Report of
Environmental Noise Evaluation

Crockett Cogeneration Power Plant,
Crockett,
Contra Costa County,
California

For
Stoel Rives,
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Introduction

A gas-fired cogeneration Power Plant, of 240 MW capacity, was built in about 1993 at the east end of C&H Sugar refinery in the town of Crockett, Contra Costa, California. It is proposed to install compressor equipment at the power plant, of about 1200 HP capacity, in order to improve the continuity of the facility's gas supply. This report considers the current noise climate in the vicinity of the Plant and the noise impact of the proposed compressor.

The Power Plant occupies waterfront overlooking the Carquinez Strait in the lee of steeply rising ground to its south, southwest and southeast. Many of the dwellings in the town of Crockett are screened from the Plant by the topography and, immediately to the south, by a series of large sugar storage bins, or silos. The silos were modified in order to act as a continuous barrier to the sound emitted by the Plant. A railway, carrying passenger and goods traffic, runs east-west along the coast and alongside the refinery and Plant. Twin bridges on the west side of the refinery carry the I-80 highway across the water of Carquinez Strait. The Plant looks northwards across this water to dwellings of Glen Cove, about 3000 to 4000 feet away, which are part of the city of Vallejo. The Plant location is shown in Figure 1, for which the annotations are explained later.

The California Energy Commission (CEC) issued Noise Conditions of Certification in 1992 before the Power Plant was constructed. These Conditions required a noise survey to verify existing ambient noise levels in the vicinity of Crockett and across the water at Vallejo. Since this survey was conducted almost 20 years ago, a new noise assessment was undertaken in September 2011 to investigate the existing prevailing noise environment and how this may affect the noise impact and mitigation of the proposed gas compressor.

Noise Descriptors and Criteria

In considering environmental noise, the terms 'sound' and 'noise' are used interchangeably, but noise usually refers to unwanted sound. The level of the noise or sound is measured in decibels, dB. When the effects of noise on people are considered, the levels are described in terms of A-weighted decibels, dBA, to represent the manner in which our ears respond to the frequency content (tones) of the sound. Levels expressed as dBA give more emphasis to the frequencies that we hear clearly, in particular those used for speech communication, while the less audible lower and higher frequency sounds are reduced in emphasis. The A-weighting is electronically applied in noise meter readings to obtain a total sound level in terms of dBA directly.

A consequence of human hearing is that a change of sound level by up to 3 dBA is not noticeable if the frequency composition is broadly similar before and after the change. An increase of 10 dBA in the sound level is perceived as being approximately twice as loud, and a reduction of 10 dBA is perceived as being half as loud as before.

Since noise in the environment can vary in level over the space of minutes or hours, various descriptors are available for quantifying sound levels with time. The most commonly encountered is the equivalent continuous level of sound, L_{eq}; it represents the average sound energy over the appropriate period of interest, which is typically several minutes to 1 hour. L_{eq} is often used to indicate the potential of a sound to cause annoyance, but the level is easily affected by unwanted, transient sounds such as papers or trees blowing in the wind, wind gusts, dogs barking, closely passing cars in a road, and people talking.

Statistical values, such as L_{10}, L_{50} or L_{90} may also be used to represent sound levels exceeded for an appropriate percentage of time. L_{90} is the level exceeded for 90% of the time and is least affected by inadvertent transients, and provides a good representation of the levels of sounds that are more continuous in nature, such as are encountered from distant traffic and power plant in continuous operation. L_{90} is employed as a descriptor of an ambient or background noise level.

For time periods extending over 24 hours, the “Noise Elements” of local plans for Contra Costa County and the city of Vallejo refer to community noise in terms of a metric called the “day-night level”, denoted as DNL or Ldn. This uses the average of hourly L_{eq} values in the daytime period of 7am to 10pm, and also L_{eq}+10 from 10 pm to 7 am. The 10 dB penalty during night-time accounts for the greater potential for annoyance by external sounds when most people are resting or sleeping.

A continuous sound level of 53.5 dBA by day and night would result in a level of 60 dBA Ldn.

The Vallejo Noise Element has defined a “normally acceptable” level of 60 dBA Ldn outside residential properties, but with a discretion of 65 dBA in some situations (Policy 1). When approving new development, it requires that project-related increases should be no more than 10 dBA in non-residential areas. In residential areas the permitted increase is 5 dBA where the ‘with-project’ total is less than 60 dBA Ldn, or no more than 3 dBA where it exceeds 60 dBA Ldn.

Similarly, the Contra Costa County Noise Element sets a standard for outside noise levels in residential areas of 60 dBA Ldn (Noise Element Policy #11-2), but it does not appear to limit permitted increases for new projects.

Noise Evaluation

The Power Plant and surrounding area were visited on September 8th 2011 to explore the existing noise environment on site and in the surrounding community, and also to select appropriate receptor positions for measurement. Community noise measurements were carried out from the evening of September 8th to 10th 2011 when the Plant was understood to be running close to full capacity and hence in its noisiest condition.

