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HOLLISTER HILLS SVRA
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AMBIENT NOISE MONITORING

FINAL SUMMARY REPORT

For FY2014/15

8 Sessions

Prepared for:

California Department of Parks and Recreation

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Prepared by:

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1. Purpose of Monitoring

The recently completed noise monitoring for FY14/15 is part of the noise management program adopted by the California Department of Parks and Recreation (Department) for the Hollister Hills SVRA (Park). The purpose of the noise monitoring program for the Park was to document the current ambient noise levels at locations along the boundary of the Park acquisitions and the adjacent private property.

This report presents a summary of data for FY14/15 from the eight monitoring sessions performed by WIA between the beginning of October 2014 and the end of May 2015. Contained in this report is a tabulation of the range of noise level data at each location from the eight sessions of monitoring. There were four sessions of four hours each completed at each of the four monitoring locations chosen by the Park, for a total of 16 measurements. Also contained in this report are observations concerning the trends of the data and the sources of existing ambient noise, and tabulations of meteorological data recorded during the monitoring sessions at each measurement location.

2. Noise Monitoring Locations

By the decision of the Park, there were four locations; 1,4,6 and 8, that were monitored in FY14/15, chosen from the original eight measured in previous years, the data from which are covered in this summary report. Each session consisted of four hours of continuous monitoring, weather permitting. Depending on the starting time, which varied from session to session, the monitoring was generally performed between the hours of 10 a.m. and 3 pm on weekends and holidays.

The locations monitored from October 2014 to May 2015, which are covered by this summary report, and the dates of monitoring are as follows:

- Session 1 - Locations 4 and 8 - 10/18/14
- Session 2 – Locations 1 and 6 – 11/8/14
- Session 3 – Locations 4 and 8 – 1/17/15
- Session 4 – Locations 1 and 6 – 2/21/15
- Session 5 – Locations 4 and 8 – 3/21/15
- Session 6 – Locations 6 and 8 – 4/11/15
- Session 7 – Locations 1 and 4 – 5/2/15
- Session 8 – Locations 1 and 6 – 5/23/15

Figure 1 indicates the specific locations of all eight monitoring sites. The geographic locations of the eight monitoring sites were determined by the Park using GPS.

3. Noise and Weather Monitoring Procedures

Noise monitoring for each four hour session includes logging noise data continuously using digital sound level meters (SLM) and strip chart recordings of A-weighted noise levels. The noise logging is performed with Larson/Davis Model 820 or 812 digital sound level meters. The noise logging SLMs are set to "slow" response and to record A-weighted levels. The strip chart recording is performed with B&K Model 2230 SLM's and B&K portable, graphic level recorders (GLR). The GLR used is either a Model 2306 or 2309. A calibrated recording of the entire four hour measurement is made on a Sony PCM – D50 digital recorder for back up and post analysis, if needed.

One measurement microphone is used at each monitoring location. The microphones used for monitoring (Larson/Davis Model 2541), and the sound level meters meet Type 1 specifications (as defined by ANSI 1.4). The signal from the Larson/Davis SLM is fed to the B&K SLM which is used to provide gain control in 10 decibel steps and drive the GLR strip chart recorder with an A-weighted signal. The linear (unweighted) output from the B&K SLM is fed to the Sony recorder. All noise monitoring is calibrated using B&K acoustic calibrators (either Model 4230 or 4231), which are kept in calibration yearly, traceable to NIST standards. The height of the monitoring microphone above the ground is 5 feet.

During monitoring, the microphones are placed inside large windscreens to minimize the amount of noise generated by air moving over the microphone and by air turbulence around the microphone. The windscreens WIA uses are transparent to sound propagating through the air. In general, noise monitoring when wind speeds are less than 15 mph are possible with proper windscreens.

However, in low background noise environments, (such as the current study for the Park where background levels are typically between 30 and 40 dBA) wind speeds over 12 mph tend to result in microphone wind noise that is substantially above the background noise levels. Consequently, noise monitoring will usually be halted when the wind is consistently more than 12 mph.

For wind speeds between 10 and 12 mph, noise data will be recorded, but not reported as existing ambient noise, if the data are affected by microphone wind noise in the judgement of the person performing the monitoring. This is usually quite obvious from the strip chart records, which will be annotated and will indicate where the noise level momentarily increases in direct correlation with a gust of wind.

