included in the construction noise analysis to allow for a conservative worst-case analysis. The small number of noise-sensitive receptors in the vicinity of the Project are located approximately 3,400 feet to 2.5 miles from the center of the Project process area, where the predominant amount of future construction activity will be located.

Because of the nature of construction noise, and with common fluctuations in the background noise level, construction activity occasionally would be discernable at the nearest receptors. Given some occasional atmospheric conditions, construction noise could also be discernable at the receptors located farther from the Project Site because of inversion effects. Under certain circumstances, the construction noise could be a source of annoyance to noise-sensitive individuals. Nighttime construction activities are not planned for this Project, but may be needed to meet the construction schedule. However, if nighttime construction is needed, the Project will limit noisy construction activities (particularly pile-driving work) to daytime hours in order to minimize nighttime noise levels to the extent practical.

Given the intermittent and temporary nature of construction activities, potential noise impacts are considered to be less than significant.

Linear Facility Construction

Construction for the majority of the Project-related linear facilities (i.e., the water pipelines and natural gas supply pipeline) will be located farther away from noise-sensitive receptors compared to the Project Site construction. Only the installation of the transmission structures may be located near a few residences. Linear facility construction noise may be audible during the short periods that the linear construction operation is nearest to these receptors. Because of the short-term nature of the linear construction operation, pipeline and transmission line construction noise will be less than significant, and will diminish once the construction operations move away from the individual receptors.

Special Construction Activities

During final construction, a method used to clean piping and testing called “steam blows” creates substantial noise. A steam blow results when high-pressure steam is allowed to escape into the atmosphere through the steam piping to clean the piping. The intent of the steam blows is to heat and sweep the piping systems to remove any debris or fine particles that could damage the steam turbine generator or other equipment. Each steam blow is followed by a cool-down period. The heating and cooling cycles are expected to last 2 or 3 hours each, and will be performed several times daily over a period of 2 or 3 weeks.

Unattenuated steam blows can produce very loud noise levels at the steam discharge/clean-out point. However, for this Project, temporary silencing systems will be employed to minimize these short-term, temporary noise impacts. Typical steam blow silencing should be able to reduce noise levels by 20 dBA to 30 dBA at each receptor location. Table 5.5-14, Estimated, Silenced Steam Blow Noise Levels, summarizes the potential noise levels at each receptor location for this temporary construction activity, including the use of silencers.

Table 5.5-14
Estimated, Silenced Steam Blow Noise Levels

Receptor	Estimated Distance to Future Project Steam Blow[(a)]	Expected, Silenced Steam Blow Noise Level (dBA)[(b)]
LT1=ST1	3,400 feet [0.65 mi]	63 – 73
LT2=ST2	4,500 feet [0.85 mi]	61 – 71
LT3=ST3	9,875 feet [1.9 mi]	54 - 64
ST4	6,600 feet [1.3 mi]	58 – 68
ST5	5,000 feet [0.95 mi]	60 – 70
ST6	13,350 feet [2.5 mi]	51 – 61

Sources: HECA Project, 2009.

Notes:
[a] Distances shown are from the Project centroid to each receptor location.
[b] This is the attenuation due to distance for sound propagating from 100 feet from a given steam blow to the nearest indicated receptor location. For conservatism, no other attenuation factors are considered.

In general, steam blow events will be short-term, intermittent, and temporary, and are therefore, not considered to result in significant impacts.

5.5.2.2 Post-Commissioning Maturation-Phase Noise

As described in Section 2.5.4 of the Project Description of this Revised AFC, the major process units will be commissioned sequentially. For this Project, the Power Block will be commissioned about 6 months ahead of the Gasification Block. The commissioning for the Project will require four distinct phases: (1) Combined Cycle Unit commissioning on natural gas; (2) commissioning of the auxiliary simple-cycle CTG on natural gas; (3) Gasification Block and Balance of Plant (BOP) Commissioning Combined-Cycle Block; and (4) commissioning on hydrogen-rich fuel. The steps involved in the commissioning of these four phases are given in Sections 2.5.4.1 to 2.5.4.4 of the Project Description of this Revised AFC.

As described in Section 2.8 of the Project Description of this Revised AFC, the startup and commissioning period of the power Project (CTG, ASU, process block and BOP, and IGCC) is expected to be completed within 1 year from mechanical completion. Commercial operation will start when the commissioning and startup activities are completed and the licensor/contractor guarantees and milestones have been achieved. The ramp-up period to maturity is estimated to be 3 years from the start of commercial operation. The hydrogen-rich fuel availability for mature operation is estimated to be greater than 80 percent. The power availability for mature operation is estimated to be greater than 90 percent.

While considerable data exist on commissioning periods on power generation involving natural gas, and mature operation is reached within a few months for natural gas combined-cycle–type systems, the power generation involving hydrogen-rich fuel from solid feedstock such as petcoke or coal requires a longer ramping duration due to the shakedown periods involved in the various technologies employed in the process block; in particular, the solid feedstock gasification. For this reason, the process block will have an availability less than 80 percent during the first 3 years.

After the 1-year initial Startup and basic Commissioning Phase, there will be multiple gasifier starts per year. These will occur over the lifespan of the Project, and can be considered as part of the 'normal' operations of the Project, from a noise standpoint. Consequently, these gasifier (and related systems) startup noise sources will need noise control treatments such that their contribution to the overall Project noise profile is no greater than the contributions from the Project equipment and systems that are operating between gasifier starts. That is, steam or gas discharges, by-pass valves, eductor systems, atmospheric vents, increased flaring rates, and the like that will be used beyond the initial startup efforts will have noise reduction features (such as casing treatments, lagging, and discharge silencers) to keep the Project's aggregate sound energy at or below the level needed to comply with the Project's noise goals.

With this general noise control philosophy for the Project equipment and systems (as detailed in Table 5.5-15), the aggregate noise emissions into the adjacent community should be comparable between the post-Commissioning Maturation Phase and the 'normal' Operations Phase, discussed below.

5.5.2.3 Operational Noise

To evaluate the expected noise emissions from the Project and identify the need for noise control measures, a noise modeling study of the Project has been performed (Appendix K-2, Noise Technical Report). A computerized noise prediction program was used to simulate and model the future equipment noise emissions throughout the area. The modeling program uses industry-accepted propagation algorithms based on ANSI and International Organization for Standardization (ISO) standards[3]. The calculations account for classical sound wave divergence (spherical spreading loss with adjustments for source directivity from point sources) plus attenuation factors due to air absorption, minimal ground effects, and barrier/shielding.

Calculations were performed using octave band sound power levels (abbreviated PWL or L_w) as inputs from each noise source. The computer outputs are in terms of octave band and overall A-weighted noise levels (sound pressure levels, abbreviated SPL or L_p) at discrete receptor positions or at grid map nodes (in preparation for computing a contour map). The output listing is ranked by relative noise contribution from each noise source. This model has been validated over the years via noise measurements at several operating plants that had been previously modeled during the engineering design phases.

[3] ANSI is the American National Standards Institute, while ISO is the International Standards Organization. Algorithms and methods for this program are included in the ISO 9613, ISO 1913 (Part 1), ANSI 126, or ISO 3891 standards.

Figure 2-5, Preliminary Plot Plan (in Section 2.0 of this Revised AFC) was used to establish the position of the noise sources and other relevant physical characteristics of the site. The noise source locations and noise-sensitive receptor locations were translated into input x, y, z coordinates for the noise modeling program.

Modeling Procedures, Inputs, and Assumptions

For conservatism, and as is standard practice in the description of environmental noise, the modeling assumed stable atmospheric conditions suitable for reproducible measurements (under "standard-day" conditions of 59°F and 70 percent relative humidity), that are favorable for propagation. These inherent conservative factors and assumptions result in a noise model that will tend to be biased to higher predicted values than will be expected in the actual environment around the Project.

All currently planned, continuous-operation equipment items that were deemed to be significant noise sources at the Project were included in the noise model. The major process areas of the Project include the Air Separation Unit, the Feed Handling Unit, the Gasification Island, the Gas Treating Unit, the Sulfur Recovery and Tail Gas Treatment Unit, the Power Block, and General Facilities (such as cooling, utilities, and auxiliary/support systems). Within these overall units, the set of modeled sources included:

- Power Block Cooling Towers and Air Separation Unit (ASU) Cooling Towers
- Main Power Block – "F class," combined-cycle, outdoor installation (Gas Turbine + Steam Turbine + Heat Generator Recovery Steam Generator [HRSG])
- Secondary Power Block – "LMS100® class," simple-cycle, outdoor installation (Gas Turbine + Selective Catalytic Converter)
- CTG and Steam Turbine Generator (STG) Main Transformers, plus several facility auxiliary transformers
- Cooling Tower Main Water Pumps and Motors
- Boiler Feed Water Pumps and Motors
- ASU systems[4], primarily an outdoor installation
- ASU vents
- Material Handling Systems, including crushers, conveyors, and transfer towers
- Flares and process vents
- Syngas and Tail Gas Compressors and Blowers
- Acid Gas and Tail Gas Burners
- Various sources in the Gasification Areas
- Slurry Feed systems, as radiated from Slurry Feed building walls
- Grinding Mill systems, as radiated from Mill building walls
- IGCC facility transformers
- Various significant Pump Systems (over 25 hp each)

[4] Major equipment inside the ASU will include approximately 70,000 hp main air compressor, approximately 15,000 hp booster air compressor, approximately 38,000 hp N_2 compressor, and related support pumps, valves, and other systems.

The Project is assumed to operate 24 hours per day at its design capacity, which means its noise output will nominally be constant, regardless of time-of-day (and, thus, the statistical sound levels should all be the same – that is, L_{100}=L_{90}=L_{50}=L_{10}=L_{0}). Given the early stages of the Project, only limited vendor data are available for use as noise model inputs. Therefore, every effort was made to use noise emission values that were obtained from equipment vendors on previous design efforts for similar-sized IGCC power plant configurations. As a secondary information source, model inputs derived from generic industry reference information were used. No special noise control options were initially assumed. These "standard-design" levels from the significant noise sources were converted into sound power levels (in decibels re 1 pico Watt) to serve as the initial inputs for the noise-modeling program. Major buildings and structures were included as barriers to account for propagation losses due to shielding between a given noise source and a receptor location. However, for conservatism, low-lying buildings/structures (such as power distribution centers) were neglected for providing shielding benefits. Earthen berms at an assumed berm height of 10 feet (see Figure 2-5, Preliminary Plot Plan) were included in the noise analysis to account for many noise sources breaking the direct, line-of-sight propagation pathway to the off-site receptors.

