Acoustical Analysis Report

for

Peaker Power Units – Barre Substation

November 6, 2006
Revised December 19, 2006

Prepared for

Southern California Edison
Engineering and Technical Services
300 No. Lone Hill Avenue
San Dimas, California 91773

By

Veneklasen Associates, Inc.
1711 16th Street
Santa Monica, California 90404

Aaron Bétit
Senior Associate

Summary

Southern California Edison contracted Veneklasen Associates (VA) to perform acoustical studies to determine the acoustical impact of including a peaker unit and the required auxiliary equipment at Barre Substation. Acoustical measurements were performed at the project site to determine the existing ambient noise level.

Using the sound information provided by GE, VA developed a computer model to compare the predicted noise levels with the local noise criteria for the proposed project site. With this model VA determined the equipment and the plant layout selected by GE will meet the existing noise guidelines at Barre Substation with additional mitigation, specifically additional sound walls and a sound enclosure for the Gas Compressor. If the equipment is to operate during the nighttime hours it will be necessary to provide a slightly taller wall and further limit the noise produced by the exhaust duct.

Project Site Description

The Barre substation is within the City of Stanton and is boarded by Dale Avenue and industrially zoned buildings to the west, Cerritos Avenue and residences to the north, residential lots to the east and south. The closest residences are located approximately 320' from the proposed peaker unit location. Figure 2 shows an aerial photograph the project site while Figure 3 shows the proposed equipment layout on the site.

Noise Criteria

It is understood that the peaker unit is expected to only operate during daytime hours when peak loads are required (typically between 1:00PM and 9:00PM). As a result VA used the daytime hours (between 7:00AM and 10:00PM) to evaluate compliance with the local noise ordinances.

The Stanton Municipal Code only has noise limits for residential areas. The daytime Noise Standard for residential property lines is 55 dBA (between the hours of 7:00AM and 10:00PM). The noise standard cannot be exceeded for a period of more then 30 minutes in a single hour. As the equipment is expected to operate for periods longer then 30 minutes the 55 dBA limit applies.

If the equipment were to operate during night time hours (between 10:00PM and 7:00AM) the Noise Standard would be 50 dBA.

Ambient Noise Conditions

Ambient noise measurements were performed with a Larson Davis Model 820 precision sound level meter on October 4th 2006. The measurement location is indicated in the attached figure 1. Ambient noise levels ranged from 50 dBA to 54 dBA during the expected hours of operation of the peaker equipment (1:00PM-9:00PM). Thus the noise limit of 55 dBA is the applicable noise criterion at this project site.

Ambient noise measurements during the night time hours (between 10:00PM and 7:00AM ranged between 46 and 52 dBA. Thus the noise standard documented in the municipal code, 50 dBA becomes the noise limit during night time hours.

Expected Operation Parameters

The equipment noise levels were provided by General Electric based on the equipment selection and operating conditions and are reported in the attached appendix.

Veneklasen Associates understands typical hours where all the new equipment would be operating will be between 1:00PM and 9:00PM.