Sound level measurements were carried out with a Rion NA-29E integrating octave band meter. The instrument meets the American National Standards Institute (ANSI) and the International Electrotechnical Commission (IEC) requirements for Type 1 accuracy . It was field calibrated before and after each session of measurements with a Bruel & Kjaer 4230 acoustic calibrator. The meter provided the measurements of L_{eq}, statistical data such as L_{90}, and frequency analysis of some of the sounds for possible future reference.

The meter and microphone were tripod-mounted, with the microphone at a height of 5 feet above the ground. Attended measurements were undertaken over periods of 15-minutes, which provided a good estimate of the hourly noise levels in the community, but also an opportunity to measure at several receptor positions within a similar time frame. Attended measurements were employed, rather than unattended automatic monitoring, because it was important to gain a subjective impression of the sounds heard at each position and to note extraneous sounds that may have influenced the recorded values.

The Report of Final Decision by the California Energy Commission, 1993, identified several useful survey positions in the Crockett area and one in the Glen Cove area, which influenced the choice of measurement positions for this latest series of measurements. Positions selected in Crockett were:

- adjacent to the Plant on Loring Avenue at the bottom of Jackson St. (referred to as Loring/Jackson),
- southwest of the refinery at the top of West St. where it meets Edwards Ave. (West/Edwards),
- southeast of the plant on higher ground at the junction of Pomona St. and Bishop Rd. (Pomona/Bishop),

- also southeast of the plant at the top of the hill in Emerson Ave close to the junction with Baldwin Ave., (Baldwin/Emerson), previously described as Crolona Heights.

In Glen Cove, two readily accessible locations were chosen which had direct view of the Plant:

- the footpath adjacent to the marina and new dwellings at the bottom of Chartmaster Drive, and
- on South Regatta Drive where new dwellings have been built.

These positions are shown in Figure 1, annotated by a letter as described in Table 1 (see below). During the course of the survey, it was apparent that only three positions are helpful for assessing the noise impact of the addition of the proposed compressor to the existing Plant: Loring/Jackson on the east side of the Plant, and across the water, Chartmaster and South Regatta. This is discussed later.

Measurements and Results

The noise measurements are summarized in Tables 1 and 2. Details of all the measurements taken are provided in Appendix A.

Table 1 describes the ambient sound levels in terms of L_{90}, which is the level exceeded for 90% of the time. This provides a baseline level as a result of continual, steady sounds, such as sounds emanating from the Plant, the sugar refinery, and which also come from road traffic using the I-80 bridges. This level is least affected by intermittent sounds, such as train horns and passing vehicles in nearby roads.

Table 1 Receptor Notation (see Figure 1) and existing ambient sound levels L_{90}, dBA

Notation (Fig. 1)	Road or Intersection	Location relative to power plant	Ambient sound levels, L_{90} dBA	
			day	night
R	S REGATTA	Across the water, N of plant	52.0	48.4
C	CHARTMASTER	Across the water, NE of plant	51.7	49.9
L	LORING/JACKSON	Adjacent to plant on the east side	51.9	51.4
W	WEST/EDWARDS	SW of plant at top of hill	57.5	55.4
P	POMONA/BISHOP	SE of plant up hill	47.6	45.9
B	BALDWIN/EMERSON	SE of plant at top of hill	49.8	47.1

Extensive noise control engineering had been employed for the design and construction of the Power Plant in order to meet the Noise Conditions of Certification. Consequently, with the Plant operating at relatively quiet levels compared with a conventional 240 MW power station, the noise environment in its vicinity has been found to be dominated mostly by other noise sources.

For example, southwest of the Plant, at the top of West St. (West/Edwards), it is the I-80 bridge traffic and the sugar refinery which dominate the noise. The sound from the I-80 bridge also carries eastwards as a significant source on the high ground southeast of the power plant (at Pomona/Bishop and Baldwin/Emerson), where some sound from the sugar refinery is also audible. Across the water to the north, the I-80 bridge traffic is also very significant, the sugar refinery is clearly audible and the power plant is best described as only scarcely audible or not audible at all. It is only adjacent to the plant, at Loring/Jackson, that the power plant is clearly audible, but within its design limit of 52 dBA.

Table 1 shows that, at night, the ambient level everywhere is generally less than 50 dBA, except at the top of West St. (West/Edwards), and adjacent to the power plant (Loring/Jackson).

Table 2 describes the sound levels in terms of Leq, which is used for defining the 24-hour Ldn value. Leq is usually a few decibels higher than L90 because of variations and, more significantly, by extraneous sounds such as passing vehicles.