Noise Modeling

To ensure compliance with applicable LORS during ongoing Project operations, extensive noise reduction features were incorporated into the Project design. These features were included in the noise modeling configuration for the Project Site.

To address the Project-controlled noise emissions, the ranked listing of noise contributors was studied to evaluate which set of equipment should have additional noise control options applied for an efficient mix of noise mitigation treatments. Then, an iterative process of reducing the highest contributors was performed, via the effective application of noise control treatments. Reasonable adjustments were made to the input noise levels to account for such treatments as installing silencers on inlets/exhausts, or using low-noise equipment. This process was continued to achieve an efficient and reasonably achievable[5] mix of noise course characteristics that will result in predicted compliance at all receptor locations. This mixture of treatments included the specification of known low-noise designs for some equipment items, using available noise control technologies (such as stack silencers), and applying external treatments such as enclosures or noise control panels on selected building walls. This mix of noise reduction measures focused on the following generalized treatments:

- Putting open-top enclosures on selected non-enclosed compressors;
- Putting an open-top enclosure on the (non-enclosed) expander;
- Noise abatement for various noise sources associated with the gasifiers;
- Low-noise procurement or shrouded or blanketed pump trains;
- Low-noise procurement or shrouded or blanketed blowers and dust handlers;
- Reduced-noise cooling tower cells;
- Use stack silencer on HRSG exhaust;
- Use stack silencer on LMS100® SCR exhaust;

[5] Assessment of achievability was based on mitigation experience efforts on similar industrial projects.

- Use inlet silencer on LMS100® air inlet;
- Specify low-noise casing on LMS100® SCR body;
- Use silencers on selected gas and steam vents to atmosphere;
- Specify low-noise package for the GTG train;
- Specify low-noise package for the STG train;
- Specify reduced-noise components on the HRSG system;
- Additional acoustical paneling of feed, transfer, and crusher enclosures/buildings;
- Refined noise emissions information for SRU burners (using vendor information); and
- Refined noise emissions information for Thermal Oxidizer (using vendor information).

Noise Control Design Features

The effective noise control treatments that were used in the Project design modeling are a combination of vendor specification limits, acoustical designs in specific systems, and/or external treatments on selected equipment items or systems. These noise control design features are summarized in Table 5.5-15, Summary of Project Noise Control Design Features.

Noise source sound levels modeled for the Noise Control Case may be found in Table 5.5-16, Source Noise Levels for the Noise Control Case and Appendix K-2, Noise Technical Report.

Table 5.5-15
Summary of Project Noise Control Design Features

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Control Feature(s)
Power Block Cooling Tower (13-cell) (64 dBA at 400 feet from tower edge)	This is a low-noise design, and tower vendors can use a combination of slower-speed fans with special blade design, low-noise drive systems, splash control features, and/or tower baffling materials to achieve the specification.
ASU Area Cooling Tower	Same as above on a per-cell basis.
Gasifier System Cooling Tower	Same as above on a per-cell basis.
F-class Gas Turbine Train	Vendor specification to meet an overall train limit of 59 dBA at 400 feet (this is a low-noise design relative to nominally standard offerings).
Steam Turbine Train	Vendor specification to meet an overall train limit of 58 dBA at 400 feet (this is a low-noise design relative to nominally standard offerings).
HRSG System	Vendor specification to meet an overall train limit of 58 dBA at 400 feet (this is a low-noise design relative to nominally standard offerings).
HRSG Stack Exit (alone)	Inclusion of a stack silencer to meet a stack exit-only limit of 50 dBA at 400 feet from stack base.
Main Power Block Transformers	Vendor specification to meet an limits of 46 dBA at 400 feet or 59 dBA at 100 feet.
Secondary Power Island: LMS100®-class Gas Turbine	Include 6 dB of silencing on air inlet (relative to nominal reduction for this class of turbine).
Secondary Power Island: Simple-cycle SCR and exhaust	(a) Include stack silencer for 10 dB reduction relative to nominal noise emissions. (b) Specify SCR body design to achieve 10 dB reduction relative to nominal noise emissions.

Table 5.5-15
Summary of Project Noise Control Design Features (Continued)

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Control Feature(s)
Secondary Power Block Transformers	Specify low-noise package (i.e., -10 dB relative to nominal noise emissions for this size transformer).
Selected Pump Trains (pump+motor) [for trains <100 hp, PWLA should be <83; for 150 to 750 hp trains, PWLA should be <91; and for trains >750 hp, PWLA should be <96]	Specify reduced noise emissions, relative to nominal offerings, for each size train (motor plus driven equipment item). Can be accomplished via noise limit specification to equipment vendor (for a quiet design). Alternatives include the installation of an acoustical enclosure around the pump and drive mechanics or blanketing around the main rotating equipment.
Miscellaneous Rotating Equipment Trains (e.g., blowers, dust collectors, agitators, etc.) [investigate all such sources for noise control, having PWLA > 83]	Specify reduced noise emissions, relative to nominal offerings, for each size train (motor plus driven equipment item). Can be accomplished via noise limit specification to equipment vendor (for a quiet design). Alternatives include the installation of an acoustical enclosure around the item and drive mechanics or blanketing around the main rotating equipment.
Material Handling Structures (including Truck Dumping Area, Transfer Towers, Feedstock Silo Building, Slurry Prep Building, Slag Handling Building, and Crushing/Milling Buildings)	Specify reduced noise emissions, relative to nominal offerings, for sheet metal building with several openings such that they are ≤60 dBA at 50 feet from any building façade (to be verified during detailed design phase). Assumes acoustical panel specifications for building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell to meet the assumed emissions levels.
Conveyors (assumed to be enclosed for noise and dust control)	Specify reduced noise emissions, relative to nominal offerings, such that they are ≤61 dBA at 50 feet).
Open Compressors and Expanders	Employ 4-sided, open-topped enclosures on selected large trains. Remaining Compressor and Expander Trains above 500 hp or above 86 PWLA should be investigated for noise control such that they achieve noise reduction features for a nominal 15 dB reduction (relative to nominal designs).
Sulfur Recovery Unit Burners	Specify low-noise burners to equipment vendors or use noise control enclosures/plenums around burner systems.
Gasifiers	Specify low-noise fuel deliver systems (slurry injectors or fuel gas aspirators) or use noise control enclosures/plenums such that noise emissions are reduced to below 90 PWLA.
Elevated Gasifier Flare (mainly used for Gasifier start-up)	None indicated at this time (provided vendors can supply equipment meeting Petrochem industry standards). (Assumes normal operations will be pilot flame only.)
Elevated Acid Gas Flare (mainly used for infrequent cold start-up of the SRU)	None indicated at this time (provided vendors can supply equipment meeting Petrochem industry standards). (Assumes normal operations will be pilot flame only.)
Elevated Rectisol Flare (emergency use only)	None indicated at this time (provided vendors can supply equipment meeting Petrochem industry standards). (Assumes normal operations will be pilot flame only.)
Carbon Dioxide Vent	None indicated at this time (preliminary pressure drop and flow velocities indicate that this will not be a noteworthy noise source).

Table 5.5-15
Summary of Project Noise Control Design Features (Continued)

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Control Feature(s)
Thermal Oxidizer (mainly used for miscellaneous tank vent discharges)	None indicated at this time (provided vendors can supply equipment meeting Petrochem industry standards). (Assumes normal operations will be ‘low’ flow; negligibly different than pilot flame only.)
Various Atmospheric Vents	Used of exhaust silencers, as applicable, such that noise emissions are below 83 PWLA.
Other Pump Sets (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3 feet.
Other Mechanical Equipment not specified above (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3 feet.
Other Electrical Equipment not specified above (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3 feet.
Building HVAC units and fans (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3 feet.

Source: HECA Project

Table 5.5-16
Source Noise Levels for the Noise Control Case

Area	Item	Notes	Octave Band Sound Power Levels, PWL								Overall PWL(A)	
			63	125	250	500	1k	2k	4k	8k		
AGR	CO_2 Compressor	40,250 hp - per Project "C"	72	68	73	75	78	80	76	69	*84.3*	1
AGR	CO_2 Recycle Compressor	900 hp	82	86	86	85	84	81	77	74	*88.6*	1
AGR	Refrigerant Compressor A	2,500 hp - int	87	78	73	70	69	68	67	66	*75.6*	1
AGR	Flash Gas Recycle Comp	800 hp - ext	82	86	86	85	84	81	77	74	*88.6*	1
AGR	Loaded Methanol Pump	250 hp	84	86	87	87	87	84	81	78	*91.3*	1
AGR	Lean Methanol Pump	2,000 hp	107	98	93	90	89	88	87	86	*95.6*	1
AGR	Reflux Pump Methanol/Water Separation	50 hp	86	87	90	90	88	85	81	79	*92.8*	
AGR	Syngas Turbo Expander	3,000 hp	102	93	88	85	84	83	82	81	*90.6*	1
ASU	Main Air Compressor Motor	70,000 hp - per Project "C"	87	83	88	90	93	95	91	84	*99.3*	
ASU	Main Air Compressor (MAC)	70,000 hp - per Project "C"	87	83	88	90	93	95	91	84	*99.3*	
ASU	Booster Air Compressor Motor	14,750 hp - per Project "C"	84	88	87	91	93	93	90	85	*98.3*	
ASU	Booster Air Compressor (BAC)	15,000 hp - per Project "C"	84	88	87	91	93	93	90	85	*98.3*	
ASU	Med Pressure Nitrogen Compressor Motor	38,000 hp - per Project "C"	87	83	88	90	93	95	91	84	*99.3*	1
ASU	Med Pressure Nitrogen Compressor	38,000 hp - per Project "C"	87	83	88	90	93	95	91	84	*99.3*	1
ASU	Expander	2,000 hp - per Project "F"	102	93	88	85	84	83	82	81	*90.6*	1
ASU	Dense Fluid Expander	500 hp	79	81	82	82	82	79	76	73	*86.3*	1
ASU	Liquid Oxygen Pump	650 hp	84	86	87	87	87	84	81	78	*91.3*	1
ASU	ASU Cooling Water Pump	750 hp	84	86	87	87	87	84	81	78	*91.3*	1
ASU	ASU CCW Pump	150 hp	84	85	90	89	88	85	80	77	*92.4*	1
ASU	Auxiliary Cooling Water Pump	200 hp	84	85	90	89	88	85	80	77	*92.4*	1
ASU	ASU Cooling Tower, 4 cells	Each 4 cell set	114	112	104	98	93	94	97	95	*103.8*	1