Computer Noise Model

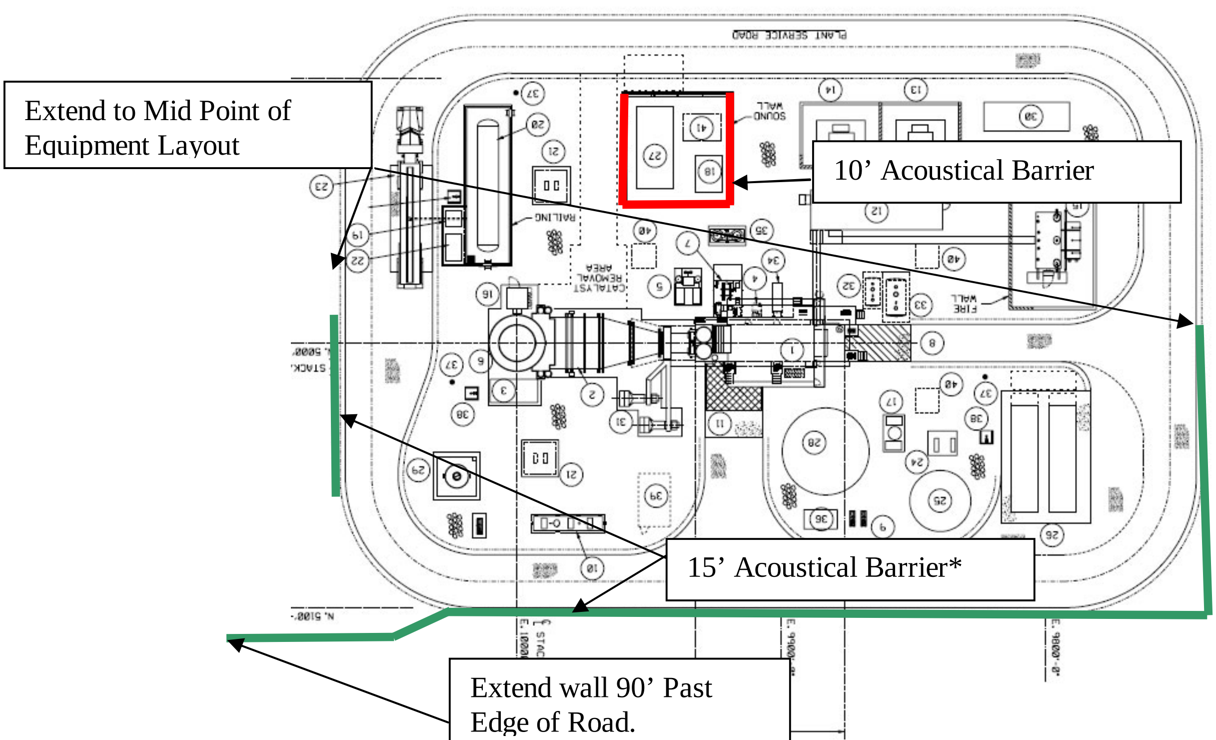
In order to predict future noise conditions at the project site, VA developed a 3D computer model of the project site utilizing LIMA noise modeling software developed by Stapelfeldt Ingenieurgesellschaft and distributed by Bruel & Kjaer. The software utilizes the ISO standard 9613-2 “Acoustics – Attenuation of Sound During Propagation Outdoors” to evaluate the expected future noise conditions.

Required Mitigation

Mitigation Package 01

In order to meet the noise limits required by the local noise ordinance it will be necessary to include a 15’ high sound wall, constructed out of materials with an STC value greater then STC 32 around the peaker equipment as shown in figure 1 below. In addition to this, it will be necessary to provide an upgraded enclosure for the Fuel Gas Compressor that will limit the noise to 85 dBA at 3 feet. Acceptable construction materials include CMU, or modular acoustical panels equal to Phoenix-E type Sono-Con Class 1-E or IAC model NoiseShield Regular.

Figure 1 – Required Acoustical Barrier



* for mitigation package 01

Mitigation Package 02

To meet the nighttime noise limits it will be necessary to provide a 20’ acoustical barrier instead of a 15’ barrier for the green barriers in figure 1. The red barriers can remain the same height. In addition it will be necessary to limit the noise from the exhaust duct so that it does not exceed 75 dBA at 3’.

Discussion of Results

The attached figure 4 shows the noise contours expected for the project site with the above recommended acoustical mitigation Package 01 implemented. Figure 5 shows the noise contours for the expected contribution of the peaker equipment with the above recommended acoustical mitigation package 02 implemented. The table below reports the calculated noise level with and without the acoustical mitigation.

Based on the sound levels provided and proposed layouts for the peaker equipment the Barre project site will require additional mitigation as described above to meet the local noise ordinance.