Table 2 Existing Sound Levels, L_{eq}, for determining Ldn

Notation	Location	L_{eq} levels, dBA			Notes of sound sources
		Ld (day)	Ln (night)	Ldn	
R	S REGATTA	58.1	52.9	60.5	Intermittent sounds of occasional passing cars on road and infrequent distant train horns from railway on south side, even at night. Steady sound from sugar refinery and I-80 bridge traffic which were clearly audible. Power plant was scarcely audible occasionally, but not audible most times.
C	CHARTMASTER	53.3	51.1	57.9	I-80 bridge traffic predominates, plus some sound occasionally from the water's edge. Occasional train horns even at night. Steady sound from sugar refinery, but power plant could not be distinguished, hence was not audible.
L	LORING/JACKSON	54.4	53.0	59.6	Intermittent sounds of an occasional passing vehicle along the road in the daytime, train horns and wind chimes and some sounds from within dwellings. Steady sound dominated by sugar refinery and power plant which were both clearly audible.
W	WEST/EDWARDS	60.2	57.1	64.1	Continual sounds of I-80 bridge traffic and sugar refinery, with occasional train horns. Power plant not audible.
P	POMONA/BISHOP	54.5	47.1	55.7	Intermittent sounds of occasional passing vehicles in day time, not at night.
B	BALDWIN/EMERSON	51.8	48.9	55.9	Continual sounds of I-80 bridge traffic; sugar refinery slightly audible, power plant not audible.

West/Edwards

The top of West St. is close to, and looks down upon, the I-80 bridge traffic. It also looks down on, and is even closer to, the sugar refinery. Both sources are clearly audible at this position and dominate the noise there. The power plant is not audible because it is largely screened by the topography, the buildings of the sugar plant, and it produces less noise than the other nearby sources.

Loring/Jackson

The position of Loring/Jackson is the closest of all measurement locations to the power plant, in front of the dwellings in Loring Avenue, immediately to its south-east side, where there is no extra benefit of screening by the large silos. Although there are occasional passing cars, the traffic here is very infrequent. Train horns are loud but infrequent and trains mostly sound off towards the west end of the sugar refinery as they approach the crossing, which is screened by the silos. Therefore the train horns do not make a significant contribution to the measured Leq over a relatively long period of 15 minutes to 1 hour. The underlying continuous sound is attributable to the sugar refinery and the power plant combined, at a level from 51 to 52 dBA L_{90}. This is within the reported design target of 53 dBA at this position, confirmed also by the night-time Leq value which averages to 53 dBA (see Table 2). It is understood that the power plant was running at close to full output at this time.

Pomona/Bishop and Baldwin/Emerson

At the locations of Pomona/Bishop and Baldwin/Emerson on the rising ground to the southeast of the power plant, the fairly quiet ambient noise is dominated by the I-80 bridge which was clearly visible and, at the time, upwind from both locations. The sugar refinery was slightly audible and the power plant was inaudible at these locations. During the daytime, frequent road traffic at this junction increased the L_{eq} value by about 4 dBA compared with the ambient of 47.6 dBA L_{90}.

Baldwin Ave just below the junction of Baldwin/Emerson has a direct view of the top of the exhaust stack of the power plant, but its sound was not audible compared with sounds of the I-80 bridge traffic and, to a lesser extent, the sugar refinery.

South Regatta

South Regatta has a clear view of the Plant, but it was only scarcely audible sometimes and not audible most of the time. Both the sugar refinery and the I-80 bridge traffic were clearly audible at all times. Occasionally, train horns could be heard distinctly as trains proceeded along the coastal track beside the refinery. L_{eq} levels were enhanced above L_{90} levels by vehicles

occasionally passing along the road, mostly in the daytime. This sound of local traffic is most responsible for elevating noise above 60 dBA Ldn at this position.

The ambient noise is likely to be greatly affected by wind conditions: a wind from the southwest and across cool water would tend to enhance sound from the bridge at this position, which was believed to be the case at the time of the measurements.

Chartmaster

The Chartmaster position is a footpath at the waterfront end of Chartmaster Drive. The measurement position was adjacent to the marina and in front of new dwellings. There is sometimes the sound of lapping water on the shore, but the noise is mostly dominated by the I-80 bridge traffic at all times of day and night, together with the sugar refinery. The power plant was inaudible at this position at all times of observation. It is believed that it should be retained as a receptor position not only because it is the closest point to the power plant on the north side of the water, but wind conditions might on some occasions make the plant slightly audible as was found at South Regatta; the design of the proposed new plant should take this into account. (A light wind more from the southwest, or very calm and cool water conditions may cause the sound to carry to this location more easily.)

Ldn values at South Regatta and Chartmaster receptors imply that a 3 dBA increase would be permitted under the Vallejo Noise Element if new equipment were introduced to the power station.