Table 5.5-16
Source Noise Levels for the Noise Control Case

Area	Item	Notes	Octave Band Sound Power Levels, PWL								Overall PWL(A)	
			63	125	250	500	1k	2k	4k	8k		
Common Cooling	Gasification Cooling Water Pump	750 hp	84	86	87	87	87	84	81	78	*91.3*	1
	Power Block Cooling Water Pump	2,500 hp - per Project "F"	107	98	93	90	89	88	87	86	*95.6*	1
	Power Block Clsd Cooling Water Pump	500 hp	84	86	87	87	87	84	81	78	*91.3*	1
	Aux Cooling Water Pump	185 hp	84	85	90	89	88	85	80	77	*92.4*	1
	Gasification Clsd Cooling Water Pump	150 hp	84	85	90	89	88	85	80	77	*92.4*	1
	HRSG FWH Recirculation Pumps	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Condensate Transfer Pump	75 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Hotwell Pump	600 hp	84	86	87	87	87	84	81	78	*91.3*	1
	Low-Pressure Boiler Feed Water Pump	250 hp	84	86	87	87	87	84	81	78	*91.3*	1
	Process Intrmd Press Boiler Fee Water Pumps	350 hp	84	86	87	87	87	84	81	78	*91.3*	1
	High Pressure Boiler Feed Water Pump	2,500 hp - per Project "F"	107	98	93	90	89	88	87	86	*95.6*	1
	Process High Press Boiler Fee Water Pumps	4,000 hp - per Project "F"	107	98	93	90	89	88	87	86	*95.6*	1
	Power Block Cooling Tower	Each 4 cell set	114	112	104	98	93	94	97	95	*103.8*	1
	Gasification Cooling Tower	Each 4 cell set	114	112	104	98	93	94	97	95	*103.8*	1
Flaring	Thermal Oxidizer	Vendor information	100	97	95	93	92	89	84	78	*96.6*	
	Rectisol Flare Stack	not used - not normal ops	94	90	82	74	71	74	78	78	*83.8*	
	Gasification Flare Stack	from Project "A"	94	90	82	74	71	74	78	78	*83.8*	
	SRU Flare Stack	not used - not normal ops	94	90	82	74	71	74	78	78	*83.8*	
Shift/ LTGC	Hot Process Condensate Pumps	500 hp	84	86	87	87	87	84	81	78	*91.3*	1
	Contact Condenser Air Cooler	from Project "E"	98	95	85	78	72	63	56	48	*82.7*	
	Regen Overhead Air Cooler	from Project "E"	98	95	85	78	72	63	56	48	*82.7*	
SRU	SRU Furnaces	Vendor information	96	93	91	89	88	85	82	74	*92.7*	
	HP Flare Knock-out Drum Pump	300 hp	84	86	87	87	87	84	81	78	*91.3*	1
TGTU	TGTU Treated Gas Compressor	1,200 hp	75	77	76	78	81	85	79	73	*88.4*	1
	Lean Amine Air Cooler	from Project "E"	98	95	85	78	72	63	56	48	*82.7*	

Table 5.5-16
Source Noise Levels for the Noise Control Case

Area	Item	Notes	Octave Band Sound Power Levels, PWL								Overall PWL(A)	
			63	125	250	500	1k	2k	4k	8k		
Gasification	Injector Cooling Water Pump	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Filter Feed Pumps	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Mill Discharge Tank Pumps	40 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Slurry Booster Pump	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Slurry Charge Pumps	500 hp	84	86	87	87	87	84	81	78	*91.3*	1
	Quench Water Pumps	350 hp	84	86	87	87	87	84	81	78	*91.3*	1
	Settler Bottom Pump	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Settler Feed Pump	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Grey Water Pumps	1800 hp - per Project "F"	107	98	93	90	89	88	87	86	*95.6*	1
	Grinding Water Tank Pumps	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Deaerator Bottoms Pumps	100 hp	79	81	82	82	81	78	75	72	*85.6*	1
	Mill Discharge Tank Agitator	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Slurry Tank Agitators	325 hp	84	86	87	87	87	84	81	78	*91.3*	1
	Settler Rake	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Filtration Skid	250 hp	84	86	87	87	87	84	81	78	*91.3*	1
	Vacuum Pump Package	60 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Slurry Prep Building	from Project "A"	114	104	94	87	80	71	69	73	*92.9*	
	Gasifiers (two of three running)	from Project "A"	102	95	90	85	82	81	81	82	*90.0*	1
Material Handling	Pneumatic Conveyor Blower	from Project "A"	98	91	86	81	78	77	77	78	*86.0*	1
	Impact Crusher	EPPENG w/ adjustment	100	100	98	96	95	93	87	80	*99.8*	1
	Belt Conveyors	EPPENG w/ adjustment	93	93	91	89	88	86	80	73	*92.8*	1
	Crusher Building	from Project "A" w/ adj.	114	104	94	88	80	71	69	73	*93.0*	1
	Feedstock Silo walls	from Project "A" w/ adj.	109	99	89	83	75	66	64	68	*88.0*	1
	Feedstock Unloading Shed	EPPENG w/ adjustment	95	95	93	91	90	88	82	75	*94.8*	1
	Feedstock Transfer Towers	EPPENG w/ adjustment	98	98	96	94	93	91	85	78	*97.8*	1
	Crushed Feedstock Transfer Towers	EPPENG w/ adjustment	98	98	96	94	93	91	85	78	*97.8*	1
	Mat'l Handling Dust Collectors	estimate	79	81	82	82	81	78	75	72	*85.6*	1

Table 5.5-16
Source Noise Levels for the Noise Control Case

Area	Item	Notes	Octave Band Sound Power Levels, PWL								Overall PWL(A)	
			63	125	250	500	1k	2k	4k	8k		
Power Block	GTG Transformer	from Project "A"	99	101	96	96	90	85	80	73	*96.4*	
	GTG Air Inlet	from Project "A"	104	93	84	71	57	47	69	73	*82.5*	1
	GTG Inlet Plenum	from Project "A"	89	86	88	87	88	97	87	76	*99.2*	1
	GTG Generator	from Project "E"	102	101	98	100	99	98	93	84	*104.0*	1
	GTG Main Body	from Project "E"	110	104	103	100	98	103	99	94	*107.2*	1
	GTG Load Compartment	from Project "E"	105	105	100	95	93	96	93	86	*101.4*	1
	GTG Accessory Bay	from Project "E"	106	99	97	96	95	98	92	86	*102.2*	1
	GTG Exhaust Diffuser	from Project "E"	109	103	97	92	85	83	79	74	*94.5*	1
	HRSG Transition	from Project "B"	115	111	107	102	101	99	95	57	*106.6*	1
	HRSG Main Body	from Project "A"	111	108	104	99	96	94	90	64	*102.5*	1
	HRSG Stack Wall-low	from Project "A"	90	91	89	86	84	78	62	25	*88.3*	1
	HRSG Stack Exhaust	from Project "A"	107	109	109	102	91	77	62	57	*103.4*	1
	STG Main Body	from Project "D"	114	112	107	103	99	96	88	82	*105.4*	1
	STG Generator	from Project "D"	107	114	105	94	95	92	96	99	*104.5*	1
	STG Transformer	from Project "A"	99	101	96	96	90	85	80	73	*96.4*	
	STG Condenser	from Project "A"	99	101	96	96	90	85	80	73	*96.4*	1
	LMS100® Air Inlet [2]	from Project "E"	112	111	100	88	94	80	80	85	*99.1*	1
	LMS100® Main Body [2]	from Project "E"	116	113	103	99	93	91	91	89	*102.6*	
	LMS100® Generator [2]	from Project "E"	106	113	104	93	94	91	95	98	*103.5*	
	LMS100® SCR Body [2]	from Project "E"	118	115	108	96	90	83	66	48	*103.3*	1
	LMS100® Stack Exhaust [2]	from Project "E"	128	122	108	96	91	83	79	71	*108.2*	1
	LMS100® Transformer [2]	from Project "E"	103	107	100	101	98	87	82	75	*102.0*	
	LMS100® Fuel Gas Compressor [2]	estimate	80	82	81	83	86	90	84	78	*93.4*	1
Water Treat	Demin Water Pump	250 hp	84	86	87	87	87	84	81	78	*91.3*	1
	Storm Water Sump Pump	75 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Sump Pump	75 hp	76	77	80	80	78	75	71	69	*82.8*	1
	Water Treat Pumps	12 x 75 hp = 11 dB	87	88	91	91	89	86	82	80	*93.8*	1

Table 5.5-16
Source Noise Levels for the Noise Control Case

Area	Item	Notes	Octave Band Sound Power Levels, PWL								Overall PWL(A)	
			63	125	250	500	1k	2k	4k	8k		
	R/O Feed Pump-1stg	1,500 hp - per Project "F"	107	98	93	90	89	88	87	86	*95.6*	1
	R/O Feed Pump-2stg	500 hp	84	86	87	87	87	84	81	78	*91.3*	1
Proc. ZLD	Vapor Compressor	500 hp	79	81	82	82	82	79	76	73	*86.3*	1
	Exhaust Fan	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	ZLD pumps	16 x 75 hp = 12 dB	88	89	92	92	90	87	83	81	*94.8*	1
	Dryer	60 hp	86	87	90	90	88	85	81	79	*92.8*	
Waste Water ZLD	Vapor Compressor	500 hp	79	81	82	82	82	79	76	73	*86.3*	1
	Exhaust Fan	50 hp	76	77	80	80	78	75	71	69	*82.8*	1
	ZLD pumps	16 x 75 hp = 12 dB	88	89	92	92	90	87	83	81	*94.8*	1
	Dryer	60 hp	86	87	90	90	88	85	81	79	*92.8*	
Misc	Aux Transformers	~15 MVA-per Project "B"	87	89	84	84	78	73	68	61	*84.4*	
	Various Atmospheric Vents	Various services	95	88	83	78	75	74	74	75	*83.0*	1
										Total Project PWL(A)[3] =	**118.9**	1

Source: HECA Project, 2009.
Notes:
[1] Items shown with an asterisk include noise control treatments
[2] LMS-100 system is not envisioned to be run at night—not included in CEC assessment
[3] Summation is from actual model input files that contain multiple items from this list

AGR = Acid Gas Removal Area
ASU = Air Separation Unit
Power Block = (includes both Main 7F-class and LMS100® trains)
Shift/LTGC = Sour Shift + Low-Temp Gas Cooling + Mercury Removal
SRU = Sulfur Recovery Unit
TGTU = Tail Gas Treating Unit
Water Treat = Water Treatment Area
ZLD = Zero Liquid Discharge Area

Noise Analysis Compared to Kern County Standards

The Project is predicted to comply with the Kern County standards, as shown in the following two tables for exterior and interior results, respectively.