Project Site	Calculated Sound Level at most Stringent Property Line	Local Noise Criteria	Ambient	Combination Ambient and Equipment	Pass/Fail
Barre without acoustical mitigation	55 dBA	55 dBA	50 dBA	56 dBA	Fail
With proposed acoustical mitigation	53 dBA	55 dBA	50 dBA	55 dBA	Pass
Nighttime Noise w/ proposed acoustical mitigation package 01	53 dBA	50 dBA	46 dBA	54 dBA	Fail
Nighttime Noise Level w/ proposed acoustical mitigation package 02	48 dBA	50 dBA	46 dBA	50 dBA	Pass

Appendix

Equipment Sound Level Limits
(Based on Data Provided by the Equipment Manufacturer)

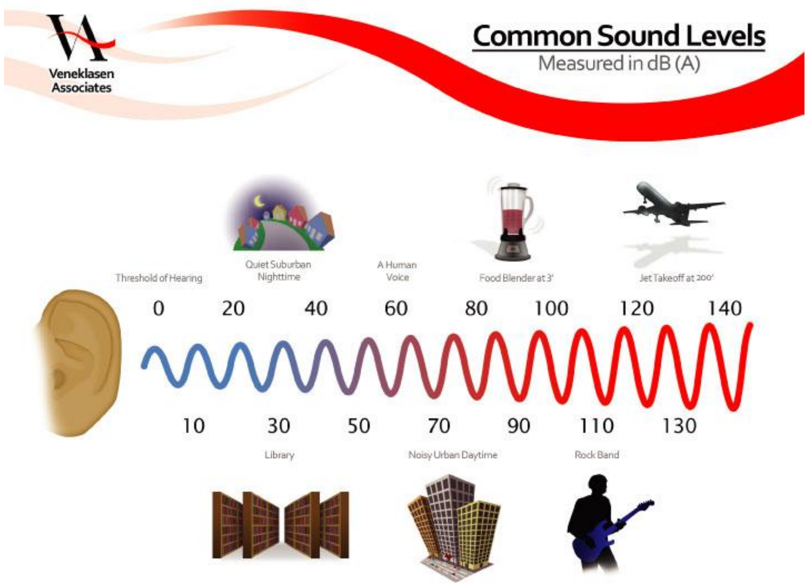
Equipment	Maximum Sound Pressure Level @ 3’
1. Combustion Turbine Generator	85 dBA
Exhaust Stack	85 dBA*
2. SCR	85 dBA
5. CTG Air/Oil Cooler	85 dBA
13. 13.8 Kv/4.16 KV Transformer	60 dBA
14. 13.8/480V Transformer	60 dBA
15. GSU Transformer	70 dBA
18. Gas Compressor Discharge Cooler	85 dBA
19. Air Compressors	85 dBA
22. Ammonia Forwarding and Storage System	85 dBA
27. Fuel Gas Compressor	95 dBA
30. Blackstart Generator	85 dBA
41. Fuel Gas Regulators	85 dBA

* Exhaust stack must be limited to 75 dBA at 3 if the equipment is to be operated between the hours of 10:00PM and 7:00AM.

- All other Equipment associated with the peaker unit is expected to generate noise levels below 60 dBA at 3’.
- Should any equipment exceed the values indicated in this table additional mitigation to reduce the noise to meet these limits will be required.

A Brief Introduction to Environmental Acoustics

Sound is the physical phenomenon of complex minute variations of atmospheric pressure. Because of the range of sound pressure level detectable by the human ear, sound pressure level (SPL) is represented on a logarithmic scale known as decibels (dB). A sound level of 0 dB is approximately the threshold of human hearing and is usually not audible, even under extremely quiet (laboratory-type) listening conditions. A SPL of 120 dB begins to be felt inside the ear as discomfort and pain at approximately 140 dB. Because decibels are logarithmic, they cannot be added or subtracted linearly. Instead, it is necessary to add the values logarithmically. For example, if two sound sources each produce 100 dB, when they are operated together they will produce 103 dB, not 200 dB. Four 100 dB sources operating together again double the sound energy, resulting in a total SPL of 106 dB, and so on. In addition, if one source is 10dB louder than another, the two sources operating together will produce the same SPL as if the louder source were operating alone. Thus, a 100 dB source plus an 80 dB source produce 100 dB when operating together. Two useful rules to remember when comparing SPLs are: (1) most people perceive a 10 dB increase in SPL between two noise events to be about a doubling of loudness, and (2) changes in SPL of less than about 3 dB between two events are not detected by typical humans. The table below reports some typical noise levels for reference:



Frequency, or pitch, is a physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20k Hz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are quieter. As the noise levels get louder, the human ear starts to hear the frequency spectrum more evenly. To accommodate for this phenomenon a weighting system to evaluate how loud a noise level is to a human was developed. The frequency weighting called "A" weighting is typically used for quieter noise levels which de-emphasizes the low frequency components of the sound in a manner similar to the response of a human ear.

