TABLE OF CONTENTS

Tables

Figures

5.12 NOISE

This section describes the existing noise environment in the vicinity of the Project and assesses the potential noise effects associated with the Project. Specifically, the assessment consists of (1) identifying sensitive receptors that may be affected by noise as well as identifying all applicable laws, ordinances, regulations, and standards (LORS) that regulate noise emissions at those receptors; (2) monitoring existing noise levels at the locations of sensitive receptors potentially affected by noise; (3) predicting Project noise levels at those receptor locations using three-dimensional computer modeling techniques; (4) comparing projected Project noise emissions to local and state performance standards for the control of noise; and (5) incorporating noise controls, if necessary, into the design of the Project to meet all state and local requirements.

The maximum potential increase in far field noise levels (i.e., where the sound field is spreading spherically and hence dissipating with increasing distance from the source) due to Project operation is 0.8 A-weighted decibels (dBA) above existing operational noise levels. In the context of the existing ambient noise environment, off-site noise levels as a result of the Project will be essentially unchanged from existing conditions. In summary, the results of this analysis indicate that the noise associated with the Project will wholly conform to limits established by the City of Carson General Plan (GP) Noise Element (2006), the City of Carson Noise Control Ordinance, and siting standards promulgated by the California Energy Commission (CEC).

5.12.1 Affected Environment

The Project Site is a 2.5-acre brown field site located within the boundary of the existing Watson Cogeneration Facility, which is a 21.7-acre area within the 428-acre parcel further described as Assessors Parcel Number (APN) 7315-006-003, 1801 Sepulveda Boulevard, Carson, California, 90745 and is integral to BP's existing Carson Refinery (BP Refinery). The street address of the Project Site is located within the boundary of the existing Watson Cogeneration Facility at 22850 South Wilmington Avenue, Carson, California. Figure 3-1, Regional Map, depicts the Project Site and surrounding area. An existing warehouse/maintenance shop on a portion of the site will be removed as part of the Project. The Project Site is located approximately 0.7 mile south of the 405 Freeway, roughly bounded by Wilmington Avenue to the west, East Sepulveda Boulevard to the south, and South Alameda Street to the east.

The Project Site elevation is approximately 32 feet above mean sea level (MSL). Because the site is located within the existing refinery property boundary, the Project Site and surrounding areas are highly developed, and have been subject to disturbance for many years.

The Project's primary objective is to provide additional process steam in response to the refinery's process steam demand. The Project complements the existing cogeneration facility located within the confines of the refinery. The existing facility has four General Electric (GE) 7EA combustion turbine generators (CTGs), four heat recovery steam generators (HRSGs), and two steam turbine generators. The Project consists of adding a fifth CTG/HRSG to the existing configuration and is referred to as the "fifth train."

The Construction Laydown and Parking Area is a paved 25-acre parcel located approximately 1 mile southeast of the Project Site, at the northeast corner of East Sepulveda Boulevard and

South Alameda Street. The area is owned by BP and is currently used as a truck parking and staging area.

No off-site improvements associated with the Project, such as water supply, natural gas or wastewater pipelines, are currently planned for the Project. The Project will connect to the existing supply pipelines currently located at the facility.

5.12.1.1 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. 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.

5.12.1.2 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 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 Day-Night Average Sound Level (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 5.12-1, Sound Levels of Typical Noise Sources and Noise Environments (A-weighted Sound Levels).

Table 5.12-1
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 ft)	140	Carrier Flight Deck	–
Civil Defense Siren (100 ft)	130	–	–
Commercial Jet Take-off (200 ft)	120	–	**Threshold of Pain** *32 times as loud
Pile Driver (50 ft)	110	Rock Music Concert	*16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Power Lawn Mower (3 ft)	100	–	**Very Loud** *8 times as loud
Propeller Plane Flyover (1,000 ft) Diesel Truck, 40 mph (50 ft) Motorcycle (25 ft)	90	Boiler Room Printing Press Plant	*4 times as loud
Garbage Disposal (3 ft)	80	High Urban Ambient Sound	*2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (3 ft)	70	–	**Moderately Loud** *70 dBs (Reference Loudness)
Air Conditioning Unit (100 ft) Normal Conversation (5 ft)	60	Data Processing Center Department Store	*1/2 as loud
Light Traffic (100 ft)	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 ft)	30	Quiet Bedroom	**Very Quiet**
	20	Recording Studio	
	10	–	**Extremely Quiet**
	0	–	**Threshold of Hearing**

Source: Compiled by Watson Cogeneration Steam and Electric Reliability Project Team 2008 from various published sources and widely used references such as Harris 1991; Berger 2004; and Beranek 1988.

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

5.12.1.3 Existing Conditions

Site Description

Figure 5.12-1, Project Site and Vicinity, depicts the Project and surrounding area. The Project Area consists of the Project Site and the off-site Construction Parking and Laydown Area. The Project Site is located approximately 0.7 mile south of the 405 Freeway, roughly bounded by East 223rd Street to the north, Wilmington Avenue to the west, East Sepulveda Boulevard to the

south, and South Alameda Street to the east, in the City of Carson. The Project Site is located within the boundary of the existing Watson Cogeneration Facility at 22850 South Wilmington Avenue, Carson, California. It is a 2.5-acre parcel further described as APN 7315-006-003. There is a residential neighborhood approximately 3,000 feet to the north of the Project Site.

The Construction Laydown and Parking Area is a paved 25-acre parcel (APN 7315-020-019) located approximately 1 mile southeast of the Project Site, at 2149 East Sepulveda Boulevard which is at the northeast corner of East Sepulveda Boulevard and South Alameda Street. The area is owned by BP, and is currently used as a truck parking and staging area.

The Project Area is zoned Heavy Manufacturing (MH) and is surrounded by existing refineries, intermodal transit yards, several freight rail lines, and other industrial facilities. Land uses of adjoining and nearby properties within 1 mile of the Project Site are varied, consisting of industrial, commercial, and residential properties.

Noise sources in the vicinity of the Project Site consist of roadways, airports (Compton and Long Beach Airports), stationary sources (including industrial, commercial, and construction activity), and railways (including Union Pacific Railroad, Burlington Northern Santa Fe, the Alameda Corridor, and the Los Angeles Metro Blue Line). According to the City of Carson GP Noise Element (2006), the most pervasive noise source within the city, including the Project Area, is vehicular traffic due to large volumes of truck traffic and rail line operations. Field noise measurements, conducted in 1999 and documented in the GP, indicate noise levels from vehicular traffic greater than 65 dBA L_{eq} at all measured locations.

Ambient Noise Level Survey

An ambient noise level survey was conducted on 8 and 9 July 2008 to characterize the acoustic environment in the vicinity of the Project Site. Specifically, noise level data were collected to establish baseline or background levels in the area of potential noise effects (within 1 mile of the Project) before construction and operation of the Project and to characterize noise-sensitive areas (NSAs) that may be potentially exposed to sound level increases as a result of the Project. NSAs are land uses associated with indoor or outdoor activities that may be subject to stress or significant interference from noise. NSAs often include residential dwellings, mobile homes, hotels, motels, hospitals, nursing homes, educational facilities, houses of worship, and libraries. Industrial, commercial, and agricultural land uses are generally not NSAs.

Ambient Survey Procedures

Aerial photography, land use maps, and a detailed site reconnaissance of the Project Area was performed to identify noise-sensitive receivers, such as residences, schools, churches, hospitals, and other locations potentially impacted by noise from the Project. As described in Table 5.12-2, Noise-Monitoring Locations, and shown on Figure 5.12-2, Noise-Monitoring Locations, primarily industrial and commercial facilities were found, with some clusters of residential land use.

Table 5.12-2
Noise-Monitoring Locations

Location	Address	Type of Noise Measurement	Site Description
LT-1	918 East Sepulveda Boulevard	Long-term	Within an easement for a gas pipeline, mounted on a telephone pole next to the residence at 918 East Sepulveda Boulevard
LT-2	North of 13 Squaw Peak Lane	Long-term	Northeastern side of the wall separating Avalon Village from adjacent industrial/business complexes off of Banning
LT-3	1260 East 222nd Street	Long-term	Next to 1260 East 222nd Street, mounted on a telephone pole off of Lucerne Street
ST-1	1830 West Columbia Street	Short-term	Parking lot of the Stephens Middle School, located at 1830 West Columbia Street
ST-2	Terminus of Hesperian Avenue	Short-term	Terminus of Hesperian Avenue, a residential street

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.

A total of five sites were selected for noise monitoring. These sites were selected due to their proximity to the Project Site and the Construction Laydown and Parking Area. Of these five sites, three had long-term monitors set up for a minimum of 25 continuous hours. The two short-term sites were monitored manually. Three measurements of 15-minute duration were conducted at each of the short-term sites. These measurements consisted of one daytime and two nighttime periods at each location. As shown in Figure 5.12-2, Noise-Monitoring Locations, noise-monitoring locations provided adequate spatial representation of nearby NSAs, and the measurement locations are representative receivers of existing ambient noise levels within the study area. Photographs of all noise monitoring locations and equipment setups are provided in Appendix M, Noise Measurements. Descriptions of the five noise-monitoring sites follow.

LT-1: This measurement location was in an easement for a gas pipeline; the monitor was mounted on a telephone pole next to the residence at 918 East Sepulveda Boulevard. The measurement location is approximately 4,000 feet southwest of the Project Site and represents the second-closest residential receptors.