Table 5.5-17
Summary of Project Contributions with Noise Control Features Relative to Kern County Noise Element Standards (Exterior)

Location *[column 1]*	Kern County Noise Element Exterior Standards, L_{dn} *[column 2]*	Existing Exterior L_{dn} Environment *[column 3]*	Predicted Project L_{eq} Contributions, dBA *[column 4]*	Predicted Project L_{dn} Contributions, *[column 5]*[a]	Total, Future Calculated L_{dn} (existing plus Project)[f] *[column 6]*[b]	Project Contribution / Project Compliance[c,f] *[column 7]*
LT1/ST1	65	58	38	44	58	0 / Yes
LT2/ST2	65	61	38	44	61	0 / Yes
LT3/ST3	65	70	26	32	70	0 / Yes
ST4	65	51 [e]	34	40	51	0 / Yes
ST5	65	68 [e]	38	44	68	0 / Yes

Source: HECA Project
Notes:
[a] Using 24 hourly L_{eq} values to calculate the equivalent L_{dn} metric, assuming continuous operations at steady-state, design conditions. Thus, $L_{dn} = L_{eq} + 6$ dB.
[b] Summing sound levels from column 3 plus column 5.
[c] Is column 6 less than or equal to columns 3 and 2?
[d] Footnote not used.
[e] Estimated L_{dn} from short-term data in Tables 5.5-8 and 5.5-9.
[f] Result is completely controlled by the existing noise environment.

Table 5.5-18
Summary of Project Contributions with Noise Control Features Relative to Kern County Noise Element Standards (Interior)

Location *[column 1]*	Kern County Noise Element Interior Standards, L_{dn} *[column 2]*	Existing Interior L_{dn} Environment[a] *[column 3]*	Predicted Project Exterior L_{dn} Contributions, *[column 4]*[b]	Predicted Project Interior L_{dn} Contributions, *[column 5]*[c]	Total, Future Calculated L_{dn} (Existing plus Project)[f] *[column 6]*[d]	Project Contribution / Project Compliance[e,f] *[column 7]*
LT1/ST1	45	41	44	27	41	0 / Yes
LT2/ST2	45	44	44	27	44	0 / Yes
LT3/ST3	45	53	32	15	53	0 / Yes
ST4	45	34	40	23	34	0 / Yes
ST5	45	51	44	27	51	0 / Yes

Source: HECA Project
Notes:
[a] Applying -17 dB to results from Table 5.5-16 above.
[b] Using results of column 5 from Table 5.5-16 above.
[c] Applying -17 dB to column 4.
[d] Summing sound levels from column 3 plus column 5.
[e] Is column 6 less than or equal to columns 3 and 2?
[f] Result is completely controlled by the existing noise environment.

Noise Analysis Compared to CEC Significance Thresholds

With receptor Locations LT1/ST1 and ST2/ST2 as the closest locations with residential structures, they are critical for achieving compliance with CEC thresholds. While Location LT1/ST1 is the nearest receptor, it has the benefit of being behind the proposed earthen berm in the northwest corner of the Project Site. The next nearest receptor, Location LT2/ST2 does not benefit from the current configuration of earthen berms breaking line-of-sight propagation, but it is approximately 4,500 feet from the center of the Project process areas and would experience on the order of 39 dB of divergence attenuation, plus a notable amount of ground attenuation over soft or vegetated ground. The other noise sensitive receptors locations are from 5,000 to over 13,000 feet away from the Project process areas and would receive less noise than the two nearest locations due to sizable distance attenuation factors.

The results of the Noise Control Case (using noise emissions inputs from Table 5.5-16) are shown in Table 5.5-19, Summary of Project Contributions with Noise Control Features Relative to CEC Noise Impact Criteria.

Table 5.5-19
Summary of Project
Contributions with Noise Control Relative to CEC Noise Impact Criteria

Location	Distance from Project Site (feet)		Measured, Late-Night L_{90} ambient conditions, (dBA)	CEC's +5 dB Late-Night L_{90} Standard[a] (dBA)	Predicted, Project Contributions[b] (dBA)	Predicted Project Contributions plus Existing Ambient (dBA)	Comparison to Design Goal
	From Approx. Nearest Boundary	From Process Area Centroid					
Off-Site Receptors							
LT-1=ST-1	480	3,425	31	36	37	38	2 dB over
LT-2=ST-2	1,400	4,475	30	35	37	38	3 dB over
LT-3=ST-3	5,400	9,875	30	35	24	31	4 dB under
ST4	3,550	6,600	37	42	33	38	4 dB under
ST5	3,000	5,000	33	38	36	38	at standard
ST6	10,500	13,325	NA	NA	24	NA	NA
Project Site Boundary							
N	–	3,686	–	–	41	41[c]	NA
E	–	3,235	–	–	39	39[c]	NA
S	–	1,293	–	–	56	56[c]	NA
W	–	2,339	–	–	45	45[c]	NA

Source: HECA Project

Notes:
NA = Not applicable
[a] Also see Table 5.5-11 at the end of Section 5.5.1.4.
[b] This is the nighttime plant configuration, which excludes operations of the auxiliary GTG (LMS-100 unit).
[c] assuming that the plant contributions dominate the rural noise environment along the Project Site Boundary.

This table shows that with the extensive design features for controlling Project noise emissions, receptor locations LT3/ST3, ST4, and ST5 are predicted to be at or below the design goal needed to achieve compliance with the CEC thresholds. The two closest receptor locations, LT1/ST1 and LT2/ST2, are predicted to be 2 and 3 dB above the L_{90}+5 dB guideline, respectively. That is, they are predicted to be +7 and +8 dB, respectively, as referenced to the existing, late-night ambient conditions.

As indicated above in Section 5.5.1.5, CEC has determined that the level of potential impact for noise increases between +5 and +10 dBA depends on the particular circumstances of a project. In considering the factors for this situation, the Project would result in less than significant impacts at the two closest receptor locations (LT1/ST1 and LT2/ST2), based on the low resulting noise levels (38 dBA) and the small number of people potentially affected.

After the results for the discrete receptor locations were predicted, the same modeling process (again using the noise control features in Table 5.5-19, Summary of Project Noise Control Design Features) was used to calculate plant noise levels at regularly spaced grid points. From these grid results, a noise level contour map was generated. This contour map is a plot of constant, A-weighted sound levels in 5 dB increments for just the Project noise sources, and is shown in Figure 5.5-2, Noise Contours at Project Site.

These extensive and comprehensive design features for controlling Project noise emissions are considered to be technically feasible, as well as reasonable and cost-effective for overall Project noise reduction. These noise reduction measures and features will be updated, refined, and confirmed during detailed design efforts to ensure producing noise emissions that are as low as reasonably achievable.

5.5.2.4 Ground-Borne Vibration

Experience at similar facilities demonstrates a very low probability for either ground-borne or airborne-induced vibration impacts to surrounding land uses. The equipment that will be used in the Project is well-balanced and designed to produce very low vibration levels throughout the life of the Project. An imbalance could contribute to ground vibration levels in the vicinity of the equipment. However, vibration-monitoring systems installed in the equipment are designed to ensure that the equipment remains balanced. Should an imbalance occur, the event will be detected and the equipment will automatically shut down. Also, given the distances from the actual equipment to the nearest receptor locations (on the order of at least 3,000 feet), coupled with the inherently low vibration levels from the Project’s well-balance machinery, ground-borne vibrations would not be expected to be even detectable above the residual background vibration environment at any of the pertinent receptor locations. As a result, impacts related to ground-borne vibrations would be less than significant.

5.5.2.5 Worker Exposure to Noise

The Project is currently planning to use HEI Engineering Practices as part of the detailed design phase. With these Practices, nearly all components of the Project will be specified not to exceed near-field maximum noise levels of 80 dBA at 1 meter (3 feet) as the standard for equipment selection and procurement. Note that this level is 5 dB lower than is commonly used for large-scale industrial design efforts. Because there are no permanent or semi-permanent workstations located near any piece of noisy plant equipment, and because a high degree of automation will be employed for operating the Project, workers' average exposure to noise should remain within allowable levels per OSHA regulations. Nevertheless, signs requiring the use of hearing protection devices will be posted in all areas where noise levels commonly exceed 85 dBA, such as inside acoustical enclosures. Outdoor noise levels throughout the Project will typically range from 90 dBA near certain systems or sets of equipment to roughly 65 dBA in areas more distant from any major noise source.

After the Project has been constructed and employee jobs and routines determined, HEI will conduct an occupational noise survey to identify the noise hazardous areas in the facility. The survey will be conducted, after the Project is in full operation, by a qualified person in accordance with the provisions of Title 8, California Code of Regulations, § 5095-5100 (Article 105) and Title 29, Code of Federal Regulations, Part 1910. More details on worker exposure limits are found in Technical Appendix K-2, Section 5.1.