Sound levels vary with time. For example, the sound increases as an aircraft approaches, then falls and blends into the ambient or background as the aircraft recedes into the distance. Because of this variation, it is often convenient to describe a particular noise "event" by its highest or maximum sound level (Lmax). Note Lmax describes only one dimension of an event; it provides no information on the cumulative noise exposure generated by a sound source. In fact, two events with identical Lmax may produce very different total exposures. One may be of very short duration, while the other may be much longer.

For the evaluation of community noise effects of long term noise sources such as traffic, aircraft, or mechanical equipment the Day-Night Average Sound Level (DNL) and Community Noise Equivalent Level (CNEL) are used. DNL averages sound levels at a location over a complete 24-hour period, with a 10-decibel adjustment added to those noise events occurring between 10:00 p.m. and 7:00 a.m. (local time) the following morning. The 10:00 p.m. to 7:00 a.m. period is defined as nighttime (or night) and the 7:00 a.m. to 10:00 p.m. period is defined as daytime (or day). The CNEL metric is similar to the DNL metric in that it produces a penalty for the nighttime hours, but it also includes an evening hour penalty adjustment. Thus ambient noise measured between 7:00 a.m.

and 7:00 p.m. has no penalty; a +5 dB adjustment must be made to noise measured between 7:00 p.m. and 10:00 p.m. and a 10+ dB penalty is added to noise measured between 10:00 p.m. and 7:00 a.m.

Sound from a point source propagates similar to the waves caused by throwing a stone into a pond. At the initial point of the disturbance the energy is strongest and dissipated over a small surface area. As the wave moves outward away from the initial point of disturbance, the circumference of the wave increases. Neglecting friction, the total energy remains the same but it is distributed over a greater surface area. Therefore for any specific point at the wave even though the total energy hasn't changed, the energy is less as the distance from the source increases. Under typical conditions the reduction in noise level is 6 dB per doubling of distance.

Acoustical Terminology

deciBel	A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 microPascals. deciBels are denoted “dB”.
A-weighted sound pressure level	The sound pressure level in deciBels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise. A-weighted deciBels are denoted “dBA” or “dB(A)”.
Equivalent Sound Level	The sound level containing the same total energy as a time-varying signal over a given sample period. Equivalent sound level, denoted “L_{eq}” is typically computed over 1, 8 and 24-hour sample periods.
The Day-Night Level	Denoted “L_{dn}”, the Day-Night Level is calculated by averaging equivalent sound levels recorded over a 24-hour period after the addition of a ten deciBel weighting to sound levels measured at night, between 10:00 p.m. and 7:00 a.m.
Percentile level	Denoted L_n, percentile level indicates the time-average sound level that is exceeded for “n” percent of the total measurement period. Unless otherwise stated, A-weighting is understood. *Example: L_{90} indicates the average sound pressure level that was exceeded 90% of the measurement period.*