Choice of Receptors for this study

Although the Pomona/Bishop and Baldwin/Emerson locations may represent the existing noise climate for the south side of Crockett, and were advocated as useful receptors by the CEC prior to building the Plant, their screening from the Plant by the terrain, trees and other dwellings makes them of less importance in determining the noise impact of the proposed new equipment. Also, the top of West St. is dominated completely by other sound sources and the Plant could not be audible there. Therefore, of the four receptor locations in Crockett, it is only Loring/Jackson that is useful for evaluating the environmental impact of the proposed new equipment and where the compressor has the potential to be heard, assuming no mitigation precautions were applied. Across the water on the north side of the Carquinez Strait, the locations of South Regatta and Chartmaster have clear line of sight to the Plant and are therefore useful for evaluating the impact of the new equipment.

Weekend Sound Levels

Table 3 shows noise readings obtained on Saturday September 10th. Early in the morning, it was found that the ambient sound had reduced considerably, which is attributed to less noise from the sugar refinery (there was still much traffic on the I-80). It is clear from the noise reading at Loring/Jackson that less noise was also coming from the power plant in response to the lower load at the sugar refinery. Measurements later in the day were affected by increasing gusts of wind, especially across the water and at Loring/Jackson (wind blowing in the trees) and were not reliable after about 12:00. These readings further reinforce the strong significance of the sugar refinery in affecting the total noise at the receptors, compared with the Power Plant, during weekdays. It is understood that the new compressor would not be required for weekend duties.

Table 3 Sound Levels Saturday, Leq and L90

Notation	Location	Sound levels, dBA			Notes of sound sources
			L_{eq}	L_{90}	
R	S REGATTA	05:00	**46.8**	**45.8**	
		12:00	58	50.7	Affected by wind gusts
C	CHARTMASTER	05:30	**47**	**46**	
L	LORING/JACKSON	06:00	**49.6**	**48.6**	
		12:30	52.7	51.8	Affected by wind gusts
W	WEST/EDWARDS	06:00	**52.4**	**51.6**	
		13:00	54.8	53.6	Affected by wind gusts
P	POMONA/BISHOP	07:00	**46.8**	**45.1**	
		13:30	**58.9**	**48.3**	Local road vehicles increased Leq
B	BALDWIN/EMERSON	07:30	**49.2**	**47.6**	
		14:00	**48.8**	**47.6**	

Predictive Noise Modeling

SoundPlan 7.1 has been used to model the local terrain around the existing power plant, including the coastline of Glen Cove across the water, and the proposed compressor installation (in a building) with relevant surrounding buildings of the existing Plant. The design details of the proposed compressor pump and associated pipework are not presently known; it is understood this will be a reciprocating compressor of approximately 1250 HP capacity, contained within a noise insulated building with its associated pipework. The building is presently at the design stage.

Noise details of a reciprocating compressor have been scaled down from a known sound power spectrum of a 7200 HP compressor (the sound power is a measure of the total sound emitted by the equipment in all directions). The sound power level applied to the model has conservatively assumed 1500 HP. The sound power is therefore assumed to be 111 dBA with its appropriate frequency spectrum (see Table 4).

Table 4 Sound Power Levels for Reciprocating Compressor

Compressor Rating	**Sound Power Levels, dB**									**Total**
Octave Band, Hz ->	**31.5**	**63**	**125**	**250**	**500**	**1 k**	**2 k**	**4 k**	**8 k**	**dBA**
7200 HP	119	123	115	110	111	113	112	105	86	118
10LOG(1500/7200)	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8
1500 HP	112	116	108	103	104	106	105	98	89	111

There are several important issues which will mitigate the sound from the compressor and piping equipment by location (see Figure 2):

- It will be screened on the north side by the existing boiler feed pump building;
- It will be screened on the east side by the main turbine building and the land topography;
- It will be screened on the south side by the HRSG boilers and sugar silos and topography;
- It will be partly screened on the west side by the auxiliary boilers and topography;

The above have an important bearing on reducing the noise from the proposed equipment, but additionally:

- It will be enclosed in a sound reducing building;
- Its hours of operation are understood to be weekday daytime only, from about noon to 1800 hrs.

The reduced operating hours would result in no night-time penalty of 10 dB in the Ldn calculation for the new equipment.

At the time of writing, the compressor details, building enclosure and pipe arrangement have not been finalized, but a very conservative calculation in SoundPlan 7.1 assumes the following:

- Sound power of 111 dBA, as shown in Table 4;
- Enclosure in a building of 22g sheet metal with 4 inch thick internal sound absorption;
- Assumption of an average sound absorption within the building of 0.3 (a conservative estimate) with no extra attenuation added for the inside-to-outside reduction due to semi-reverberant environment inside the building (this is equivalent to including a 3 dB design margin in the data).

The noise level within the building is assumed, for the present therefore, to be approximately 104 dBA, which is a conservative situation.

SoundPlan has determined the following sound levels at the key receptors, shown in Table 5, for the compressor only.

Table 5 Predicted Sound Levels at Key Receptors, Leq dBA (Ld, daytime) for Continuous Operation of the Compressor Equipment Only.