5.5.2.6 Traffic Noise

Project construction and operation would result in an increase in vehicular traffic along site access roadways. Primary access roadways include Stockdale Highway, Dairy Road, and Adohr Road. These roadways are shown in Figure 5.5-3, Access Roads in the Vicinity of the Project.

As discussed above, the CEC assesses noise exposure from new stationary noise sources such as power plants in terms of local General Plans, noise ordinances, and changes to the ambient noise environment. While analysis of the change in the background noise level (L_{90}) has proven to be effective for assessing noise impacts from stationary, steady-state noise sources such as power plants, this metric is not reliable for assessing changes in noise levels from intermittent mobile noise sources such as highway traffic. Highway noise is most often assessed in terms of a cumulative 24-hour metric such as L_{dn}, or in the State of California, CNEL, or in terms of peak traffic noise hour L_{eq}.

Based on Federal Highway Administration (FHWA) (23 CFR 772) and Caltrans (Traffic Noise Analysis Protocol, 2006), traffic noise impacts for new highway construction projects occur when the predicted noise level, in terms of peak traffic noise hour, approaches the Noise Abatement Criteria (66 dBA for residential areas), or when a substantial noise increase occurs. In the State of California, a substantial noise increase is defined as when the project's predicted worst-hour design-year noise level exceeds the existing worst-hour noise level by 12 dBA. In terms of local guidelines, the Kern County Noise Element of the General Plan specifies an exterior noise level of 65 dBA L_{dn} for residential land uses. This guideline is applicable to traffic noise.

Unlike noise emissions from power plants, vehicular noise sources are very localized. For example, the noise environment in the front yard facing a street is often very different from the noise environment in a rear yard, which may be shielded from the roadway by intervening structures. Therefore, noise abatement for highway noise is typically only considered where frequent human use occurs, and where a reduced noise level would be of benefit. In addition, the Project vehicular traffic does not introduce a new noise source to the environment; but rather, increases noise levels along existing highways.

The existing traffic noise environment along Stockdale Highway was assessed by a 25-hour noise measurement survey as described in Section 5.5.1.3. Based on existing traffic noise measurement data from LT3/ST3 (Table 5.5-6 25-Hour Sound Level Measurement at LT3), the peak traffic noise hour is the hour ending 5:00 p.m. and the peak traffic noise hour L_{eq} is 69.1 dBA at LT3/ST3. The measured CNEL was 70.0 dBA, or 0.9 dBA higher than the peak traffic noise hour L_{eq} at this location. The minimum hourly L_{eq} is 50.2 dBA, and occurs at 1:00 a.m. As expected, the highest noise levels in terms of hourly L_{eq} occur during the morning and evening commuting hours: 7:00 a.m. in the morning and 5:00 p.m. in the evening. It should be noted that traffic noise levels at this measurement location do not correlate with the L_{90} background noise levels; a result that is consistent with the State of California's determination of the L_{eq} value being the most appropriate metric.

The FHWA's Traffic Noise Model (TNM) Version 2.5 was used to estimate existing traffic noise levels along the access roads. This model is also used by the Caltrans to evaluate noise exposure from highways. The modeling effort considered the posted vehicle speed, average daily trips (ADT) (Section 5.10, Traffic and Transportation), and the existing and future estimated vehicle mixes.

Calculations were performed at a distance of 50 feet from the centerline of each roadway. Table 5.5-20, Traffic Noise Levels at 50 feet from Centerline of Roadway, shows the calculated existing traffic noise levels in term of CNEL. It should be noted that this analysis distance is greater than the measurement distance of LT3/ST3 from the roadway. These TNM modeling values are in terms of CNEL, and approximate the L_{eq} during peak traffic noise hour. Peak-hour traffic noise L_{eq} is the noise metric commonly used by Caltrans to evaluate noise exposure from highways. For this analysis, as determined via measurement data, it is assumed that CNEL is approximately 1 dBA higher than the peak traffic noise hour L_{eq} and L_{dn}. Vehicle speed assumptions for this analysis are based on posted speed limits. These are considered to be worst-case assumptions, because vehicle speeds along rural roads in the vicinity of the project vary greatly due to the varied vehicle mix, including agricultural equipment.

As indicated in Table 5.5-20, Traffic Noise Levels at 50 feet from Centerline of Roadway, existing noise levels along sections of Stockdale Highway, Taft Highway, Enos Lane, and Interstate 5 currently exceed the Kern County General Plan exterior requirement of 65 dBA L_{dn}. The actual noise level at any receptor location is dependent upon such factors as the source-to-receptor distance, ground type, and the presence of intervening structures, barriers, and topography.

Construction Traffic

Acoustical calculations were performed for vehicular traffic during construction as described above. The construction employee traffic trips were added to the 2014 traffic volume for the purpose of analysis. It was assumed that construction truck trips would be evenly distributed throughout the work day. A comparison of existing traffic noise levels and the 2014 traffic noise levels during construction is shown in Table 5.5-20, Traffic Noise Levels at 50 feet from Centerline of Roadway. This table also shows the Project's contribution to the noise environment.

The noise levels along Project roadway segments are expected to increase above projected 2014 noise levels by approximately 0 to 11 dBA during construction. A change of greater than 3 dBA is considered to be perceptible by the average human ear. No substantial changes (greater than 12 dBA per Caltrans guidelines) will occur. Noise levels along sections of Stockdale Highway, Taft Highway, Enos Lane, and Interstate 5 will exceed the Kern County Exterior Noise Standard of 65 dBA L_{dn} without the Project. No other exceedences of the Kern County Exterior Noise Standard will occur.

The most significant change attributable to the project occurs along Stockdale Highway west of Interstate 5. Noise levels along this segment are expected to increase from 62.2 dBA to 68.5 dBA, an increase of 6.3 dBA; 68.5 dBA exceeds the Kern County Exterior Noise Standard. The Project noise impact at this location would therefore be potentially significant without mitigation. However, the Project noise impact is considered less than significant with mitigation measure NOISE-1. NOISE-1 is expected to reduce noise increases to less-than-perceptible levels.

Operation Traffic

Acoustical calculations were performed for operations vehicular traffic as described above. The Project peak-hour employee operations traffic trips were added to the 2016 peak hour traffic volume as cars. Daily operations truck trips were added to the 2016 peak hour traffic volume as "heavy trucks." A comparison of existing traffic noise levels and the 2016 traffic noise levels during operations is shown in Table 5.5-20, Operation Traffic Sound Levels at 50 feet from Centerline of Roadways. This table also shows the Project's contribution to the traffic noise environment.

The noise level along Project roadway segments is expected to increase by approximately 0 to 10 dBA during Project operations. No substantial changes (greater than 12 dBA per Caltrans guidelines) will occur. The largest increases are along Dairy Road (9.6 dBA), Adohr Road (8.2 dBA), and Stockdale Highway (7.1 dBA west of I-5). With the exception of Stockdale Highway, no exceedences of the Kern County Exterior Noise Standard will occur. For Stockdale Highway west of I-5, noise levels along this segment are expected to increase from 62.4 dBA to 69.5 dBA, an increase of 7.1 dBA. This increase results in an exceedence of the Kern County Exterior Noise Standard of 65 dBA L_{dn}. Therefore, the Project's traffic noise impact at this location is potentially significant without mitigation. However, mitigation measure NOISE-1, identified in Section 5.5.4, is expected to reduce traffic noise by 5 dBA, resulting in less-than-significant noise impacts.

5.5.3 Cumulative Impacts

Only one industrial or commercial development has been identified that could potentially influence ambient levels at noise-sensitive receptors in the vicinity of the Project Site. This is the proposed dairy farm, a 1,057-acre milk production facility that may occupy plots to the west, north, and east of the Project Site (see Appendix J, List of Proposed Projects, for additional information). Of the total dairy project, approximately 121 acres are slated for cattle yards and milking facilities. Although no details are currently available for this development, noise from dairy operations is estimated to be in the range of 75 to 85 dB (unweighted decibels); this is

Table 5.5-20
Traffic Noise Levels at 50 feet from Centerline of Roadway

Road Segment	Speed (mph)	Existing	Future 2014 No Project			Future 2014 Plus Const.			Future 2016 No Project			Future 2016 Plus Project		
		dB CNEL at 50 feet	ADT	dB CNEL at 50 feet	Change[1]	ADT	dB CNEL at 50 feet	Change[2]	ADT	dB CNEL at 50 feet	Change[3]	ADT	dB CNEL at 50 feet	Change[4]
Stockdale Highway														
West of I-5	55	61.8	1,562	62.2	0.4	4,068	68.5	6.3	1,633	62.4	0.6	3,283	69.5	7.1
East of I-5	55	66.1	4,147	66.5	0.4	4,969	69.4	2.9	4,336	66.7	0.6	4,524	70.9	4.2
Morris Road														
South of Stockdale Highway	35	49.9	363	50.3	0.4	363	50.3	0.0	380	50.5	0.6	380	50.5	0.0
Station Road														
West of Morris Road	35	49.9	363	50.3	0.4	363	50.3	0.0	380	50.5	0.6	380	50.5	0.0
Adohr Road														
East of Dairy Road	35	48.8	284	49.2	0.4	2,790	59.1	9.9	297	49.4	0.6	1,947	57.6	8.2
Dairy Road														
North of Adohr Road	35	47.2	195	47.6	0.4	2,701	59.0	11.4	204	47.8	0.6	1,854	57.4	9.6
Tupman Road														
North of Station Road	55	50.0	133	50.4	0.4	1,195	60.0	9.5	139	50.6	0.6	235	52.9	2.3
South of Station Road	55	54.9	407	55.3	0.4	1,469	60.9	5.6	426	55.5	0.6	522	56.4	0.9
North of Taft Highway	55	58.8	1,012	59.3	0.4	1,958	62.1	2.9	1,058	59.5	0.6	1,142	59.8	0.3
Taft Highway														
West of Enos Lane	55	74.8	13,530	75.2	0.4	14,360	75.2	0.1	14,145	75.4	0.6	14,217	75.4	0.0
East of Enos Lane	55	74.6	13,090	75.0	0.4	13,920	75.1	0.1	13,682	75.2	0.6	13,757	75.2	0.0
East of I-5	55	72.5	8,030	72.9	0.4	8,738	73.1	0.2	8,395	73.1	0.6	8,511	73.1	0.0
Enos Lane														