FIGURE 1 – BARRE

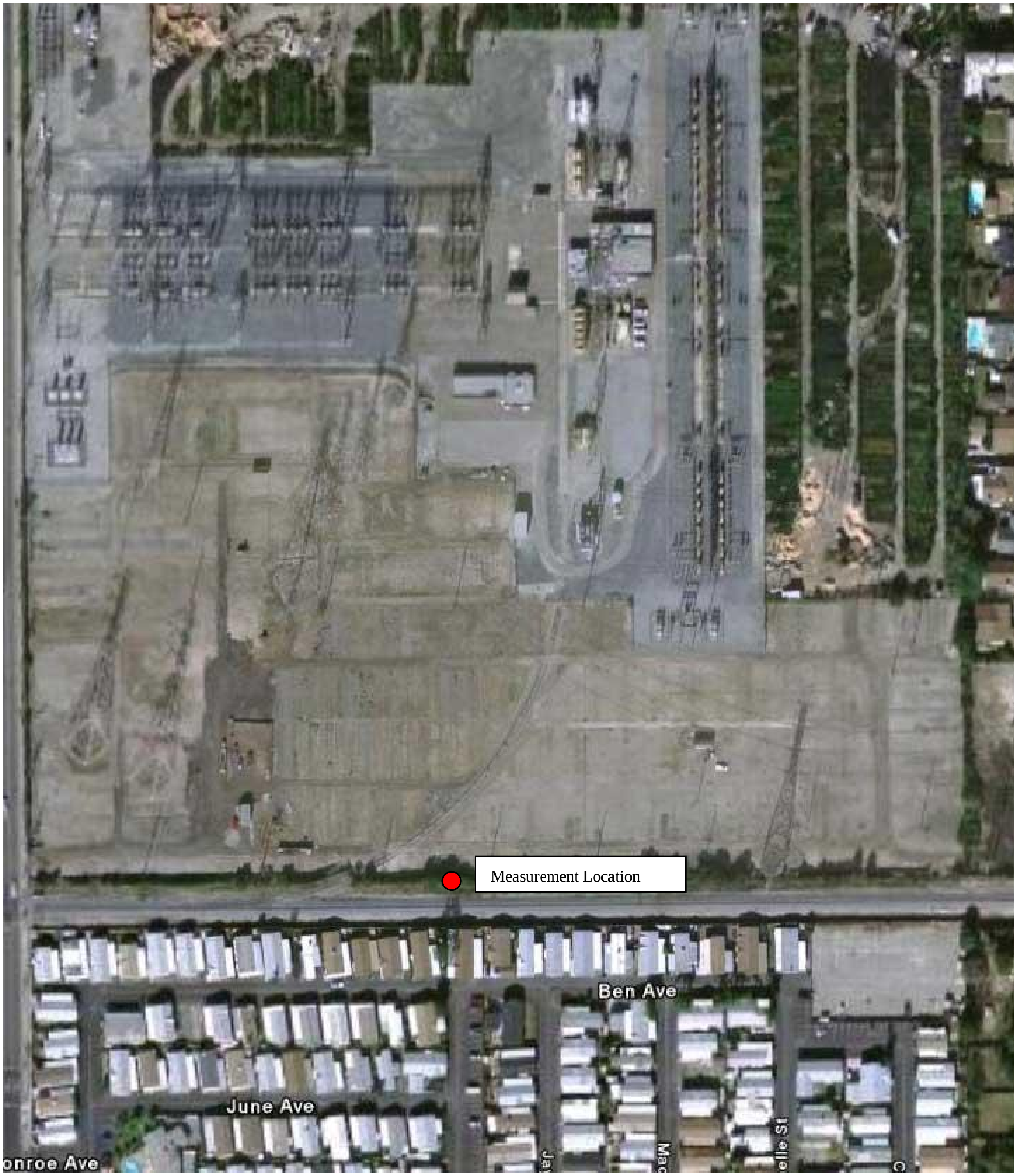