Each monitoring session lasts for at least four hours, weather permitting. Rain or any substantial precipitation will necessitate cessation of monitoring. The noise data are tabulated on an hourly basis and presented herein. The strip charts are annotated by hand, live in the field to identify significant noise events and their sources. All noise events over 45 dBA are noted on the individual strip charts as to the source of the noise. Noise events at lower levels are also noted depending on the relevance of the event and the source based on the judgement of the person performing the monitoring. The GLR strip charts have been archived and will become part of the

Park's permanent record for the current noise monitoring study. All single noise events causing noise levels to rise above 60 dBA have been tabulated and sources indicated.

Meteorological data are obtained using Kestral Model 3000 weather gauges. The data are collected every half hour by the person performing the monitoring. The following parameters are measured: wind direction and speed (average and maximum), air temperature, and humidity. Cloud cover is determined visually as was precipitation. These data are also tabulated and presented herein for each of the monitoring sessions covered by this report.

4. Noise Standards for Hollister Hills SVRA

The Department has adopted noise standards which it will apply to off-highway vehicle activity in the new acquisition portion of the Park. These "defined standards" establish that noise from off-highway activity in the Park will be considered excessive if it exceeds the following levels for any one-hour period when measured at the monitoring locations located in proximity to the SVRA acquisitions:

40 dBA for more than 30 minutes, L_{50}, or
45 dBA for more than 15 minutes, L_{25}, or
50 dBA for more than 5 minutes, $L_{8.3}$, or
55 dBA for more than 1 minute, $L_{1.7}$, or
60 dBA for any period of time, L_{max}

5. Noise Session Data

The noise metrics logged on an hourly basis were the L_{50}, L_{25}, L_8, L_2, L_{max} and L_{eq} at each location monitored. The range of hourly noise data have been tabulated for all 16 measurements for eight sessions. Where the single event noise level (L_{max}) exceeded 60 dBA, the level measured and time of occurrence for each of the 16 measurements are indicated in Table 1.

6. Trends and Observations

General Comments

As can be seen in Table 1, the primary sources of single event noise, which exceeds 60 dBA, are small planes, except where the monitoring is close to one of the Park's race tracks and there is a race event.

Of the locations monitored in FY14/15, only Locations 6 and 8 (during a race at the GP track), on a routine basis, clearly exhibited noise levels attributable to Park OHV activity, which registered on the strip chart (i.e., they were discernible on the strip chart from the existing ambient).

At the other locations monitored in FY14/15 (i.e., Locations 1and 4), an occasional OHV was audible, but the noise levels typically were no greater than the ambient noise which is unrelated to

the Park activity. OHV activity in these situations did not register on the strip charts above the other ambient noise.

In general, a sound would have to be 5 to 10 decibels less than the ambient to be inaudible. A noise level that was 5 dBA less than the ambient would only cause the combined noise level to change by approximately 1 dBA or less. This level of change would not clearly register as being detectable on the strip chart.

Location 8 is close to the Park's GP track. When a race or practice for a race was in progress, the noise levels monitored at that location are dominated by the dirt bike activity. This was observed during Session 5 (March 21, 2015), and during Session 6 (April 11, 2015) at Location 8.

There were four sessions at each of the four locations over the course of eight months of monitoring. During a session, each location was monitored for a period of four hours. Consequently, there are 16 hours or more of noise monitoring data for each of the locations.

The L50 is the median noise level. For all four locations the lower end of the range for the L50 was about 30 dBA. The upper end of the L50 range was more site-dependent, reaching as high as 49 dBA at Location 8 during a race event. The defined standard for L50 is 40 dBA. Locations 4, 6 and 8 had L50 ambient noise above the standard. The noise sources causing these exceedances are discussed below in the following section on location specific comments.

The L25 levels were not dramatically different than the L50 levels (i.e., within a few decibels). The lower end of the L25 range was 2 to 6 dBA higher than the respective L50 for each location. The highest L25 level of 52 dBA was recorded at Location 8 during a race. The defined standard for L25 is 45 dBA. Locations 4, 6 and 8 had L25 ambient noise above the standard as discussed in the next section.

As is to be expected, there was variability in the L50 and L25 due to short term noise events (i.e., those lasting for an hour or less). However, the data tend to indicate that the ambient noise level is relatively constant with some variation depending on local noise events, which vary from day to day, but in general are unrelated to Park activity. This conclusion is based on the written field observations during the noise monitoring and the hourly noise data.