Table 5.5-20
Traffic Noise Levels at 50 feet from Centerline of Roadway

Road Segment	Speed (mph)	Existing	Future 2014 No Project			Future 2014 Plus Const.			Future 2016 No Project			Future 2016 Plus Project		
		dB CNEL at 50 feet	ADT	dB CNEL at 50 feet	Change[1]	ADT	dB CNEL at 50 feet	Change[2]	ADT	dB CNEL at 50 feet	Change[3]	ADT	dB CNEL at 50 feet	Change[4]
North of Taft Highway	55	66.6	6,050	67.0	0.4	6,050	67.0	0.0	6,325	67.2	0.6	6,325	67.2	0.0
North of I-5	55	66.7	6,160	67.1	0.4	6,160	67.1	0.0	6,440	67.3	0.6	6,440	67.3	0.0
5 Freeway														
North of Stockdale Road	65	76.4	37,400	76.8	0.4	38,170	76.9	0.1	39,100	77.0	0.6	39,808	77.0	0.1
South of Stockdale Road	65	76.2	36,300	76.6	0.4	37,214	76.7	0.1	37,950	76.8	0.6	38,704	76.9	0.1
East of Enos Lane	65	76.0	34,650	76.4	0.4	35,564	76.6	0.1	36,225	76.6	0.6	36,979	76.7	0.1

Notes:
[1] Change is the difference between 2008 Traffic noise levels and future noise levels (2014) without the project.
[2] Change is the difference between future noise levels (2014) without the project and future noise levels (2014) with the project. The changes in noise levels at the various locations are due to project construction activities.
[3] Change is the difference between 2008 Traffic noise levels and future noise levels (2016) without the project.
[4] Change is the difference between future noise levels (2016) without the project and future noise levels (2016) with the project. The changes in noise levels at the various locations are due to project operation.

approximately equivalent to 57 to 67 dBA. For these levels of on-site dairy noise, and in consideration of the distances to the nearest sensitive receptors, the dairy facility is expected to contribute negligible, if any, additional noise levels to the environment around the Project Site. Therefore, there are no known noise sources in the area that will contribute to Project noise levels in a manner that would result in an additional cumulative impact.

For potential Project operations noise impacts to the proposed dairy facility, the 121 acres of cow yards and milking facilities were assumed, as a worst case, to be near the southeastern corner of Section 9, immediately to the west of the Project Site across Dairy Road. Project modeling for this location indicated an expected daytime plant contribution (including the operations of the LM-100 GTG system) of 43 dBA (which is approximately equivalent to 60 dB unweighted). Because the majority of Project noise sources would be over ½ mile away, and based on predicted Project contributions, the estimated dairy facility self-generated noise is seen to overshadow the Project equipment noise levels (by a difference on the order of 14 or more dB). Thus, no noise impacts from the Project are expected at the closest potential dairy facilities.

5.5.4 Mitigation Measures

The implementation of Project design features during the detailed design process will result in the operation of the Project meeting the Kern County Noise Element limits, as well as the CEC's significance impact threshold. In addition, the Project has incorporated mitigation measure NOISE-1 to reduce the construction and operation traffic impacts to less-than-significant levels.

Noise-1

Several traffic noise mitigation measures were explored. These measures included noise barriers, spacing of delivery times, use of alternate routes, and vehicle speed restrictions. After careful evaluation, it was determined that reducing vehicle speeds was the most effective mitigation.

Acoustical calculations using the TNM Model as described in Section 5.5.2.6 were performed to evaluate reduced vehicle speed as a traffic noise mitigation measure. Based on this analysis, it was determined that noise levels could be reduced in the vicinity of the sensitive receptor locations by limiting vehicle speeds. By limiting the speed of employee vehicles to 35 miles per hour and all trucks to 30 miles per hour within 250 feet of residential structures along Stockdale Highway, noise levels would be reduced to below the Kern County General Plan exterior requirement of 65 dBA L_{dn}. Therefore, the Project has committed to train drivers of construction and delivery vehicles that reduced vehicle speeds within 250 feet of residential structures are required as part of the Project.

5.5.5 Laws, Ordinances, Regulations, and Standards

This section describes LORS for the control of noise, as summarized in Table 5.5-21, Summary of LORS – Noise.

Table 5.5-21
Summary of LORS – Noise

LORS	Applicability	Section
Federal Jurisdiction		
USEPA 1974 Noise Guidelines	Guidelines for state and local governments.	Section 5.5.5.1
Noise Control Act (1972) as amended by the Quiet Communities Act (1978); (42 USC 4901-4918)	Separate noise-sensitive areas are encouraged.	
State Jurisdiction		
CEC	This agency has established guidelines for noise generated during operation and construction of the project. It identifies criteria for the determination of significant impact on residential areas.	Section 5.5.5.2
Cal/OSHA Occupational Noise Exposure Regulations (8 CCR, General Industrial Safety Orders, Article 105, Control of Noise Exposure, § 5095, *et seq*.)	Sets employee noise exposure limits. Equivalent to Federal OSHA standards.	Section 5.5.5.2
California Vehicle Code	Regulates vehicle noise limits on California highways.	Section 5.5.5.2
Local Jurisdiction		
Kern County General Plan (Chapter 3 – Noise Element)	This requirement is applicable to stationary and temporary construction noise sources such as the project. It requires proposed commercial and industrial uses or operations be designed so they will not significantly impact noise sensitive areas.	Section 5.5.5.3

Source: URS Corporation, 2009.

Notes:
Cal/OSHA = California Occupational Safety and Health Administration
CCR = California Code of Regulations
CEC = California Energy Commission
LORS = laws, ordinances, regulations, and standards
OSHA = Occupational Safety and Health Administration
USC = United States Code
USEPA = U.S. Environmental Protection Agency

5.5.5.1 Federal

There are no noise-related federal LORS that affect this Project. However, there are guidelines at the federal level that direct the consideration of a broad range of noise issues as listed below:

- National Environmental Policy Act (42 United States Code [USC] 4321, *et seq*.) (Public Law [PL]-91-190)
- Noise Control Act of 1972 (42 USC 4910)

The USEPA has not promulgated standards or regulations for environmental noise generated by power plants. However, USEPA has published a guideline (USEPA Levels Document, Report

No. 556/9-74-664) containing recommendations for noise levels affecting residential land use. 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.

Occupational Safety and Health Administration. In the U.S., worker noise exposure limits are regulated by OSHA under the Occupational Safety and Health Act of 1970[6]. The noise exposure level for workers is limited to 90 dBA over a time-weighted average (TWA) 8-hour work shift to protect hearing[7]. If there are workers exposed to a $TWA_{8\text{-hr}}$ above 85 dBA (i.e., the OSHA Action Level), then the regulations call for a worker hearing protection program that includes baseline and periodic hearing testing, availability of hearing protection devices, and training in hearing damage prevention.

5.5.5.2 State of California

California Energy Commission

Under CEC siting requirements, new-source noise impacts at residential receptors are evaluated with respect to the pre-existing background noise level or specific local performance standards. The CEC typically defines an area as negligibly impacted by a project where operation potentially increases existing ambient noise levels by 5 dBA or less. CEC defines the ambient background noise level as the lowest 4-consecutive-hour logarithmic-average L_{90} at a 25-hour measurement site, and the lowest L_{90} at a short-term measurement site.

CEC also considers construction noise as typically insignificant if all of the following are true:

- The construction activity is temporary.
- Use of heavy equipment and noisy activities is limited to daytime hours.
- All feasible noise abatement measures are implemented for noise-producing equipment.

California Department of Transportation (Caltrans)

Based on FHWA (23 CFR 772) and Caltrans (Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects, 2006), traffic noise impacts for new highway construction projects occur when the predicted noise level, in terms of peak-hour traffic noise, approaches the Noise Abatement Criteria (66 dBA for residential areas) or when a substantial noise increase occurs. In the State of California, a substantial noise increase is

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[6] *OSHA noise regulations are established in Code of Federal Regulation (CFR) Title 29, Part 1910-G, Section 191095, "Occupational Noise Exposure."*

[7] *In practice, workers are routinely exposed to varying noise levels for their 8-hour shift. So, to compute the entire shift's time-weighted average (higher level means shorter duration and vice versa), the other key component of worker noise exposure – the exchange rate – comes into play. The exchange rate is simply the decibel trade-off factor for exposure duration. Under OSHA regulations, the exchange rate is 5 dB. Thus, for every 5 dB increase in sound level, the allowable exposure duration is halved (i.e., 90 dB(A) for 8 hours, 95 dB(A) for 4 hours, 100 dB(A) for 2 hours, etc.).*

defined as when the project's predicted worst-hour design-year noise level exceeds the existing worst-hour noise level by 12 dBA.

In identifying traffic noise impacts, primary consideration is given to exterior areas. In situations where there are no exterior activities, or where the exterior activities are far removed from the roadway or physically shielded in a manner that prevents an impact on exterior activities, an interior criterion of 52 dBA is used as the basis for determining noise impacts.

California Occupational Safety and Health Administration

Occupational exposure to noise is regulated by Cal/OSHA in Title 8, Group 15, Article 105, § 5095 to § 5100. This standard stipulates that protection against the effects of noise exposure will be provided when sound levels exceed 90 dBA over an 8-hour exposure period. Protection will consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to within acceptable levels, personal protective equipment will be provided and used to reduce exposure to the employee. Additionally, a Hearing Conservation Program must be instituted by the employers whenever employee noise exposure equals or exceeds the Action Level of an 8-hour time-weighted average (TWA) sound level of 85 dBA. The Hearing Conservation Program requirements consist of periodic area and personal noise monitoring, performance and evaluation of audiograms, provision of hearing protection, annual employee training, and record keeping.

California Vehicle Code

Noise limits for highway vehicles are regulated under the California Vehicle Code, § 27151. The limits are enforceable on the highways by the California Highway Patrol and the County Sheriff's Office.