LT-2: This measurement location was on the northeastern side of the wall separating Avalon Village from adjacent industrial/business complexes off of Banning, near Squaw Peak Lane. The measurement location is approximately 4,400 feet west of the Project Site.

LT-3: This measurement location was next to 1260 East 222nd Street; the monitor was mounted on a telephone pole off of Lucerne Street. The measurement location is approximately 3,300 feet northwest of the Project Site and is the closest residential receptor.

ST-1: This measurement location was situated in the parking lot of the Stephens Middle School, which is located at 1830 West Columbia Street. The location is the nearest school to the Project Site. This measurement location is also the site nearest to the Project Construction Laydown and Parking Area.

ST-2: This measurement location was situated at the dead end of Hesperian Avenue. The site is the nearest residential location east of the Project Site and the second closest to the Project Construction Laydown and Parking Area.

The dominant daytime noise sources were aircraft overflights, roadway traffic, train noise, and children playing. Evening noise sources primarily consisted of aircraft overflights, back-up alarms from nearby heavy trucks, roadway traffic, train noise, children playing, dogs barking, and an electric saw. Nighttime noise sources included aircraft overflights, roadway traffic, train noise, and back-up alarms from nearby heavy trucks.

Instrumentation

Four Larson Davis 820 Type I Sound Level Meters (Serial Numbers: 1324, 1635, 1651, and 1652) were used to monitor existing ambient conditions. The sound measurement instruments meet the requirements of the American National Standards Institute Standard S1.4-1983 and the International Electrotechnical Commission Publications 804 and 651 and are the best instrumentation available outside of specialized laboratory settings. Acoustic laboratory calibration was performed on all meters at the Larson Davis labs. The laboratory calibrations were performed within a 12-month period using references traceable to the National Institute of Standards and Technology. A Field calibrator (Larson Davis Model CAL200 Acoustic Calibrator Serial Number 5789) was used to conduct field calibration checks on each meter before and after each measurement period. Complete instrument specifications and calibration certificates are provided in Appendix M, Noise Measurements.

Meteorological Conditions

Wind conditions were calm during the survey period. Temperatures ranged from 71 degrees Fahrenheit during the night to 85 degrees Fahrenheit during the day. The relative humidity was 50 to 60 percent. Cloud cover was estimated to be 20 percent, with scattered clouds, which indicated the absence of temperature inversion layers. No precipitation occurred during the survey. Meteorological conditions were favorable for monitoring environmental noise during the entire survey period.

Noise Sources

The primary noise source for all measurement sites was traffic. The Project Site is near the Ports of Los Angeles and Long Beach, adjacent to the Alameda Corridor train line, and is a heavy truck route in and out of the area. Also, existing industrial activity around the site was apparent, with most sound emissions generated by diesel trucks. Table 5.12-3, Description of Ambient Noise at Each Measurement Location, provides a description of the ambient noise sources observed at each measurement position. The existing power generating units of the Watson Cogeneration Facility and the BP Carson Refinery were in operation for the entirety of the field noise survey. The facilities were not audible at any of the noise-sensitive receptors surveyed.

Table 5.12-3
Description of Ambient Noise at Each Measurement Location

Location	Ambient Noise Sources
LT-1	Primarily traffic along Sepulveda Boulevard, including a high percentage of heavy truck traffic; aircraft overflights.
LT-2	Truck traffic to and from industrial/commercial facilities; regular vehicular activities; neighborhood activities within the Scottsdale neighborhood; aircraft overflights.
LT-3	Highway traffic on Interstate 405; aircraft overflights; vehicular and truck traffic on 223rd Street.
ST-1	Roadway and train noise; children playing; aircraft overflights.
ST-2	Roadway and train noise; aircraft overflights.

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.

Noise Measurement Results

Background (L_{90}) noise levels ranged from approximately 45.9 to 66.5 dBA at the three long-term sites and 48.1 to 58.2 at the two short-term sites. These levels were controlled by traffic along arterial roadways. At four of the five measurement locations, background (L_{90}) levels were higher during daytime hours than during nighttime hours. This result was likely due to increased truck traffic volumes during daytime hours.

Table 5.12-4, LT-1: 25-Hour Noise Measurement Results (dBA), Table 5.12-5, LT-2: 25-Hour Noise Measurement Results (dBA), and Table 5.12-6, LT-3: 25-Hour Noise Measurement Results (dBA), provide the long-term noise measurement results for LT-1, LT-2 and LT-3, respectively, for the 25-hour measurement periods. Table 5.12-7, Short-Term (15-Minute) Noise Measurement Results (dBA), provides the short-term noise measurement results for ST-1 and ST-2. The Field Measurement Data Sheets documenting survey measurement and weather data are provided in Appendix M, Noise Measurements.

Table 5.12-4
LT-1: 25-Hour Noise Measurement Results (dBA)

Start Date	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
7/8/2008	4:00 p.m.	4:59 p.m.	59.7	53.2	76.2	62.1	58.1	55.8
7/8/2008	5:00 p.m.	5: 59 p.m.	59.5	54.3	74.7	61.8	58.2	56.1
7/8/2008	6:00 p.m.	6: 59 p.m.	60.4	54.3	71.7	62.1	59.8	58.0
7/8/2008	7:00 p.m.	7: 59 p.m.	65.3	54.9	74.7	66.9	65.2	62.6
7/8/2008	8:00 p.m.	8: 59 p.m.	64.4	54.2	83.3	66.4	63.9	60.7
7/8/2008	9:00 p.m.	9: 59 p.m.	62.5	54.5	93.1	60.0	56.7	55.6
7/8/2008	10:00 p.m.	10: 59 p.m.	57.9	54.6	79.1	59.2	56.3	55.3
7/8/2008	11:00 p.m.	11: 59 p.m.	55.9	49.0	71.4	57.3	54.4	53.4
7/9/2008	12:00 a.m.	12: 59 a.m.	52.6	48.2	67.4	54.8	50.7	49.4
7/9/2008	1:00 a.m.	1: 59 a.m.	52.0	47.2	67.2	54.1	49.7	48.6
7/9/2008	2:00 a.m.	2: 59 a.m.	54.8	46.4	73.3	56.8	52.5	49.4
7/9/2008	3:00 a.m.	3: 59 a.m.	51.8	44.2	71.1	54.1	49.4	47.2
7/9/2008	4:00 a.m.	4: 59 a.m.	53.6	45.7	75.1	55.5	50.4	48.2
7/9/2008	5:00 a.m.	5: 59 a.m.	56.6	45.4	81.4	58.5	52.4	49.2
7/9/2008	6:00 a.m.	6: 59 a.m.	58.3	47.5	83.5	60.4	55.1	51.5

Table 5.12-4
LT-1: 25-Hour Noise Measurement Results (dBA)

Start Date	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
7/9/2008	7:00 a.m.	7: 59 a.m.	58.5	49.7	73.5	61.4	56.4	53.1
7/9/2008	8:00 a.m.	8: 59 a.m.	58.5	50.8	71.6	61.2	56.8	53.9
7/9/2008	9:00 a.m.	9: 59 a.m.	60.1	49.0	81.2	62.6	57.7	54.7
7/9/2008	10:00 a.m.	10: 59 a.m.	59.8	51.1	74.3	62.9	57.6	54.6
7/9/2008	11:00 a.m.	11: 59 a.m.	58.8	50.7	78.1	61.4	56.6	53.9
7/9/2008	12:00 p.m.	12: 59 p.m.	64.8	48.8	79.2	67.7	63.9	60.1
7/9/2008	1:00 p.m.	1: 59 p.m.	76.5	48.6	96.2	79.9	72.3	63.3
7/9/2008	2:00 p.m.	2: 59 p.m.	57.9	49.2	80.0	60.9	55.3	51.6
7/9/2008	3:00 p.m.	3: 59 p.m.	57.8	48.0	73.1	61.1	55.3	51.4
7/9/2008	4:00 p.m.	4: 59 p.m.	59.9	49.2	84.0	62.8	56.1	52.1

48.4	= Quietest L_{90} (average of quietest four consecutive hours, 1:00 a.m. through 4:59 a.m., as shaded above)
65.9	= L_{dn}
66.6	= CNEL

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.
Notes:

a.m.	=	morning	L_{dn}	=	Day-Night Level
CNEL	=	Community Noise Equivalent Level	L_{eq}	=	equivalent sound energy level
dBA	=	"A-weighted" decibels	L_{max}	=	maximum sound level
$L_{(10)}$	=	sound level exceeded 10 percent of time	L_{min}	=	minimum sound level
$L_{(50)}$	=	sound level exceeded 50 percent of time	p.m.	=	evening
$L_{(90)}$	=	sound level exceeded 90 percent of time			

Table 5.12-5
LT-2: 25-Hour Noise Measurement Results (dBA)