The L8 was somewhat higher than the L25 levels. The defined standard for L8 is 50 dBA. Locations 4, 6 and 8 had L8 ambient noise above this standard. The L2 levels were somewhat higher than the L8 levels, by 2 to 6 dBA at the lower end of the respective ranges. The defined standard for L2 is 55 dBA. Locations had L2 ambient noise above the standard as discussed in the next section. The highest L8 and L2 levels of 54 and 57 dBA respectively were recorded at Location 8 during a race.

The EIR for the Park acquisitions established no standard for Leq. These data were recorded in response to a request by the Hollister Hills Advisory Committee to do so as part of the noise monitoring. The magnitude of the Leq can be disproportionately affected by louder events (i.e.,

those with more sound energy even if for a short duration). The Leq levels monitored tended to generally fall in between the L25 and L8 levels as might be expected for this type of rural environment that has occasional louder noise events (e.g., small planes), but has an ambient that fluctuates only slightly otherwise.

The Lmax or the maximum level attained in each hour ranged from a low of 49 dBA at Location 1, which is relatively well shielded from human noise sources (except for planes) to a high of 65 dBA recorded at Location 8 during a race at the GP track. Lmax levels as high as 75 dBA due to local noise from birds, or inadvertent movement by the person performing the monitoring were also recorded and documented in Table 1 for each occasion when the level exceeded 60 dBA.

Location Specific Comments

Location 1:

This location is relatively quiet. The primary sources of louder single event noise are small airplanes and occasional birds. Helicopters entering or flying over the Park are sometimes responsible for the maximum single event noise levels in any one hour period during the 4 hour monitoring sessions. Dirt bike and ATV noises are sometimes audible, but do not dominate nor noticeably affect the measured level of any of the six noise metrics in use for the monitoring program. The closest existing Park trails to this location are Rancho Road and Woodcamp Road. The only recorded exceedances of the defined standards were of the Lmax due to small planes, helicopters or birds.

Location 4:

This location is somewhat more exposed to dirt bike and ATV noise than Location 1, but not directly so (no direct line of sight) with regard to the existing Park trails. The primary source of louder single event noises are small airplanes and nearby birds. Outdoor activity (e.g., cutting grass) at the nearby residences occasionally will result in one of the project noise metrics to be affected. Dirt bikes and ATV are only occasionally audible. The closest existing Park trails are Back Ridge Road and Back Springs Road. Four of the five defined standards were exceeded at this location during one session. The exceedances were due to nearby birds, for sessions 5 and 7. The L2 standard was exceeded by a helicopter flyover during session 3.

Location 6:

This hillside location is directly exposed to dirt bike and ATV noise, and is closer to the existing Park trails and less shielded (i.e., direct line of sight) than most of the other monitoring locations. The primary sources of louder single event noises are airplanes, traffic on Cienega Road, and an occasional bird. Dirt bikes and ATV were often audible, and more so than at Locations 1 and 4. The closest existing Park trails are Lower Field Road, Middle Field Road and Adobe Road. Plane flyovers caused three Lmax exceedances during session 2. Three of the five defined standards were exceeded during session 8 due to a combination of, noise from constant wind and some dirt bike activity on the *Adobe Section* of the Park. During the first two hours of monitoring, the highest level from dirt bikes was 51 dBA, with numerous exceedances of 40dBA. Average wind

speed of 7-10 mph, and gusts to 15 mph repeatedly generated noise levels from 40 – 50 dBA. Exposure to wind gusts in the third hour of monitoring caused an exceedance of Lmax during session 8.

Location 8:

This location is shielded from direct exposure to dirt bike and ATV noise from Park trails in the Lower Ranch, but is in close proximity to the G.P. track. When there are no race events, the primary source of louder single event noises are airplanes and an occasional bird. Road traffic on Cienega Road is also sometimes a factor. On race days when the G.P. track is in use, dirt bikes at this track generate the loudest level. On non-race days, dirt bikes and ATV are occasionally audible. At this location, essentially all of the exceedances of the defined standards were due to race activity at the GP track. During Session 6 wind gusts caused two Lmax exceedances. During Session one, a truck on Cienega Road caused an Lmax exceedance.