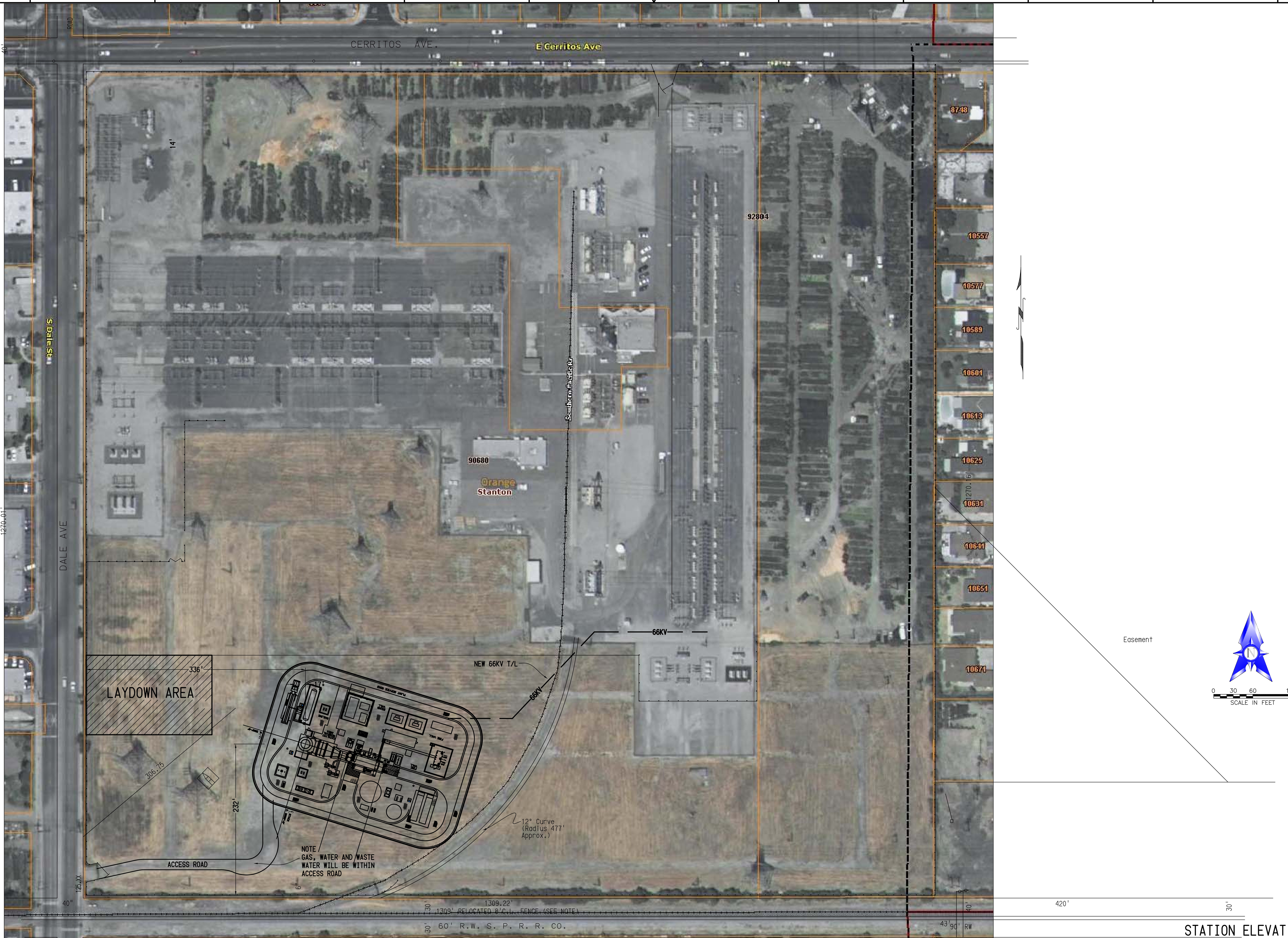