Start Date	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
7/8/2008	4:30 p.m.	5:29 p.m.	67.2	51.1	94.6	68.5	59.2	53.5
7/8/2008	5:30 p.m.	6:29 p.m.	63.9	51.5	89.8	67.4	57.2	54.0
7/8/2008	6:30 p.m.	7:29 p.m.	63.6	51.8	89.1	64.9	56.6	53.9
7/8/2008	7:30 p.m.	8:29 p.m.	61.1	50.1	87.3	62.6	54.4	52.1
7/8/2008	8:30 p.m.	9:29 p.m.	60.7	49.3	82.7	61.3	54.4	51.6
7/8/2008	9:30 p.m.	10:29 p.m.	57.7	47.3	84.5	62.0	53.5	48.9
7/8/2008	10:30 p.m.	11:29 p.m.	52.5	44.5	73.5	55.8	48.3	45.9
7/8/2008	11:30 p.m.	12:29 a.m.	56.3	44.5	77.8	54.6	48.9	46.2
7/9/2008	12:30 a.m.	1:29 a.m.	54.8	43.3	76.8	58.3	49.4	46.0
7/9/2008	1:30 a.m.	2:29 a.m.	54.7	43.2	75.9	56.4	48.3	45.4
7/9/2008	2:30 a.m.	3:30 a.m.	52.9	42.4	80.8	56.6	48.7	46.7
7/9/2008	3:30 a.m.	4:29 a.m.	54.5	43.0	69.9	50.2	45.8	45.6
7/9/2008	4:30 a.m.	5:29 a.m.	52.7	43.8	78.8	56.8	51.3	45.2
7/9/2008	5:30 a.m.	6:29 a.m.	60.0	44.3	75.3	60.7	51.3	49.2
7/9/2008	6:30 a.m.	7:29 a.m.	62.9	47.5	83.9	64.9	56.0	54.0
7/9/2008	7:30 a.m.	8:29 a.m.	61.1	47.3	80.3	65.8	57.4	50.8
7/9/2008	8:30 a.m.	9:29 a.m.	62.4	47.4	82.4	65.3	56.1	50.9
7/9/2008	9:30 a.m.	10:29 a.m.	62.6	47.3	79.3	65.7	56.3	53.4
7/9/2008	10:30 a.m.	11:29 a.m.	62.8	47.7	81.5	64.0	54.7	53.3
7/9/2008	11:30 a.m.	12:29 p.m.	62.7	48.4	83.6	67.1	60.5	53.9
7/9/2008	12:30 p.m.	1:29 p.m.	62.6	47.6	77.6	65.7	57.6	53.2
7/9/2008	1:30 p.m.	2:29 p.m.	66.2	47.9	81.5	70.5	62.2	55.9
7/9/2008	2:30 p.m.	3:29 p.m.	62.1	45.7	83.3	66.1	58.0	51.8
7/9/2008	3:30 p.m.	4:29 p.m.	62.2	46.7	78.9	66.0	55.5	51.8
7/9/2008	4:30 p.m.	5: 29 p.m.	62.3	47.6	81.7	65.0	56.6	52.9

45.8	= Quietest L_{90} (average of quietest four consecutive hours, 1:30 a.m. through 5:29 a.m., as shaded above)
65.1	= L_{dn}
65.4	= CNEL

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.
Notes:

a.m.	=	morning	L_{dn}	=	Day-Night Level
CNEL	=	Community Noise Equivalent Level	L_{eq}	=	equivalent sound energy level
dBA	=	"A-weighted" decibels	L_{max}	=	maximum sound level
$L_{(10)}$	=	sound level exceeded 10 percent of time	L_{min}	=	minimum sound level
$L_{(50)}$	=	sound level exceeded 50 percent of time	p.m.	=	evening
$L_{(90)}$	=	sound level exceeded 90 percent of time			

Table 5.12-6
LT-3: 25-Hour Noise Measurement Results (dBA)

Start Date	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
7/8/2008	4:30 p.m.	5:29 p.m.	61.7	53.7	78.2	64.5	58.4	56.3
7/8/2008	5:30 p.m.	6:29 p.m.	62.8	53.9	87.0	64.8	58.8	56.9
7/8/2008	6:30 p.m.	7:29 p.m.	62.1	56.3	83.2	63.5	60.4	58.7
7/8/2008	7:30 p.m.	8:29 p.m.	62.0	56.4	77.3	63.5	60.8	59.1
7/8/2008	8:30 p.m.	9:29 p.m.	64.0	56.5	90.2	64.2	60.4	58.6
7/8/2008	9:30 p.m.	10:29 p.m.	61.2	55.4	73.8	62.9	60.2	58.1
7/8/2008	10:30 p.m.	11:29 p.m.	60.4	53.7	76.2	61.9	59.5	57.4
7/8/2008	11:30 p.m.	12:29 a.m.	59.1	50.4	75.4	60.8	57.9	55.1
7/9/2008	12:30 a.m.	1:29 a.m.	60.4	49.8	80.6	62.4	59.4	57.0
7/9/2008	1:30 a.m.	2:29 a.m.	59.8	50.4	75.3	61.9	59.1	56.5
7/9/2008	2:30 a.m.	3:29 a.m.	56.6	49.1	75.5	58.8	55.0	52.5
7/9/2008	3:30 a.m.	4:29 a.m.	61.8	51.9	81.4	63.6	60.8	58.9
7/9/2008	4:30 a.m.	5:29 a.m.	63.7	55.4	81.8	65.3	63.1	61.1
7/9/2008	5:30 a.m.	6:29 a.m.	64.3	57.8	80.2	65.8	63.2	61.5
7/9/2008	6:30 a.m.	7:29 a.m.	66.1	58.7	82.8	67.4	65.1	63.5
7/9/2008	7:30 a.m.	8:29 a.m.	67.8	62.1	81.8	69.4	67.2	65.6
7/9/2008	8:30 a.m.	9:29 a.m.	69.9	64.1	93.1	69.8	67.9	66.5
7/9/2008	9:30 a.m.	10:29 a.m.	68.4	63.7	78.9	70.0	67.8	66.2
7/9/2008	10:30 a.m.	11:29 a.m.	72.8	62.3	97.5	73.4	68.3	66.5
7/9/2008	11:30 a.m.	12:29 p.m.	67.4	60.7	87.2	68.7	66.4	64.7
7/9/2008	12:30 p.m.	1:29 p.m.	68.8	58.4	95.5	68.3	63.4	61.4
7/9/2008	1:30 p.m.	2:29 p.m.	65.3	56.1	92.4	65.8	61.8	59.8
7/9/2008	2:30 p.m.	3:29 p.m.	64.1	54.5	88.5	65.5	60.4	58.1
7/9/2008	3:30 p.m.	4:29 p.m.	62.7	51.9	83.8	66.0	58.0	55.6
7/9/2008	4:30 p.m.	5: 29 p.m.	64.8	52.4	89.3	67.1	57.9	56.3

55.3	= Quietest L_{90} (average of quietest four consecutive hours, 11:30 a.m. through 3:29 a.m., as shaded above)
69.6	= L_{DN}
69.8	= CNEL

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.
Notes:

a.m.	=	morning	L_{dn}	=	Day-Night Level
CNEL	=	Community Noise Equivalent Level	L_{eq}	=	equivalent sound energy level
dBA	=	"A-weighted" decibels	L_{max}	=	maximum sound level
$L_{(10)}$	=	sound level exceeded 10 percent of time	L_{min}	=	minimum sound level
$L_{(50)}$	=	sound level exceeded 50 percent of time	p.m.	=	evening
$L_{(90)}$	=	sound level exceeded 90 percent of time			

Table 5.12-7
Short-Term (15-Minute) Noise Measurement Results (dBA)

Location	Period	Date	Start Time	L_{eq}	L_{min}	L_{max}	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$
ST-1	Day	7/8/2008	3:50 p.m.	51.6	47.1	61.7	54.3	49.6	48.1
ST-1	Evening	7/8/2008	9:30 p.m.	53.5	49.0	72.0	54.9	51.3	50.0
ST-1	Night	7/8/2008	10:35 p.m.	51.7	46.7	71.5	51.8	49.7	48.3
ST-2	Day	7/8/2008	3:10 p.m.	53.6	47.6	68.4	54.6	49.7	48.3
ST-2	Evening	7/8/2008	9:40 p.m.	57.3	52.8	68.8	58.7	55.9	54.6
ST-2	Night	7/8/2008	10:05 p.m.	61.9	56.0	73.2	65.2	59.6	58.2

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.
Notes:
* The cumulative noise metrics CNEL and L_{dn} are not available at these locations, as cumulative metrics are not applicable to short-term measurements.

dBA = "A-weighted" decibels
$L_{(10)}$ = sound level exceeded 10 percent of time
$L_{(50)}$ = sound level exceeded 50 percent of time
$L_{(90)}$ = sound level exceeded 90 percent of time
L_{eq} = equivalent sound energy level
L_{max} = maximum sound level
L_{min} = minimum sound level

5.12.2 Environmental Consequences

Noise would be produced during both the construction of the Project and its operation of the combustion turbines and auxiliary support equipment. This section assesses potential noise effects from both activities. To determine the significance of Project-generated increases in noise levels, the following significance criteria were used. Effects were considered significant if it meets the following criteria.

- Project operation would conflict with the City of Carson Noise Control Ordinance.
- Project operation would conflict with the range thresholds of the Noise & Land Use Compatibility Matrix of the City of Carson GP Noise Element (see Table 5.12-8, City of Carson Noise and Land Use Compatibility Matrix).
- Project operation would conflict with the range thresholds of the Exterior Noise Standards of the City of Carson GP Noise Element (see Table 5.12-9, City of Carson Interior and Exterior Noise Standards).
- Project operation would result in an increase of more than 5 dBA at NSAs (as per CEC performance standards).
- Project construction was not temporary.
- Use of heavy construction equipment and noisy activities was not limited to daytime hours.
- Use of all feasible construction noise abatement measures was not implemented.