Notation	Location	Predicted Sound Levels due to Compressor Only Ld (day)
R	S REGATTA	28.0
C	CHARTMASTER	35.7
L	LORING/JACKSON	32.6

Since the predicted levels at the receptors are more than 10 dBA less than the measured levels, there is no increase to the total noise, as shown in Table 6. This situation would apply for the compressors running by day, or even if they were to run at night. A visual presentation of noise contours for the compressor only noise is shown in Figure 3.

Table 6 No Impact Change in Ldn at the Key Receptors

Notation	Location	Existing Leq levels, dBA			Leq Total for Existing Plus Compressor, dBA			Change
		Ld (day)	Ln (night)	Ldn	Ld (day)	Ln (night)	Ldn	Ldn
R	S REGATTA	58.1	52.9	60.5	58.1	52.9	60.5	0
C	CHARTMASTER	53.3	51.1	57.9	53.3	51.1	57.9	0
L	LORING/JACKSON	54.4	53.0	59.6	54.4	53.0	59.6	0

Therefore, on the basis of comparing A-weighted sound levels, it is concluded that the proposed new compressor equipment would have no impact at the key receptors.

A review of the predicted daytime octave frequency band spectra (see Table 7) also indicates that there would be no impact at the receptors. Although there is a slight increase in the total noise at low frequencies of 31.5 to 125 Hz, the increase in each octave band is less than 3 dB, which would not be heard.

The ambient noise levels in Table 7 are the average daytime level L_{90} measured at each of the three receptors. The night-time octave band spectra are very similar (within the error expected with this type of measurement) and would present a similar conclusion if the compressor were run at night.

Table 7 Predicted Increase in Total Noise at Key Receptors in Octave Frequency Bands

		Sound Levels, dB								
Notation		**31.5**	**63**	**125**	**250**	**500**	**1 k**	**2 k**	**4 k**	**8 k**
R	ambient	24	34	40	41	44	45	40	32	22
	1500 HP	12	25	21	18	18	14	4		
	Total	24	35	40	41	44	45	40	32	22
	Difference	0	1	0	0	0	0	0	0	0
C	ambient	26	36	38	40	45	46	40	29	19
	1500 HP	19	33	29	26	25	23	15		
	Total	27	38	39	40	45	46	40	29	19
	Difference	1	2	1	0	0	0	0	0	0
L	ambient	26	37	43	44	48	47	42	34	22
	1500 HP	15	30	20	12	11	16	14	5	15
	Total	26	38	43	44	48	47	42	34	22
	Difference	0	1	0	0	0	0	0	0	0

Conclusion

For the present stage of design, the following has been concluded:

- The assumptions applied to the model are conservative and include, effectively, a 3 dB design margin in the calculation of sound emitted by the compressor building walls;
- The compressor assumption has been conservatively made for a 1500 HP reciprocating model, although a 1250 HP model is anticipated in the final design;
- The compressor is located behind existing buildings and therefore is less likely to create a noise impact than for an unsheltered or unscreened building;
- The compressor is predicted to produce at least 10 dBA less noise than already exists at the key receptors. Therefore it will have no impact at these receptors.

Further information is anticipated concerning building design, dimensions, compressor equipment and pipework which can be used to refine the model. However, the degree of conservatism built into the present model indicates that no significant impact is likely at the key receptors.

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Figure 1 Map of Local Area Around the Power Plant