5.5.5.3 Local

Noise Element to the Kern County General Plan

The Noise Element of the Kern County General Plan requires proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise-sensitive land uses to exterior noise levels in excess of 65 dBA L_{dn}, and interior noise levels in excess of 45 dBA L_{dn}.

5.5.6 Involved Agencies and Agency Contacts

5.5.6.1 Federal

No agencies were contacted.

5.5.6.2 State

No agencies were contacted.

5.5.6.3 County

No agencies were contacted.

5.5.7 Permits Required and Permit Schedule

No permits are required for noise.

5.5.8 References

42 United States Code (U.S.C.). The Noise Control Act of 1972, as amended, 42 U.S.C. § 4901 § 4918 *et seq.*

Beranek, Leo, 1988. *Noise and Vibration Control*. Revised Edition. Institute of Noise Control Engineering. Washington, D.C.

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CCR (California Code of Regulations), 1983. Title 8, Article 105, § 5095. October 3.

CEC (California Energy Commission), 1997. Rules of Practice and Procedure, Power Plant Site Certification Regulations.

County of Kern, 2005. Zoning Ordinance of Kern County. Chapter 8.36 Noise Control. February.

County of Kern, 2007. Kern County General Plan. Noise Element. March 13.

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Harris, Cyril M., 1998. *Handbook of Acoustical Measurements and Noise Control, Third Edition*. McGraw Hill, Inc.

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Miller, L.N., E.W. Wood, R.M. Hoover, A.R. Thompson, S.L. Thompson, and S.L. Paterson, 1978. *Electric Power Plant Environmental Noise Guide, Vol. 1*. (EPPENG) Bolt Beranek & Newman, Inc. Cambridge, Massachusetts. Prepared for the Edison Electric Institute, New York.

URS Corporation, 2009. Field work, data collection, and vehicular traffic modeling analysis.

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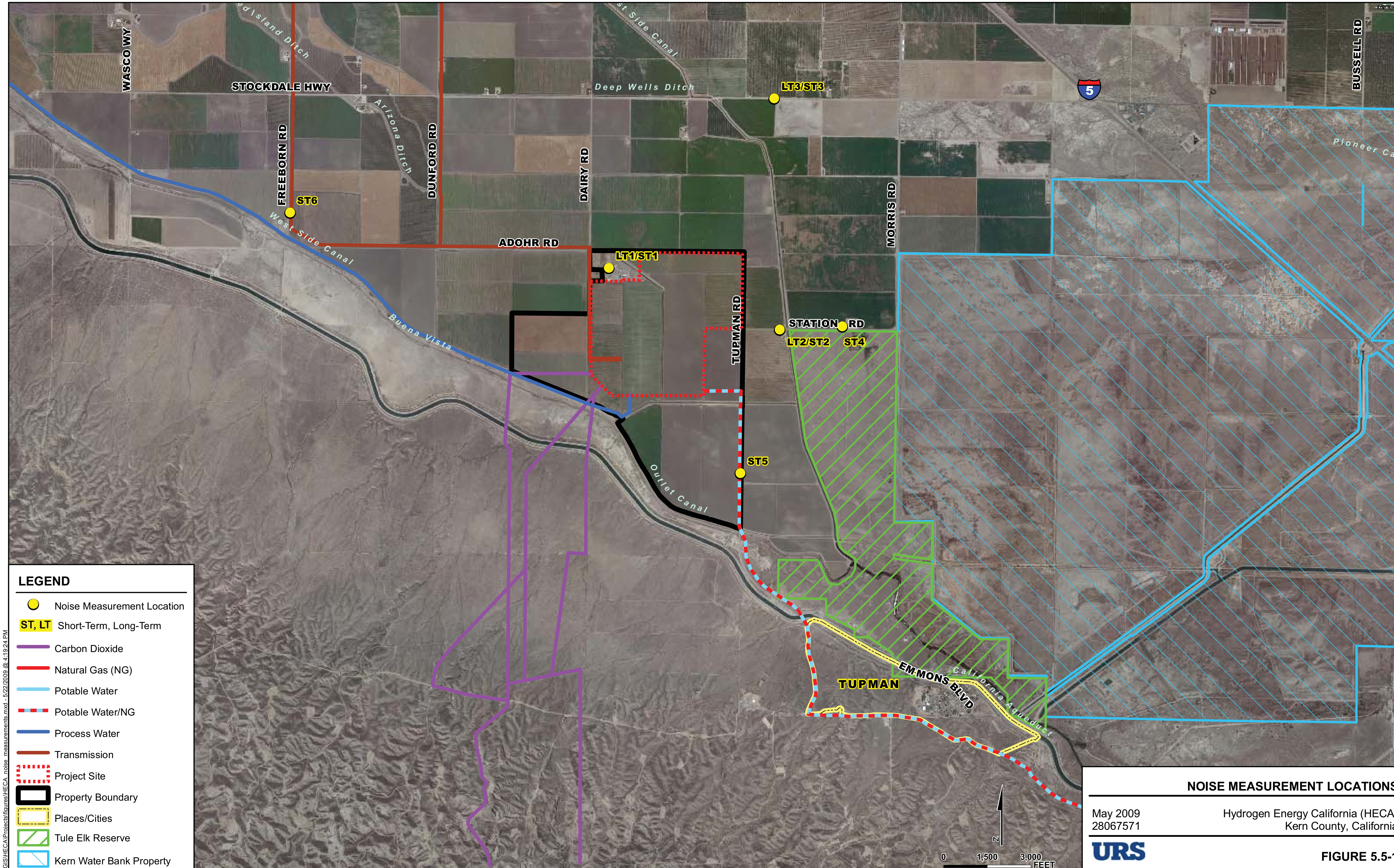
USEPA (U.S. Environmental Protection Agency), 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, EPA Report 55019-74-004. Washington, DC.

USEPA (U.S. Environmental Protection Agency), 1978. *Protective Noise Levels*. Office of Noise Abatement and Control. Report number EPA 550/9-79-100. Washington, D.C. 20460.



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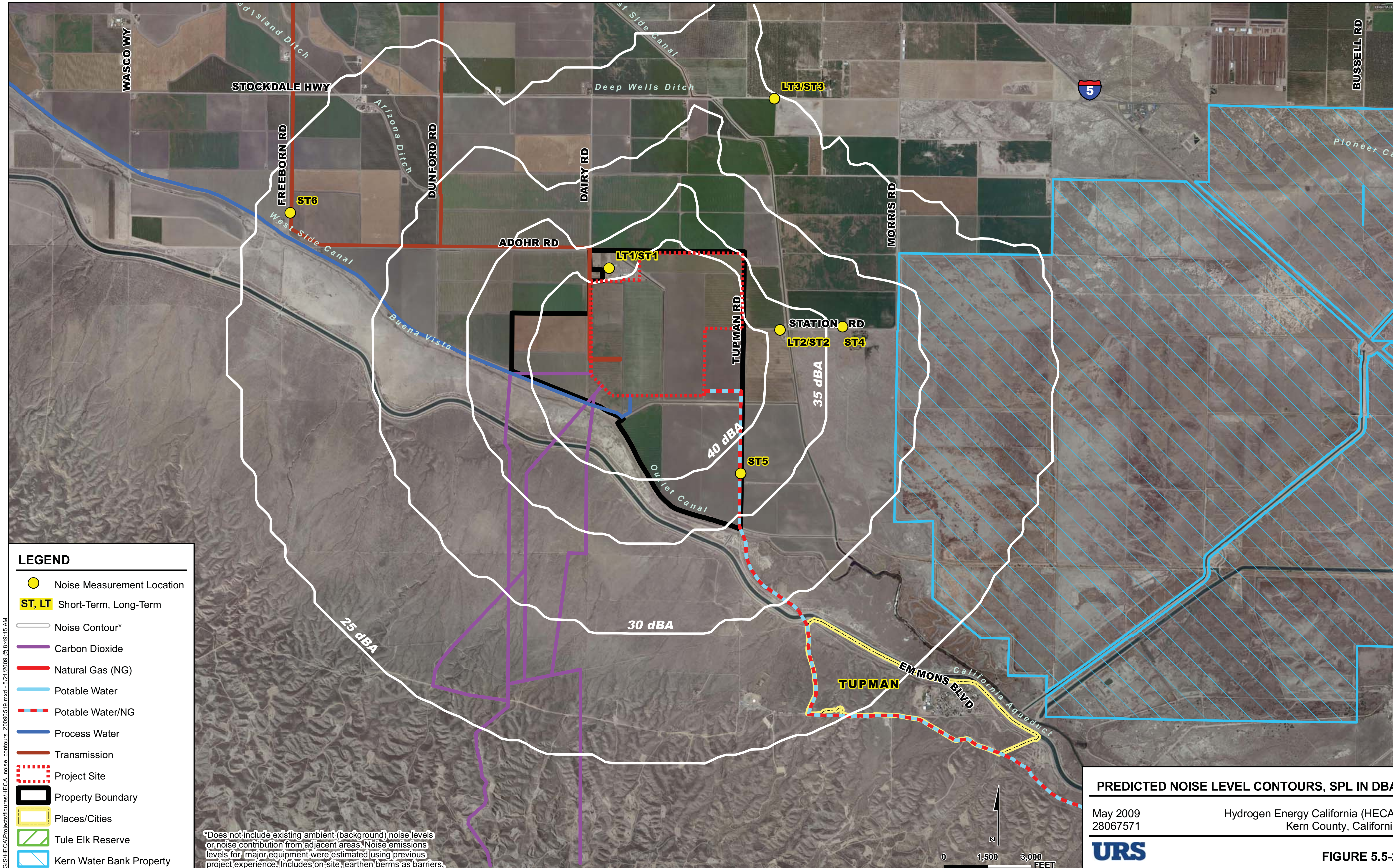
Source: Aerial Photo, Digital Globe, June 1, 2008; Kern Water Bank Property, Kern County Parcels, 2008; Tule Elk Reserve, California State Parks, 2008; Roads, Kern County, 2008; Waterways, US Census Bureau Tiger Data, 2000; Places, ESRI Streetmap Data, 2000-2005; Sensitive Receptors, URS, January 2009 and USGS Geographic Names Information System (GNIS), December 2008.