The City of Carson Noise and Land Use Compatibility Matrix from the GP is shown in Table 5.12-8, City of Carson Noise and Land Use Compatibility Matrix.

Table 5.12-8
City of Carson Noise and Land Use Compatibility Matrix

Land Use Category	Community Noise Exposure L_{dn} or CNEL, dB			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Low Density	50-60	60-65	65-75	75-85
Residential – Multiple Family	50-60	60-65	65-75	75-85
Transient Lodging – Motels, Hotels	50-65	65-70	70-80	80-85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-60	60-65	65-80	80-85
Auditoriums, Concert Halls, Amphitheaters	NA	50-65	NA	65-85
Sports Arenas, Outdoor Spectator Sports	NA	50-70	NA	70-85
Playgrounds, Neighborhood Parks	50-70	NA	70-75	75-85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-70	NA	70-80	80-85
Office Buildings, Business Commercial and Professional	50-67.5	67.5-75	75-85	NA
Industrial, Manufacturing, Utilities, Agriculture	50-70	70-75	75-85	NA

Sources: City of Carson, 2006. General Plan, Chapter 7 Noise Element, Table N-2.

Notes:

Normally Acceptable: Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable: New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable: New construction or development should generally not be undertaken.

CNEL = Community Noise Equivalent Level
dB = decibels
L_{dn} = Day-Night Level
NA = not applicable

Table 5.12-8, City of Carson Noise and Land Use Compatibility Matrix, presents the criteria used to assess the compatibility of proposed land uses with the noise environment. Table 5.12-9, City of Carson Interior and Exterior Noise Standards, presents the standards and criteria that specify acceptable limits of noise for various land uses within the City.

Table 5.12-9
City of Carson Interior and Exterior Noise Standards

Land Use Categories		CNEL	
Categories	**Users**	**Interior[1]**	**Exterior[2]**
Residential	Single-family Duplex, Multiple Family	45-55	50-60
	Mobile Home	45	65
Commercial Industrial Institutional	Hotel, Motel, Transient Lodging	45	--
	Commercial Retail, Bank, Restaurant	55	--
	Office Building, Research and Development, Professional Offices, City Office Building	50	--
	Amphitheater, Concert Hall, Auditorium, Meeting Hall	45	--
	Gymnasium (Multipurpose)	50	--
	Sports Club	55	--
	Manufacturing, Warehousing, Wholesale, Utilities	65	--
	Movie Theaters	45	--
Institutional	Hospital, Schools' Classrooms	45	65
	Church, Library	45	--
Open Space	Parks	--	65

Source: City of Carson, 2006. General Plan, Chapter 7 Noise Element, Table N-3.

Notes:

[1] Indoor environment including: Bedrooms, living areas, bathrooms, toilets, closets, corridors.

[2] Outdoor environment including: Private yard of single family, multi-family private patio or balcony which is served by a means of exist from inside the dwelling, balconies 6 feet deep or less are exempt, mobile home park, park's picnic area, school's playground

Noise levels requirements with closed windows. Mechanical ventilating system or other means of natural ventilation shall be provided as of Chapter 12, Section 1205 of Uniform Building Code.

Exterior noise levels should be such that interior noise levels will not exceed 45 CNEL.

-- = No Standard Specified

CNEL = Community Noise Equivalent Level

As shown in these tables, an exterior noise level of up to 60 dBA L_{dn} or CNEL is compatible with residential land uses. Similarly, an exterior noise level of up to 70 dBA L_{dn} or CNEL is compatible with industrial land uses within the city.

5.12.2.1 Acoustical Modeling of Operational Noise

The acoustical modeling is based on one GE 7EA CTG, with an inlet fogging system, one duct-fired HRSG, an electrical distribution system, instrumentation and controls, and all necessary auxiliary equipment. Major noise-generating components would include the CTG, STG, and the HRSG. The overall noise level generated by these components at off-site locations depends on the physical layout of the Project and the noise control measures incorporated into the Project design. As part of the Project design, the following noise control equipment listed below will be incorporated.

- Inlet air silencer (with acoustically lined elbow).
- Gas turbine (with sound-attenuated enclosure).
- Exhaust diffuser and duct (with acoustical barrier).

- Gas compressors (with sound-attenuated enclosure).

The incorporation of these noise control devices has been included in the formulation of equipment noise generation values and the modeling of overall noise emissions.

Cadna/A® was used to model the generation and propagation of noise from the Project. Cadna/A® is a three-dimensional software program for prediction and assessment of noise levels in the vicinity of industrial facilities and other noise sources. Cadna/A® uses internationally recognized algorithms (International Organization for Standardization [ISO] 9613-2) for the propagation of sound outdoors to calculate noise levels and presents the resultant noise levels in an easy to understand tabular or graphical format. The program allows for input of all pertinent features (such as terrain or structures) that affect noise, resulting in a highly accurate estimate of existing and future noise levels.

Cadna/A® was used to create a virtual model of the planned Project and other existing nearby structures. Digital terrain modeling was used to account for elevation and terrain features, and aerial photographs were used to model the existing structures. Noise emission levels were input using octave band levels to accurately estimate noise propagation and attenuation effects. To ensure the validity of the results, the model was tested using previously measured and modeled noise data and found to be consistent with both practice and theory.

All pieces of equipment that were deemed to be significant noise sources at the Project were included in the baseline noise model. The Project was assumed to operate 24 hours per day. The set of modeled sources included turbines, generators, pumps, motors, main transformers, HRSGs, and auxiliary equipment. These data are shown in Table 5.12-10, Equipment Sound Power Levels. Small equipment items, such as pumps of less than 25 horsepower, were excluded because they were considered insignificant sources. Nominal noise emissions levels from various sources were used for the modeling inputs. The source-level data included data provided by Watson Cogeneration Company (Applicant), limited vendor data, databases of previously modeled similar projects, and industry-standard estimated sound power values. Major buildings, tanks, and large equipment trains were included as barriers, where appropriate.

Table 5.12-10
Equipment Sound Power Levels

Noise Source		Sound Power Level (dB) at Octave Band Center Frequency (Hz)								
	31.5	**63**	**125**	**250**	**500**	**1,000**	**2,000**	**4,000**	**8,000**	**A-Wt**
HRSG wall	Lw	134	124	122	111	103	95	96	92	85
HRSG stack	Lw	134	136	138	121	108	94	79	70	65
GE 7EA inlet system (w/ 8-foot silencer)	Lw	102	101	94	96	94	89	88	88	91
GE 7EA gas turbine package (w/ acoustical barrier walls)	Lw	121	119	116	108	106	102	101	95	90
Gas compressor	Lw	101	109	105	110	105	102	103	96	91
Exhaust frame blowers	Lw	59	64	76	81	87	85	83	77	69
Ammonia air blower	Lw	59	64	76	81	87	85	83	77	69
Closed cooling water pump	Lw	81	88	86	81	84	82	80	75	70
Water wash skid	Lw	81	88	86	81	84	82	80	75	70
Fogger water drum & pump skid	Lw	81	88	86	81	84	82	80	75	70

Table 5.12-10
Equipment Sound Power Levels

Noise Source		Sound Power Level (dB) at Octave Band Center Frequency (Hz)								
		31.5	63	125	250	500	1,000	2,000	4,000	8,000	A-Wt
Main transformer	Lw	92	96	88	84	80	78	74	74	69
Butane gas valve skid	Lw	81	88	86	81	84	82	80	75	70

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.
Notes:
A-Wt = A-weighted decibel
dB = decibel(s)
GE = General Electric
HRSG = heat recovery steam generator
Hz = hertz
Lw = sound power level

Attenuation due to spherical wave divergence, topographic features, barriers, and standard atmospheric absorption (70 percent relative humidity, 50 degrees Fahrenheit) was included in the calculation of predicted noise levels. Attenuation due to wind or temperature gradients was not subtracted from the predicted levels to provide a conservative estimate of Project sound levels.

Project Operation Noise at Noise-Sensitive Areas

Project Operation involves the introduction of noise-generating equipment. Overall noise levels generally depend on the physical layout of the Project, the noise emission characteristics of the equipment, the numbers of individual equipment units, and the noise control measures incorporated into the Project design. The following results are based on equipment listed in Table 5.12-10, Equipment Sound Power Levels.

As shown in Table 5.12-11, Noise Level Compliance Assessments, given the acoustical design of the Project, predicted noise emissions at nearby sensitive areas are expected to range from 38 to 48 dBA and therefore conform to the most restrictive standards. As presented in Table 5.12-12, Noise-Sensitive Areas, Ambient Increases During Project Operation, these levels would result in ambient increases of not more than 1 dBA, which is considered an insignificant effect.