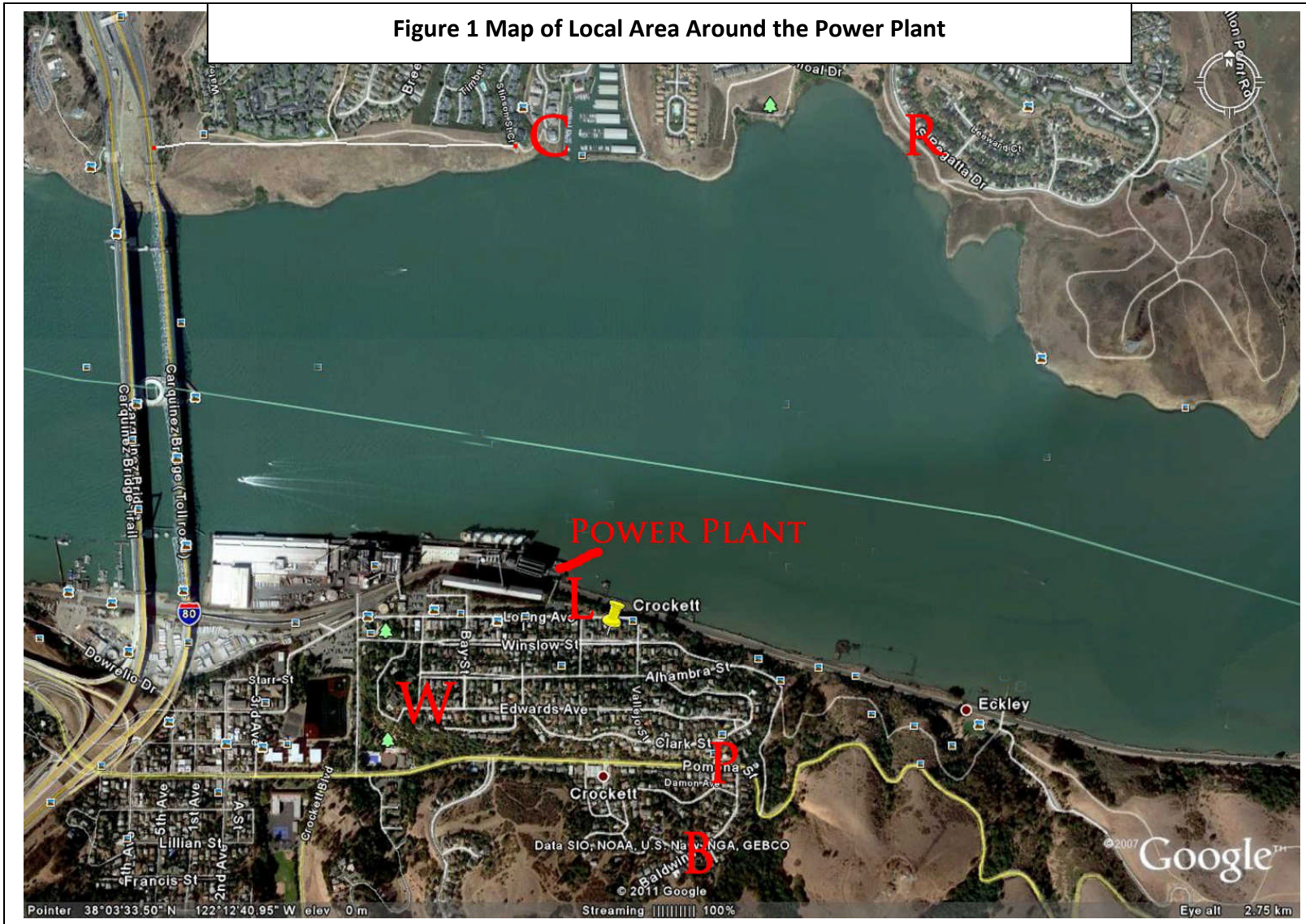


Figure 2 Existing Plan of Compressor Location and Buildings