FIGURE 3 EQUIPMENT LAYOUT



STATION ELEVATIOIN 76 FEET

REFERENCE DRAWINGS	REFERENCE DRAWINGS	NO.	REVISIONS	DATE	P.E.	QAE	SUPV	APPROVED	ENGR	CK'D	MADE	I.D.

NO.	REVISIONS	DATE	P.E.	QAE	SUPV	APPROVED	ENGR	CK'D	MADE	I.D.
A	ISSUED FOR INFORMATION						TE		JR	7537

LOCATION: BARRE SUBSTATION

PEAKER INITIATIVE PROJECT
EQUIPMENT PLOT PLAN

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

SHEET NO. X

SCALE: 1"=60'

X OF Y SHTS.

DWG. LIST M-____ SH.____
● REVISE ON AUTOCAD SYSTEM ONLY ●

E4-652-CADD 03-85

SKT-082506-01

FIGURE 4 CALCULATED NOISE CONTOURS WITH PROPOSED MITIGATION PACKAGE 01

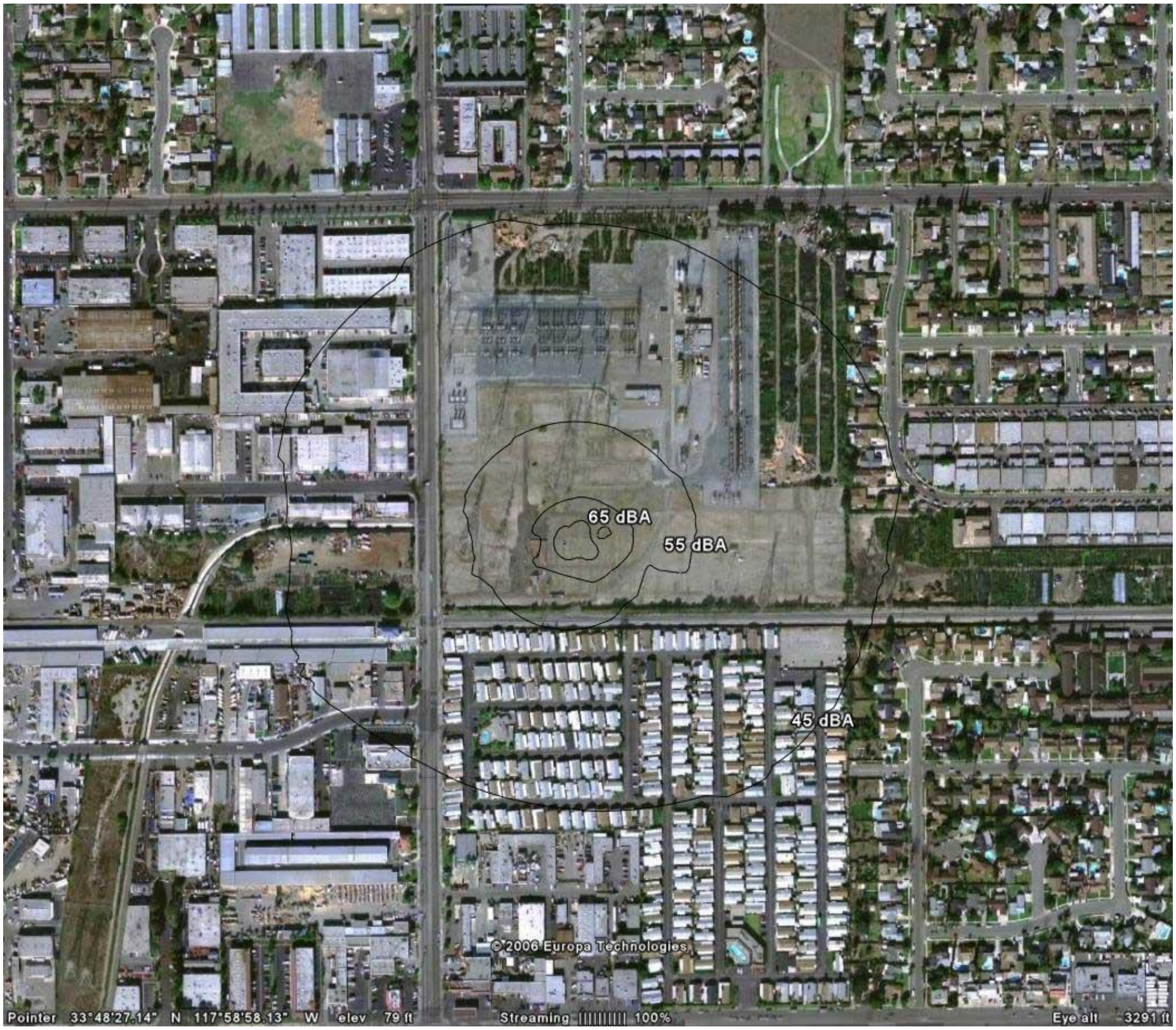


FIGURE 5 CALCULATED NOISE CONTOURS WITH PROPOSED MITIGATION PACKAGE 02