Table 5.12-11
Noise Level Compliance Assessments

Location	Predicted Project Noise Level with Sound Attenuation Measures	Most Restrictive Limit Table 5.12-15, Facility Noise Emissions Limits (L_{eq})	Complies with Most Restrictive Standard?
LT-1	44 dBA	50	Yes
LT-2	45 dBA	55	Yes
LT-3	48 dBA	52	Yes
ST-1	38 dBA	52	Yes
ST-2	40 dBA	50	Yes

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.
Note:
dBA = "A-weighted" decibels
L_{eq} = equivalent sound level

Table 5.12-12
Noise-Sensitive Areas,
Ambient Increases During Project Operation

Location	Ambient Noise Level (L_{eq} dBA)	Predicted Project Noise Level with Sound Attenuation Measures (L_{eq} dBA)	Future Predicted Ambient Noise Level (L_{eq} dBA)	Ambient Noise Level Increase (L_{eq} dBA)
LT-1	64	44	64	<1 dBA
LT-2	62	45	62	<1 dBA
LT-3	66	48	66	<1 dBA
ST-1	54	38	54	<1 dBA
ST-2	62	40	62	<1 dBA

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.
Notes:
Cumulative = ambient + Project.
< = less than
dBA = "A-weighted" decibels
L_{eq} = equivalent sound level

Tonal Noise

The CTGs, transformers, and combustion turbine inlet compressors produce tonal sounds. Because of care in specifying the Project's engineering design features, no prominent tonal noise emissions will be propagated to the noise-sensitive receptors. For example, the generator enclosure and combustion turbine enclosure and inlet silencers will be designed to reduce the tonal emissions from these sources to levels below the general Project noise. Also, the transformer tonal noise emission level will be below the broadband Project noise. Therefore, any equipment tonal emissions will not be distinctly audible at any off-site locations. During normal Project operation, the nature of noise from the Project will be essentially continuous and broadband, with no audible tonal emissions.

Ground-Borne Noise Levels

Operation of the existing Watson Cogeneration Facility has not resulted in ground-borne vibration effects, and the addition of a fifth turbine system to the existing four turbine systems will not produce ground-borne vibration effects. The equipment that would 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 would be detected and the equipment would automatically shut down.

Project Operation Noise at Adjacent Industrial Land Uses

Noise levels are less than 70 dBA along the entire Project Site boundary and are therefore lower than the City of Carson's maximum allowable noise level of 70 dBA at industrial receiver land uses.

Worker Exposure to Noise

The occupational noise exposure of employees within the Project cannot be evaluated until the Project has been constructed and employee jobs and routines determined. The Applicant will conduct an occupational noise survey to identify noise hazardous areas within the Project Site. The survey will be conducted when the Project is in full operation by an individual qualified in accordance with Title 8, California Code of Regulations, Sections 5095–5100 (Article 105) and Title 29 CFR Part 1910. Signage will be posted in high-noise areas, where hearing protection will be required.

5.12.2.2 Construction Noise

Project construction is expected to be typical of that of other power facilities in terms of schedule and equipment used. The noise level will vary during the construction period, depending on the construction phase. Construction of power facilities can generally be divided into five phases that use different types of construction equipment. The five phases are commonly known as (1) site preparation and excavation, (2) concrete pouring, (3) steel erection, (4) mechanical equipment installation, and (5) cleanup.

Both the USEPA Office of Noise Abatement and Control and the Empire State Electric Energy Research Company have extensively studied noise from individual pieces of construction equipment and from power facility construction sites (USEPA 1971; Barnes et al. 1976). Since specific information on types, quantities, and operating schedules of construction equipment is not available at this point in Project development, information from these documents for similarly sized industrial projects was used. The use of this information, shown in Table 5.12-13, Typical Noise Emission Levels for Construction Equipment, which is between 21 and 26 years old, is considered conservative, as construction equipment has evolved over this period toward quieter designs to protect operators from exposure to high noise levels.

Table 5.12-13
Typical Noise Emission Levels for Construction Equipment

Equipment Item	Noise Level at 50 feet (dBA)	Equipment Item	Noise Level at 50 feet (dBA)
Air compressors	76 – 89	Generators (Portable)	71 – 87
Backhoes	81 – 90	Jackhammers	69 – 85
Concrete pumps	74 – 84	Pile Drivers	81 – 107
Concrete vibrators	68 – 81	Pumps	68 – 80
Cranes (derrick)	79 – 86	Steel Rollers	75 – 82
Cranes (mobile)	80 – 85	Shovels	77 – 90
Dozers	77 – 90	Trucks	81 – 87
Front-end loaders	77 – 90	Vibratory Conveyors	70 – 80
Graders	79 – 89	Welders	66 – 75

Source: Bolt Beranek and Newman, Inc. 1997.
Note:
dBA = "A-weighted" decibels

As with most major projects, construction of the Project will result in temporary increases to ambient noise levels. The magnitude of the increases will depend on the type of construction activity, the noise levels generated by various pieces of construction equipment, the duration of the construction phase, and the distance between the noise sources and receiver.

Construction will occur over the course of daytime shifts, though it is possible that extensions of the basic workday or moderate amounts of evening or weekend work will be required. However, construction activities associated with higher increases in ambient noise levels will typically take place only during weekday daytime hours.

Noise levels may vary widely, depending on the phase of construction and specific tasks being performed. For example, during site preparation, heavy equipment for grading, excavation, and pad construction would be required, including backhoes, front-end loaders, dump trucks, and concrete trucks. Alternatively, on-site fabrication during the equipment installation phase would require portable generators, air compressors, welding machines, etc.

As shown in Table 5.12-14, Projected Construction Noise Levels (dBA), L_{eq} levels are predicted to range from 44 dBA to 52 dBA at nearby residential receivers. The noise emissions presented are those expected outdoors, and a building or home would provide significant attenuation of these levels. Specifically, noise levels within homes and dwellings will be up to 27 dBA lower (with windows closed). Even in homes with open windows, indoor noise levels will be up to 17 dBA lower than outdoor levels (USEPA 1974).

Table 5.12-14
Projected Construction Noise Levels (dBA)

Location	Distance from Project Site (ft)	Maximum Construction Noise Level (L_{eq} dBA)	Distance from Laydown Area (ft)	Maximum Construction Noise Level (L_{eq} dBA)
LT-1	4,710	50	7,642	45
LT-2	4,893	49	9,325	44
LT-3	3,575	52	8,282	45
ST-1	8,386	45	3,854	51
ST-1	6,527	47	5,211	49

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.
Notes:
Based on 89 dBA at 50 feet from the source.
dBA = "A-weighted" decibels
ft = feet
L_{eq} = equivalent sound energy level

These projected levels would be temporary and only occur during daytime hours. Moreover, all feasible construction noise abatement measures will be implemented. Therefore, no significant effect is expected to result from construction noise.

Pile Driving

Pile driving will be necessary for construction of the Project. Noise from these operations could be expected to reach 104 dBA at a distance of 50 feet. Based on simple geometric dispersion, pile driving noise would thus be projected to reach levels of 77 dBA at LT-3, the nearest

residential receptor. Added to the existing daytime ambient level of 66 dBA Leq, this would combine to produce 77 dBA, an increase of 11 dBA over the ambient level.

The actual effect at the receptor locations will be greatly reduced from this value due to localized attenuation (approximately 10 dBA, variable by specific location). Although pile driving will produce a noticeable effect, limiting the pile driving to daytime hours, combined with localized attenuation and the temporary nature of the work, will result in effects that are tolerable to residents.

Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feed water and steam systems, the piping and tubing that constitutes the steam path has accumulated dirt, rust, scale, and construction debris such as weld spatter, dropped welding rods, and the like. If the Project were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

To prevent this problem from happening, the steam line is temporarily routed to the atmosphere before the steam system is connected to the turbine. Typically, high-pressure steam is then raised in the HRSG or a temporary boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a "high-pressure steam blow," is quite effective at cleaning out the steam system. A series of short steam blows of 2 or 3 minutes each is performed several times daily over a period of 2 or 3 weeks. At the end of this procedure, the steam lines are connected to the steam turbine, which is then ready for operation.

High-pressure steam blows, if unsilenced, can typically produce noise levels as high as 129 dBA at a distance of 50 feet; this would amount to roughly 92 dBA at LT-3, the nearest sensitive receptor. With a silencer installed on the steam blow piping, noise levels are commonly attenuated to 89 dBA at 50 feet; this would yield approximately 52 dBA at LT-3 without consideration of path attenuation.

5.12.3 Mitigation Measures

No mitigation measures for the Project are required, because the Project noise levels will comply with all state and local performance standards, given the acoustical design of the Project, which includes CTG air intake and exhaust stack silencers, CTG acoustical enclosures, fuel gas compressor enclosures, and property line acoustical barriers.

5.12.4 Cumulative Effects

According to the City of Carson Development Summary 2007, several other projects are either proposed or approved within the City of Carson. Subsection 5.9.3, Cumulative Effects, within Section 5.9, Land Use, of this AFC provides additional details and a map of these project locations. Five of the proposed/current projects occur within 1 mile the Project Site: the Alameda Corridor Improvement Study; the Shell Oil Products U.S. Redevelopment; the BP Safety, Compliance and Optimization Project; Mixed-use office, parking and recreational area located at 2254 East 223rd Street; and the expansion of an existing industrial facility located at

2116 E 220th Street. The City of Carson Development Service has not identified any trends on recent zoning changes.

The proposed and approved projects within 1 mile of the Project Site have the potential to increase the existing noise levels. The Project will increase existing noise levels by less than 1.0 dBA. This level of increase is insignificant. In view of the proposed and approved projects in the vicinity of the Project, the future contribution to the noise environment from the Project is also less than significant.