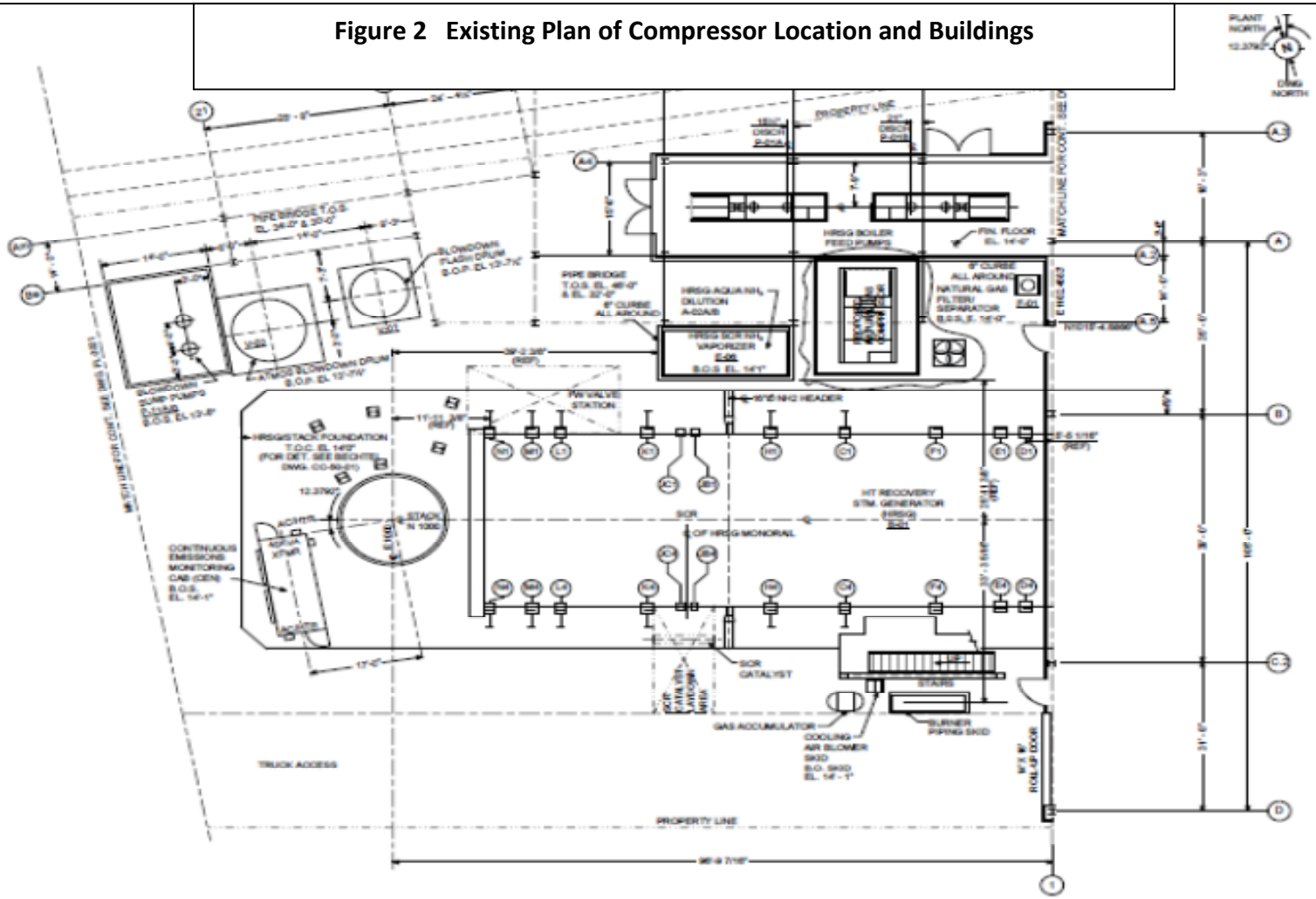
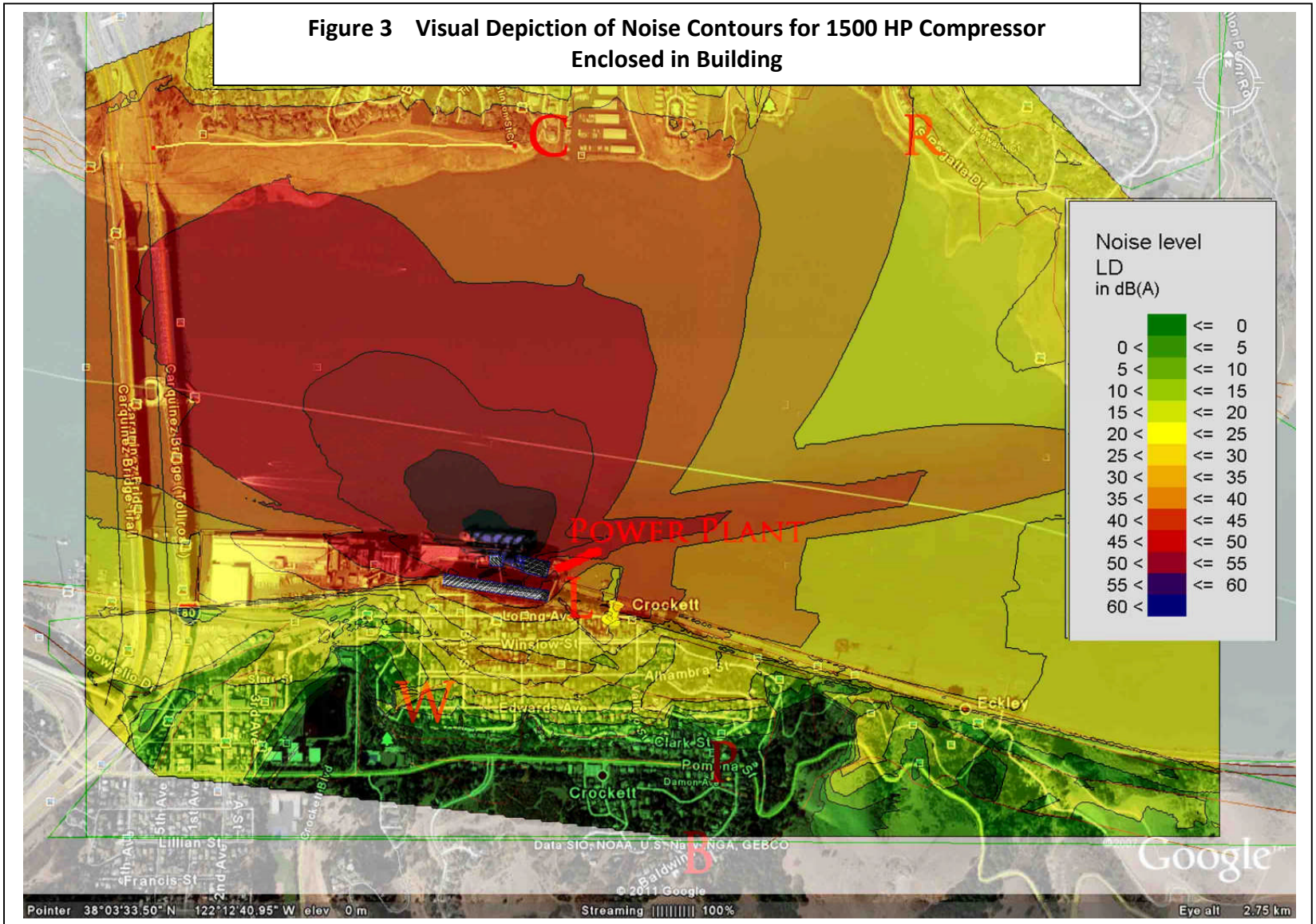