PREDICTED NOISE LEVEL CONTOURS, SPL IN DBA

May 2009 — Hydrogen Energy California (HECA)
28067571 — Kern County, California

FIGURE 5.5-2

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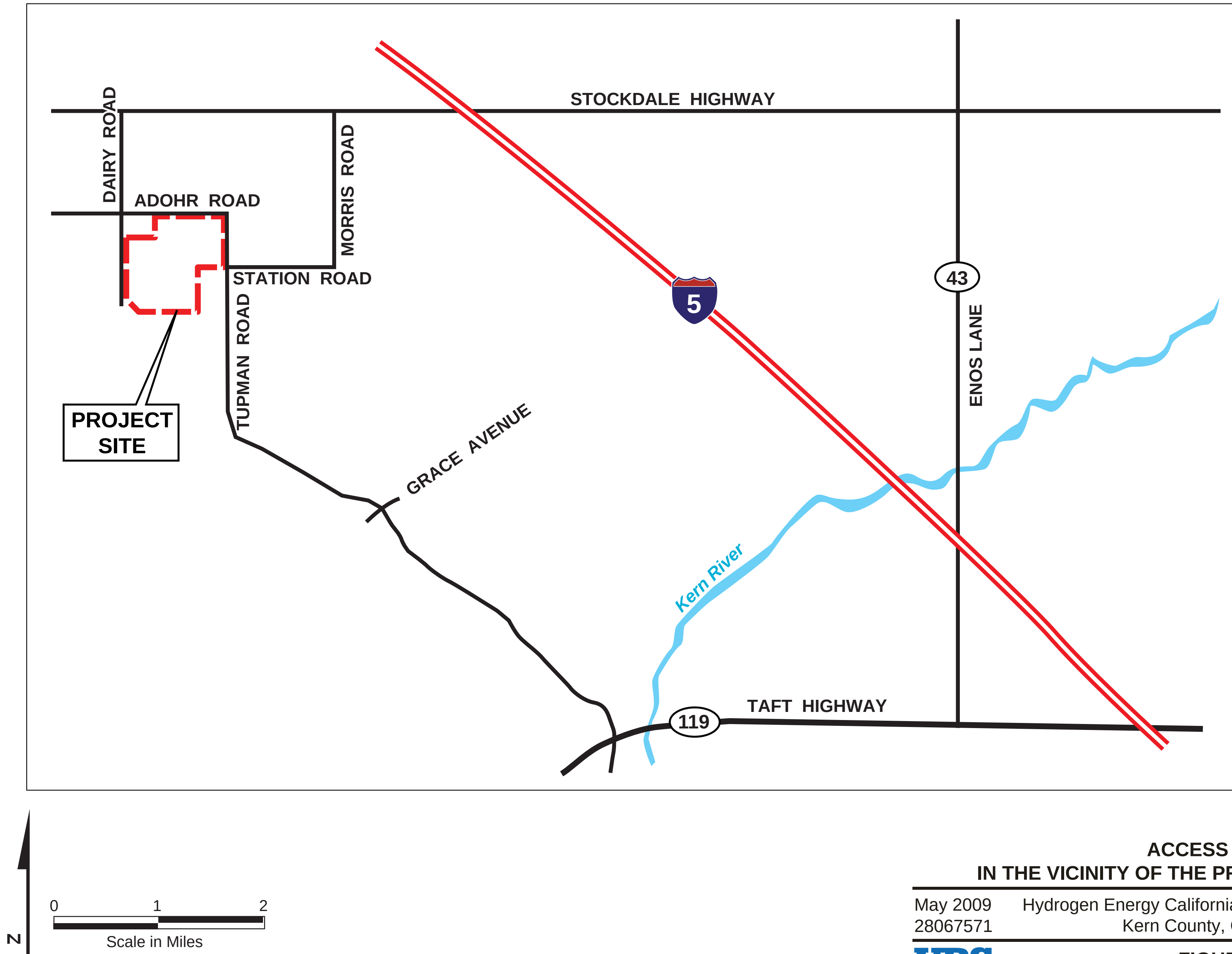
Source: Aerial Photo, Digital Globe, June 1, 2008; Kern Water Bank Property, Kern County Parcels, 2008; Tule Elk Reserve, California State Parks, 2008; Roads, Kern County, 2008, Waterways, US Census Bureau Tiger Data, 2000; Places, ESRI Streetmap Data, 2000-2005; Sensitive Receptors, URS, January 2009 and USGS Geographic Names Information System (GNIS), December 2008.



ACCESS ROADS
IN THE VICINITY OF THE PROJECT

May 2009 Hydrogen Energy California (HECA)
28067571 Kern County, California

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FIGURE 5.5-3

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Adequacy Issue: Adequate ____ Inadequate ____ DATA ADEQUACY WORKSHEET Revision No. 0 Date ____

Technical Area: **Noise** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

Siting Regulations	**Information**	**AFC Page Number And Section Number**	**Adequate Yes Or No**	**Information Required To Make AFC Conform With Regulations**
Appendix B (g) (1)	...provide a discussion of the existing site conditions, the expected direct, indirect and cumulative impacts due to the construction, operation and maintenance of the project, the measures proposed to mitigate adverse environmental impacts of the project, the effectiveness of the proposed measures, and any monitoring plans proposed to verify the effectiveness of the mitigation.	Section 5.5.1, p. 5.5-3 Section 5.5.2, p. 5.5-20 Section 5.5.3, p. 5.5-44 Section 5.5.4, p. 5.5-44		
Appendix B (g) (4) (A)	A land use map which identifies residences, hospitals, libraries, schools, places of worship, or other facilities where quiet is an important attribute of the environment within the area impacted by the proposed project. The area potentially impacted by the proposed project is that area where, during either construction or operation, there is a potential increase of 5 dB(A) or more, over existing background levels.	Section 5.5.1.3, p. 5.5-7		

Adequacy Issue: Adequate ____ Inadequate ____ **DATA ADEQUACY WORKSHEET** Revision No. 0 Date ____

Technical Area: **Noise** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

Siting Regulations	**Information**	**AFC Page Number And Section Number**	**Adequate Yes Or No**	**Information Required To Make AFC Conform With Regulations**
Appendix B (g) (4) (B)	A description of the ambient noise levels at those sites identified under subsection (g)(4)(A) which the applicant believes provide a representative characterization of the ambient noise levels in the project vicinity, and a discussion of the general atmospheric conditions, including temperature, humidity, and the presence of wind and rain at the time of the measurements. The existing noise levels shall be determined by taking noise measurements for a minimum of 25 consecutive hours at a minimum of one site. Other sites may be monitored for a lesser duration at the applicant's discretion, preferably during the same 25-hour period. The results of the noise level measurements shall be reported as hourly averages in Leq (equivalent sound or noise level), L_{DN} (day-night sound or noise level) or CNEL (Community Noise Equivalent Level) in units of dB(A). The L10, L50, and L90 values (noise levels exceeded 10 percent, 50 percent, and 90 percent of the time, respectively) shall also be reported in units of dB(A).	Section 5.5.1.3, p. 5.5-7 Section 5.5.1.4, p. 5.5-17		
Appendix B (g) (4) (C)	A description of the major noise sources of the project, including the range of noise levels and the tonal and frequency characteristics of the noise emitted.	Section 5.5.2.1, p. 5.5-21 Section 5.5.2.2, p. 5.5-25 Section 5.5.2.3, p. 5.5-26		

Adequacy Issue: Adequate ____ Inadequate ____ **DATA ADEQUACY WORKSHEET** Revision No. 0 Date ____

Technical Area: **Noise** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

Siting Regulations	Information	AFC Page Number And Section Number	Adequate Yes Or No	Information Required To Make AFC Conform With Regulations
Appendix B (g) (4) (D)	An estimate of the project noise levels, during both construction and operation, at residences, hospitals, libraries, schools, places of worship or other facilities where quiet is an important attribute of the environment, within the area impacted by the proposed project.	Section 5.5.2.1, p. 5.5-21 Section 5.5.2.2, p. 5.5-25 Table 5.5-12, p. 5.5-21 Table 5.5-13, p. 5.5-22 Table 5.5-14, p. 5.5-24 Figure 5.5-2		
Appendix B (g) (4) (E)	An estimate of the project noise levels within the project site boundary during both construction and operation and the impact to the workers at the site due to the estimated noise levels.	Section 5.5.2.1, p. 5.5-21 Section 5.5.2.2, p. 5.5-25 Section 5.5.2.3, p. 5.5-26 Section 5.5.2.5, p. 5.5-38 Table 5.5-12, p. 5.5-21 Table 5.5-13, p. 5.5-22 Table 5.5-14, p. 5.5-24		
Appendix B (g) (4) (F)	The audible noise from existing switchyards and overhead transmission lines that would be affected by the project and estimates of the future audible noise levels that would result from existing and proposed switchyards and transmission lines. Noise levels shall be calculated at the property boundary for switchyards and at the edge of the rights-of-way for transmission lines.	Section 4.0		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Noise** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (i) (1) (A)	Tables which identify laws, regulations, ordinances, standards, adopted local, regional, state, and federal land use plans, leases, and permits applicable to the proposed project, and a discussion of the applicability of, and conformance with each. The table or matrix shall explicitly reference pages in the application wherein conformance, with each law or standard during both construction and operation of the facility is discussed; and	Section 5.5.5, p. 5.5-45 Table 5.5-21, p. 5.5-45		
Appendix B (i) (1) (B)	Tables which identify each agency with jurisdiction to issue applicable permits, leases, and approvals or to enforce identified laws, regulations, standards, and adopted local, regional, state and federal land use plans, and agencies which would have permit approval or enforcement authority, but for the exclusive authority of the commission to certify sites and related facilities.	Section 5.5.5, p. 5.5-45 Table 5.5-21, p. 5.5-45		
Appendix B (i) (2)	The name, title, phone number, address (required), and email address (if known), of an official who was contacted within each agency, and also provide the name of the official who will serve as a contact person for Commission staff.	Section 5.5.6, p. 5.5-48		
Appendix B (i) (3)	A schedule indicating when permits outside the authority of the commission will be obtained and the steps the applicant has taken or plans to take to obtain such permits.	Section 5.5.7, p. 5.5-48		