5.12.5 Applicable Laws, Ordinances, Regulations, and Standards

The following discussion addresses relevant LORS regarding noise emissions and exposure. Some of these LORS may not be legally applicable to the Project because of the preemptive jurisdiction of the CEC in the certification process of power facilities. The purpose of this section is to provide the reader with a greater understanding of the regulatory environment relating to environmental noise.

A summary of applicable LORS is provided in Table 5.12-15, Summary of LORS – Noise.

Table 5.12-15
Summary of LORS – Noise

LORS	Applicability	Conformance (AFC Section)
Federal		
USEPA 1974 Noise Guidelines	Guidelines for state and local governments.	5.12.2.1
Noise Control Act (1972) as amended by the Quiet Communities Act (1978); (42 USC 4901-4918)	Separate noise-sensitive areas are encouraged.	5.12.2.1
State		
CEC	This agency has established guidelines for noise generated during operation and construction of the Project. It identifies criteria for the determination of significant effect on residential areas.	5.12.2.2
Cal/OSHA Occupational Noise Exposure Regulations (8 CCR, General Industrial Safety Orders, Article 105, Control of Noise Exposure, Section 5095, *et seq*.)	Sets employee noise exposure limits. Equivalent to Federal OSHA standards.	5.12.2.2
Local		
City of Carson GP	This requirement is applicable to noise generated during operation and sets limits on the maximum level of facility noise at residential, commercial and industrial land uses	5.12.2.3

Table 5.12-15
Summary of LORS – Noise

LORS	Applicability	Conformance (AFC Section)
City of Carson Noise Control Ordinance	This requirement is applicable to noise generated during operation and sets limits on the maximum level of facility noise at residential, commercial and industrial land uses.	5.12.2.3

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.
Notes:
Cal/OSHA = California Occupational Safety and Health Administration
CEC = California Energy Commission
CCR = California Code of Regulations
LORS = laws, ordinances, regulations, and standards
N/A = not applicable
USC = United States Code
USEPA = United States Environmental Protection Agency

5.12.5.1 Federal

A number of laws and guidelines at the federal level direct the consideration of a broad range of noise and vibration issues. Because the Project does not fall within the purview of the Federal Energy Regulatory Commission or require action by federal agencies, the Project is not directly subject to federal noise regulations other than those of the Occupational Safety and Health Administration (OSHA). For perspective, several of the more significant noise-related federal regulations and guidelines are provided below.

- National Environmental Policy Act (42 United States Code 4321, *et seq*.; Public Law 91-190; 40 Code of Federal Regulations [CFR] Section 1506.5). The National Environmental Policy Act is the basic national charter for protection of the environment, including the noise environment. It establishes policy, sets goals, and provides means for carrying out the policy. It also contains "action-forcing" provisions to ensure that federal agencies act according to the letter and spirit of the act. The regulations that follow provide guidance to federal agencies regarding what they must do to comply with the procedures and achieve the goals of the act.
- Noise Control Act of 1972 (42 United States Code 4910). This act establishes a national policy to promote an environment for all Americans that is free from noise that jeopardizes their health and welfare. To accomplish this policy, the act establishes a means for the coordination of federal research and activities in noise control, authorizes the establishment of federal noise emission standards for products distributed in commerce, and provides information to the public regarding the noise-emission and noise-reduction characteristics of such products.
- United States Environmental Protection Agency (USEPA) recommendations in *Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety* (USEPA 1974). In response to a federal mandate, the USEPA provided guidance in this document, commonly referenced as the "Levels Document," that establishes an L_{dn} of 55 dBA as the requisite level, with an adequate margin of safety, for areas of outdoor uses, including residences and recreation areas. This document does not constitute

USEPA regulations or standards, but identifies safe levels of environmental noise exposure without consideration for achieving these levels or other potentially relevant considerations. It is intended to "provide State and Local governments as well as the Federal Government and the private sector with an informational point of departure for the purpose of decision making." 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.

- Federal Energy Regulatory Commission Guidelines on Noise Emissions From Compressor Stations, Substations, and Transmission Lines (18 CFR 157.206(d)5). These guidelines require that:

  > "the noise attributable to any new compressor stations, compression added to an existing station, or any modification, upgrade or update of an existing station, must not exceed a day-night level (L_{dn}) of 55 dBA at any pre-existing NSAs (such as schools, hospitals, or residences)."

  This policy was adopted based on the USEPA-identified level of significance of 55 L_{dn} dBA.

- Federal Highway Administration Noise Abatement Procedures (23 CFR Part 772). The purpose of 23 CFR Part 772 is to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways. It establishes five categories of noise-sensitive receptors and prescribes the use of the hourly L_{eq} as the criterion metric for evaluating traffic noise effects.

- Department of Housing and Urban Development (HUD) Environmental Standards (24 CFR Part 51). HUD Regulations set forth the following exterior noise standards for new home construction assisted or supported by HUD:

  65 L_{dn} or less – Acceptable,

  > 65 L_{dn} and < 75 L_{dn} – Normally unacceptable, appropriate sound attenuation measures must be provided, and

  > 75 L_{dn} – Unacceptable.

  HUD's regulations do not contain standards for interior noise levels. Rather, a goal of 45 dB is set forth for interior noise, and attenuation requirements are geared to achieve that goal.

- OSHA Occupational Noise Exposure; Hearing Conservation Amendment [Federal Register 48 (46), 9738–9785 (1983)]. The standard stipulates that protection against the effects of noise exposure shall be provided for employees when sound levels exceed 90 dBA over an 8-hour exposure period. Protection shall consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to within acceptable levels, personal protective equipment shall be provided and used to reduce exposure of the employee. Also, 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 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.

The most relevant federal guidelines applicable to community noise exposure are those provided by the USEPA in *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (USEPA 1974). However, these guidelines are not adopted or recommended by the State of California or any local jurisdiction. The USEPA is careful to stress that the recommendations contain a factor of safety and do not consider technical or economic feasibility issues needed to implement these guidelines.

5.12.5.2 State

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

- Exposure of persons to or generation of noise levels in excess of standards established in the local GP or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to or generation of excessive ground-born vibration or ground-born noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the project.

The State of California provides regulation by adopted laws and guidance regarding noise emissions through the jurisdiction of state commissions. Regulation of noise emissions and noise exposure from power facilities is provided by the CEC. The CEC provides siting guidelines (CEC-140-2007-003) to assist power facility operators with the evaluation of potential power facility locations. The siting guidelines specify the that potential noise effects from power plant construction and operation be evaluated through the comparison of existing ambient noise levels and local noise standards with the noise levels projected to result from the project. This approach requires the determination of noise emissions from the Project and evaluation of noise exposure at specific receptor locations. In essence, this methodology ensures that power facilities in California are sited with due regard to the local noise environment.

In general, the CEC considers that a project-related increase in environmental noise of 5 to 10 dBA or more at noise-sensitive receptors may be significant. An increase of 10 dBA or more is generally considered a significant effect. The CEC typically defines the ambient background noise level as the lowest four consecutive hour average L_{90} measurements at a 25-hour measurement site, and the lowest L_{90} at a short-term measurement site. The CEC also considers construction noise as typically insignificant if it meets the following criteria.

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

Occupational exposure to noise is regulated at the state level by the California Division of Industrial Occupational Safety and Health (commonly referred to as Cal/OSHA) in Title 8 of the California Code of Regulations, Chapter 4 (Division of Industrial Safety), Subchapter 7 (General Industry Safety Orders), Group 15, Article 105, Sections 5095-5100. These regulations contain language that is consistent with the aforementioned Federal OSHA requirements, and the CEC typically incorporates it into its Conditions of Certification guidelines.

5.12.5.3 Local

City of Carson General Plan

The City of Carson GP provides a blueprint for how the city anticipates directing and managing growth while minimizing potential effects for existing and future generations. The City of Carson GP has adopted community noise exposure levels based on HUD Guidelines and State of California Standards.

City of Carson Noise Control Ordinance

In 1995, the City of Carson adopted, with amendments, the Los Angeles County Noise Control Ordinance as the City of Carson Noise Control Ordinance. The City of Carson Noise Control Ordinance limits noise exposure by receiver categories (zones) or limits noise emission levels by noise-producing activities. No specific noise emission levels are identified for industrial or stationary noise sources; therefore, the noise restrictions applicable to noise levels for Project operation are limits on noise levels at receptor locations. The maximum exterior noise levels in terms of receptor category are shown in Table 5.12-16, City of Carson Noise Control Ordinance Exterior Noise Levels.