Figure 3 Visual Depiction of Noise Contours for 1500 HP Compressor Enclosed in Building



APPENDIX A

NOISE READINGS

= day
= night

S REGATTA

		Leq	Leq	**L90**	L90	Frequency Spectrum, L90								
		dBA	ave	**dBA**	ave	31.5	63	125	250	500	1000	2000	4000	8000
Fri 9th	2230	55.4		49.2		25	32	39	41	43	44	39	34	25
	1:30	50.5		47.8										
	4:30	50.8	52.9	48.1	48.4									
	8:00	58.5	58.1	50	52.0	24	34	40	41	44	45	40	32	22
	12:30	54.4		50.5										
	17:30	58.1		51.3										
	20:30	54.6		51.2										
		Ldn =	**60.5**											
0500 Sat		46.8		45.8		20	30	38	39	40	40	34	26	15
1200	wind	58		50.7										

CHARTMASTER		**Leq**	Leq	**L90**	L90	Frequency Spectrum, L90								
		dBA	ave	**dBA**	ave	31.5	63	125	250	500	1000	2000	4000	8000
Fri 9th	2300	52.2		50.4		25	35	38	41	45	45	40	30	21
	1:00	50.8		49.7		24	39	38	40	44	45	40	30	19
	4:00	50.2	51.1	49.5	49.9									
	8:30	53.3	53.3	50.2	51.7	26	36	38	40	45	46	40	29	19
	12:00	51.5		50.5										
	17:00	51.7		50.7										
	20:00	51.3		50.2										
		Ldn =	**57.9**											
0530 Sat		47		46		20	30	38	39	40	40	34	26	15
1230	wind													

LORING/JACKSON		**Leq**	Leq	**L90**	L90	Frequency Spectrum, L90								
		dBA	ave	**dBA**	ave	31.5	63	125	250	500	1000	2000	4000	8000
Thur 8th	17:30	53.5		51.4		26	37	42	42	46	46	40	31	20
Fri 9th	0:00	53.1	53.0	51.8	51.4	26	36	41	43	47	46	43	32	18
	3:30	52.8		51										
	10:00	56.5	54.4	52.8	51.9	26	37	43	44	48	47	42	34	22
	14:00	53.2		51.3		27	37	44	42	46	45	39	30	18
	19:00	53.5		52										
		Ldn =	**59.6**											
0600	Sat	49.6		48.6		24	35	40	40	44	42	37	29	16
0800	wind	52.7		51.8										

WEST/EDWARDS		**Leq**	Leq	**L90**	L90	Frequency Spectrum, L90								
		dBA	ave	**dBA**	ave	31.5	63	125	250	500	1000	2000	4000	8000
Thur 8th	18:00	61.6		57.2		26	38	46	47	51	54	48	33	21
Fri 9th	0:30	57.1	57.1	55.9	55.4	26	38	48	49	51	53	47	36	24
	2:00	57		54.8										
	11:30	61.1	60.2	58.7	57.5									
	15:30	57		56.1										
	18:30	59.9		57.6										
		Ldn =	**64.1**											
0600 Sat		52.4		51.6		22	34	39	42	45	48	43	29	15
1300 Sat		54.8		53.6										

POMONA/BISHOP		**Leq**	Leq	**L90**	L90	Frequency Spectrum, L90								
		dBA	ave	**dBA**	ave	31.5	63	125	250	500	1000	2000	4000	8000
Thur 8th	23:30	47.4		45.3		18	29	35	37	39	40	37	25	17
Fri 9th	3:00	46.8	47.1	45	45.9									
	10:30	54.8	54.5	46.5	47.6									
	14:30	54.2		48.4										
		Ldn =	**55.7**											
0700 Sat		**46.8**		**45.1**										
1330 Sat		**58.9**		**48.3**										

BALDWIN/EMERSON		**Leq**	Leq	**L90**	L90	Frequency Spectrum, L90								
		dBA	ave	**dBA**	ave	31.5	63	125	250	500	1000	2000	4000	8000
Fri 9th	2:30	48.9	48.9	47.1	47.1									
	11:00	52.9	51.8	49.8	49.8									
	15:00	50.2		49.7										
		Ldn =	**55.9**											
0700 Sat		**49.2**		**47.6**										
1400 Sat		**48.8**		**47.6**										