Table 5.12-16
City of Carson Noise Control Ordinance Exterior Noise Levels

Noise Zone	Designated Noise Zone Land Use (Receptor Only)	Time Interval	Exterior Noise Level (dBA)
I	Noise-sensitive area	Anytime	45
II	Residential Properties	10:00 p.m. to 7:00 a.m.	45
		7:00 a.m. to 10:00 p.m.	50
III	Commercial Properties	10:00 p.m. to 7:00 a.m.	55
		7:00 a.m. to 10:00 p.m.	60
IV	Industrial Properties	Anytime	70

Source: City of Carson 1995.
Notes:
a.m. = morning
dBA = "A-weighted" decibels
p.m. = evening

As noted in the City of Carson GP, the noise environment in the city is complex, with many noise sources, and provisions are made within the Noise Ordinance for cases where the ambient noise levels exceed the levels provided in Table 5.12-16, City of Carson Noise Control

Ordinance Exterior Noise Levels. These provisions provide that measured ambient noise levels, in terms of L_X (where X is the percentage of time during a measurement period that an indicated sound level is exceeded) statistical descriptors such as L_{10}, L_{50}, and L_{90}, may be used to determine the criterion exterior noise levels. Specifically, Paragraph 5502(b) of the Noise Ordinance states:

> Unless otherwise herein provided, no person shall operate or cause to be operated, any source of sound at any location within the unincorporated county, or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level, when measured on any other property either incorporated or unincorporated, to exceed any of the following exterior noise standards:
>
> **Standard No. 1** shall be the exterior noise level which may not be exceeded for a cumulative period of more than 15 minutes in any 30 minute period. Standard No. 1 shall be the applicable noise level from subsection A of this Section; or, if the ambient L_{50} exceeds the foregoing level, then the ambient L_{50} becomes the exterior noise level for Standard No. 1.
>
> **Standard No. 2** shall be the exterior noise level which may not be exceeded for a cumulative period of more than 7.5 minutes in any 30 minute period. Standard No. 2 shall be the applicable noise level from subsection A of this Section plus 5 dB; or, if the ambient L_{25} exceeds the foregoing level, then the ambient L_{25} becomes the exterior noise level for Standard No. 2.
>
> **Standard No. 3** shall be the exterior noise level which may not be exceeded for a cumulative period of more than 2.5 minutes in any 30 minute period. Standard No. 3 shall be the applicable noise level from subsection A of this Section plus 20 dB; or, if the ambient $L_{8.3}$ exceeds the foregoing level, then the ambient $L_{8.3}$ becomes the exterior noise level for Standard No. 3.
>
> **Standard No. 4** shall be the exterior noise level which may not be exceeded for a cumulative period of more than 30 seconds in any 30 minute period. Standard No. 4 shall be the applicable noise level from subsection A of this Section plus 15 dB; or, if the ambient $L_{1.7}$ exceeds the foregoing level, then the ambient $L_{1.7}$ becomes the exterior noise level for Standard No. 4.
>
> **Standard No. 5** shall be the exterior noise level which may not be exceeded for any period of time. Standard No. 5 shall be the applicable noise level from subsection A of this Section plus 20 dB; or, if the ambient L_0 exceeds the foregoing level then the ambient L_0 becomes the exterior noise level for Standard No. 5.

The applicable standard for steady-state noise sources, such as power facilities, is Standard No. 1. This standard specifies that in the event the ambient L_{50} exceeds the exterior noise level shown in Table 5.12-17, Minimum L_{50} (dBA), the ambient L_{50} becomes the exterior noise level for Standard No. 1. The minimum L_{50} values obtained during the measurement survey period at each of the noise measurement sites are shown in Table 5.12-17. These values are the criterion exterior noise levels in terms of the City of Carson Noise Control Ordinance for these locations.

Table 5.12-17
Minimum L_{50} (dBA)

Location	Minimum $L_{(50)}$
LT-1	49.7
LT-2	48.3
LT-3	55.0
ST-1	49.6
ST-2	49.7

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.

Notes:

dBA = "A-weighted" decibels

$L_{(50)}$ = sound level exceeded 50 percent of time

In addition to operational noise, construction activities have the potential to create noise disturbances within the city, and specific noise restrictions related to construction activities are contained in Part 4 of the Noise Ordinance. Part 4 contains restrictions on the hours of construction activities and maximum noise levels from mobile and stationary construction equipment and states, "Operating or causing the operation of any tools or equipment used in the construction, drilling, repair, alteration or demolition work between weekday hours of 7:00 p.m. and 7:00 a.m., or at any time on Sundays or holidays, such that the sound there from creates a noise disturbance across a residential or commercial real-property line, except for emergency work or public service utilities or by variance issued by the health officer, is prohibited." Table 5.12-18, Maximum Noise Levels for Mobile Construction Equipment, and Table 5.12-19, Maximum Noise Levels for Stationary Construction Equipment, provide maximum noise levels for mobile and stationary construction equipment as provided in the City of Carson Noise Control Ordinance.

Table 5.12-18
Maximum Noise Levels for Mobile Construction Equipment

	Single Family Residential	Multi Family Residential	Semiresidential/ Commercial
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	75 dBA	80 dBA	85 dBA
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays	60 dBA	64 dBA	70 dBA

Source: City of Carson 1995.

Notes:

a.m. = morning

dBA = "A-weighted" decibels

p.m. = evening

Table 5.12-19
Maximum Noise Levels for Stationary Construction Equipment

	Single Family Residential	Multi Family Residential	Semiresidential/ Commercial
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	60 dBA	65 dBA	70 dBA
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays	50 dBA	55 dBA	60 dBA

Source: City of Carson 1995.
Notes:
a.m. = morning
dBA = "A-weighted" decibels
p.m. = evening

5.12.5.4 Facility Operational Performance Standards Summary

Table 5.12-20, Summary of Facility Noise Emission Limits (L_{eq}), compares facility noise limits for all applicable LORS. The design basis for noise control is the minimum or most stringent limit established by any of the applicable LORS. As shown, the most restrictive limits for noise-sensitive receptors range from 50 to 55 dBA L_{eq} and are taken from either the City of Carson Noise Control Ordinance or City of Carson GP performance standards. These limits serve as the noise-control design goals for the Project and ensure that no significant effect results from Project construction and operation.

Table 5.12-20
Summary of Facility Noise Emission Limits (L_{eq})

Location/ Land Use	Applicable LORS (All values are L_{eq} Equivalents)				
	City of Carson GP Noise Element (Noise & LUCM)	City of Carson GP Noise Element (Exterior Noise Standard)	City of Carson Noise Control Ordinance	CEC Regulations Based on Measurement Data	Most Restrictive Limit - Noise Control Design Goal
LT-1/Residential	52	52	50	55	**50/NO**
LT-2/Residential	52	52	48	53	**48/NO**
LT-3/Residential	52	52	55	62	**52/GP**
ST-1/School	52	58	N/A	55	**52/GP**
ST-2/Residential	52	52	50	55	**50/NO**

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.
Notes:
City of Carson Noise Control Ordinance based on measured L_{50}.
CEC = California Energy Commission
GP = General Plan
L_{EQ} = equivalent sound energy level
LORS = laws, ordinances, regulations, and standards
LUCM = Land Use Compatibility Matrix
N/A = not applicable
NO = City of Carson Noise Control Ordinance

5.12.5.5 Agencies and Agency Contacts

The agencies contacted for and likely to be involved in this Project are listed in Table 5.12-21, Agencies and Contacts.

Table 5.12-21
Agencies and Contacts

Issue	Agency/Address	Contact/Title	Telephone
Noise Control Ordinance	City of Carson 701 East Carson Street Carson, CA 90745	Ina Lefeiloai, Senior Code Compliance Specialist	310-830-7600 ext. 1338

Source: Watson Cogeneration Steam and Electric Reliability Project Team, 2008.

5.12.5.6 Permits Required and Permit Schedule

No noise-specific permits are required for construction or operation of the Project.

5.12.6 References

Barnes, J.D., L.N. Miller, and E.W. Wood. 1976. *Prediction of noise from power plant construction.* Bolt Beranek and Newman, Inc. Cambridge, MA. Prepared for the Empire State Electric Energy Research Corporation, Schenectady, NY.

Beranek, L.L., ed. 1988. *Noise and Vibration Control.* Second Edition. Institute of Noise Control Engineering.

Berger (Louis Berger Group, Inc.). 2004. Federal Agency Review of Selected Airport Noise Analysis Issues. 1992 edition modified by the Louis Berger Group, Inc, 2004.

Bolt Beranek and Newman, Inc. 1997. *Power Plant Construction Noise Guide.*

CCR (California Code of Regulations). Title 8, Sections 5095–5100 (Article 105).

CEC (California Energy Commission). 2007. CEC-140-2007-003, Rules of Practice and Procedure & Power Plant Site Certification Regulations, Appendix B(g)(4), p. 89.

CEQA (California Environmental Quality Act). Section XI of Appendix G of the California Environmental Quality Act Guidelines (Title 14, California Code Regulations, Appendix G)

City of Carson. 1972. Municipal Code and Charter; Chapter 8: Morals and Conduct; Article 3: Noise Regulations.

City of Carson. 1995. Municipal Code, Article V, Chapter 5, Sections 5500-5503 Noise Control Ordinance

City of Carson. 2006. General Plan. Noise Element.

EEI (Edison Electric Institute). 1983. *Electric Power Plant Environmental Noise Guide.* 2nd Edition, Revised, New York, NY.

Harris, C.M., ed. 1991. The Handbook of Acoustical Measurements and Noise Control. Third Edition.

HUD (Department of Housing and Urban Development). 2003. Code of Federal Regulations, Title 24, Volume 1, Part 51 Environmental Criteria and Standards, Subpart B Noise Abatement and Control. 24CFR51.103.c. Exterior Standards.

USEPA (United States Environmental Protection Agency). 1971. *Noise from Construction Equipment and Operations, Building Equipment and Home Appliances.* Prepared by Bolt et al, Bolt, Beranek & Newman, Boston, MA. Washington, DC.

USEPA (United States Environmental Protection Agency). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* Washington, DC: National Technical Information System, EPA Report 55019-74-004, March.

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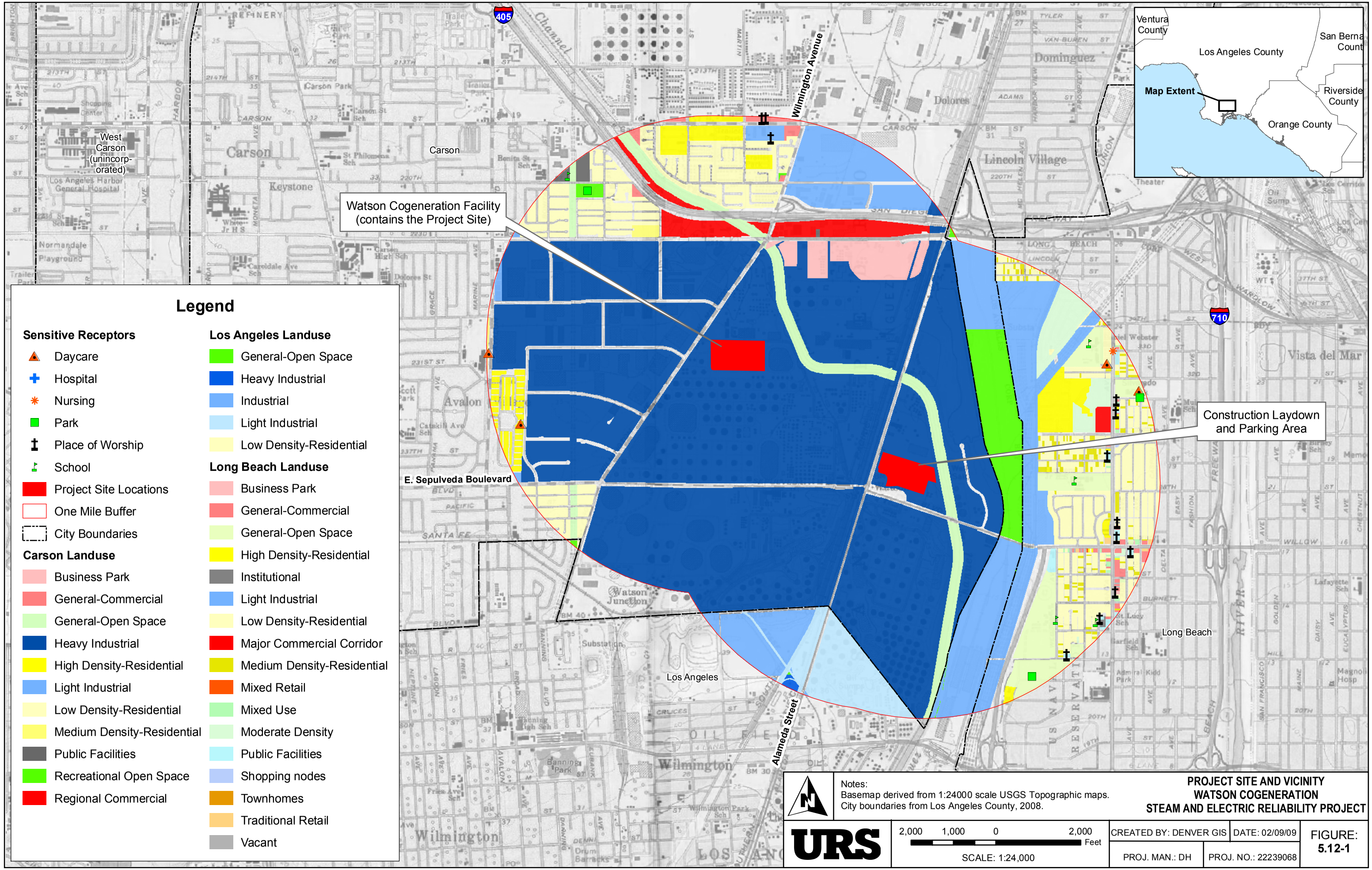
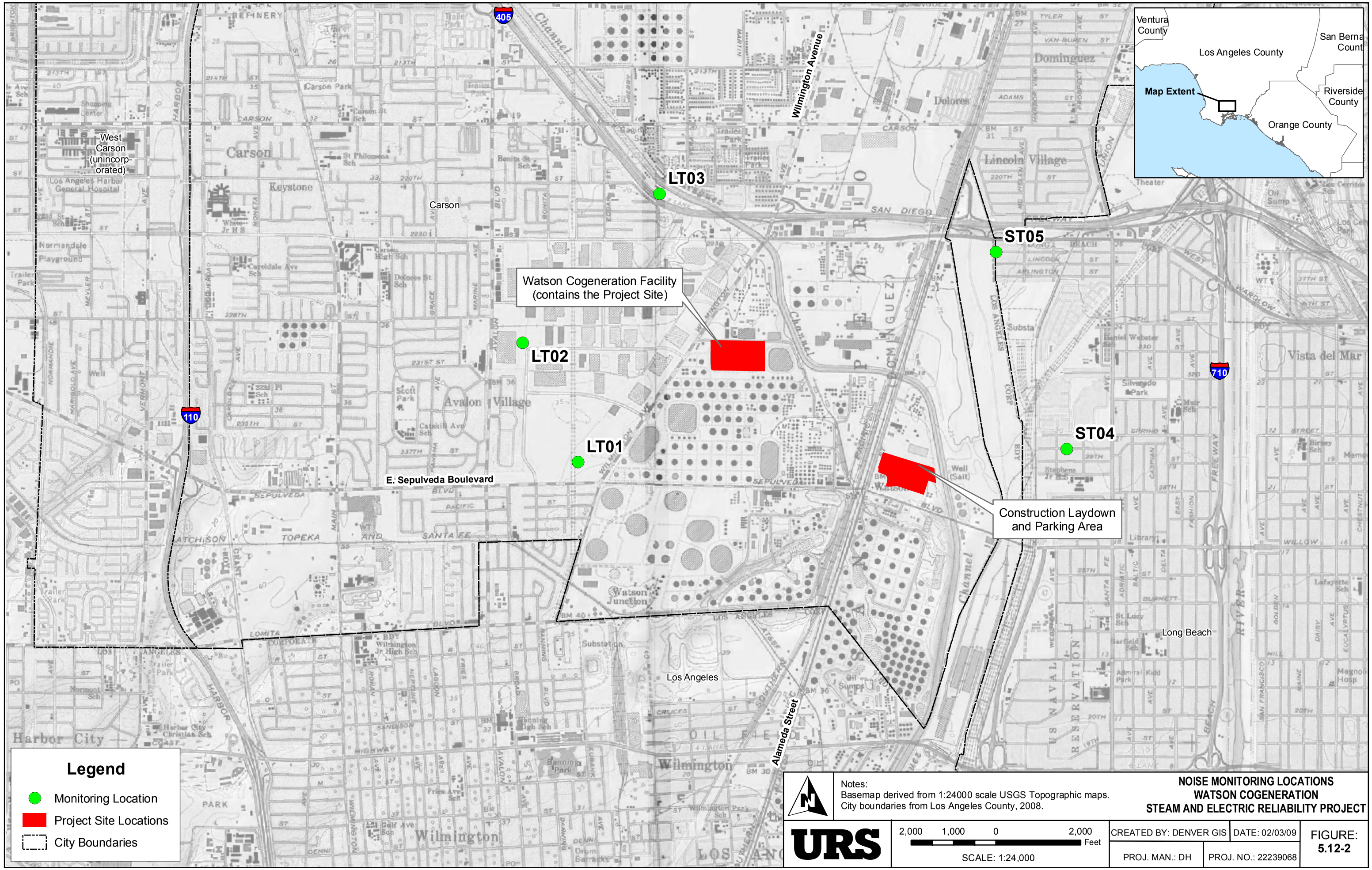


Path: Y:\GIS\Projects\BP_Carson_Cogen\mxds\fig5-12-1_NoiseProjectSiteVicinity.mxd



Path: Y:\GIS\Projects\BP_Carson_Cogen\mxds\fig5-7-2_NoiseMonitorLocs.mxd

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

Technical Area: **Noise** Project: Watson Cogeneration Steam and Electric Reliability 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 5.12.1.3; pages 5.12-5 through 5.12-13 Section 5.12.2; pages 5.12-13 through 5.12-21 Section 5.12.3; page 5.12-21 Section 5.12.4; pages 5.12-21 through 5.12-22		
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.	Figure 5.12-1 Figure 5.12-2		

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

Technical Area: **Noise** Project: Watson Cogeneration Steam and Electric Reliability 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), Ldn (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 5.12.1.3; pages 5.12-5 through 5.12-13		
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 5.12.2; pages 5.12-13 through 5.12-21		
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 5.12.2; pages 5.12-13 through 5.12-21		

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

Technical Area: **Noise** Project: Watson Cogeneration Steam and Electric Reliability 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) (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 5.12.2; pages 5.12-13 through 5.12-21		
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.	N/A		
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 5.12.5; pages 5.12-22 through 5.12-30 Section 5.12.2.2, Table 5.12-13; page 5.12-19		

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

Technical Area: **Noise** Project: Watson Cogeneration Steam and Electric Reliability 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) (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 5.12.5.5; page 5.12-30 Section 5.12.5.5; Table 5.12-21; page 5-12-30		
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 5.12.5.5; page 5.12-30 Section 5.12.5.5; Table 5.12-21; page 5-12-30		
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 5.12.5.6; page 5.12-30		