Table 1 Single Event Noise Levels Exceeding 60 dBA

Session	Date	Location	Time	L_{max} (dBA)	Source
1	10/18/14	8	1028	64	Truck brake on Cienega Road
2	11/8/14	1	1218	70	Small plane overhead
		6	1056	68	Small plane overhead
			1115	66	"
			1218	62	"
			1344	60	"
3	1/17/15	4	1518	62	Helicopter
4	2/21/15	1	1106	61	Local noise near microphone
			1215	66	Small plane overhead
5	3/21/15	4	1103	60	Several Birds near microphone
			1105	61	"
			1106	62	"
			1229	61	"
		8	1051	62	Dirt Bike at GP track
			1101	62	Dirt Bike at GP track
			1109	63	Birds near Microphone
			1130	61	Dirt Bike at GP track
			1336	61	2 small planes overhead
6	4/11/15	6	1136	68	Movement near microphone
			1307	60	Small plane overhead
		8	1034	61	Dirt Bikes at GP track
			1051	62	Dirt Bikes at GP track
			1117-1204	60-65	11 Dirt Bike exceedances at GP track
			1143	61	Small plane
			1207	69	Wind gust
			1323	63	Wind gust

Table 1 Continued - Single Event Noise Levels Exceeding 60 dBA

Session	Date	Location	Time	L_{max} (dBA)	Source
7	5/2/15	1	1425	72	Movement near microphone
		4	1056	75	Bird near microphone
8	5/23/15	6	1118	62	Truck brakes on Cienega Road
			1305	63	Wind gust

Table 2 - Ambient Noise Monitoring Data

Session No. 1

Location No. 4

Date 10/18/14

Start Time 1004

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	30	35	41	49	39	59
2	30	34	40	46	37	57
3	31	37	43	48	39	58
4	30	33	39	47	37	58

Table 3 - Ambient Noise Monitoring Data

Session No. 1

Location No. 8

Date 10/18/14

Start Time 1006

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	39	43	47	51	43	64*
2	38	41	45	48	41	57
3	36	39	43	47	39	54
4	36	39	42	47	39	56

* Noise level due to truck braking on Cienega

Table 4 - Ambient Noise Monitoring Data

Session No. 2

Location No. 1

Date 11/8/14

Start Time 1023

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	28	33	40	48	37	55
2	27	32	39	44	41	70*
3	30	34	39	44	35	49
4	27	33	38	44	36	57

* Noise level due to small plane

Table 5 - Ambient Noise Monitoring Data

Session No. 2

Location No. 6

Date 11/8/14

Start Time 1015

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	38	40	45	49	45	67*
2	37	39	43	48	40	56
3	36	39	44	50	41	62*
4	35	38	42	49	40	60*

* Noise level due to small plane flyovers

Table 6 - Ambient Noise Monitoring Data

Session No. 3

Location No. 4

Date 1/17/15

Start Time 1116

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	36	38	43	51	41	56
2	33	36	42	46	37	52
3	32	35	38	43	35	50
4	31	35	43	50	40	61*

* Noise level due to helicopter flyover

Table 7 - Ambient Noise Monitoring Data

Session No. 3

Location No. 8

Date 1/17/15

Start Time 1008

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	31	36	44	48	39	57
2	31	36	42	48	38	53
3	33	37	42	46	37	52
4	31	34	37	40	33	47

Table 8 - Ambient Noise Monitoring Data

Session No. 4

Location No. 1

Date 2/21/15

Start Time 1006

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	28	31	34	39	32	61*
2	30	34	40	44	35	53
3	29	32	36	45	39	66**
4	29	33	38	43	34	52

* Noise level due to monitor movement near microphone
** Noise level due to small plane flyover

Table 9 - Ambient Noise Monitoring Data

Session No. 4

Location No. 6

Date 2/21/15

Start Time 1006

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	36	38	43	49	39	54
2	36	39	43	49	40	56
3	36	40	44	48	40	59
4	36	40	44	47	39	54

Table 10 - Ambient Noise Monitoring Data

Session No. 5

Location No. 4

Date 3/21/15

Start Time 1026

Comments Numerous birds nearby in tall grass during entire session

Hour	L50	L25	L8	L2	Leq	Lmax
1	41*	44	49	50	47	53
2	45*	48*	53*	56*	48	62*
3	43*	46*	49	52	45	59
4	44*	47*	50*	53	46	61*

* Noise level due to birds

Table 11 - Ambient Noise Monitoring Data

Session No. 5

Location No. 8

Date 3/21/15

Start Time 1048

Comments Race at GP track and steady insect noise

Hour	L50	L25	L8	L2	Leq	Lmax
1	48**	50**	52*	56*	49	63*
2	44**	46*	49	51	45	60*
3	40**	42	50**	55*	45	61***
4	46**	48**	50**	53	47	57

* Noise level due to dirt bikes on GP track
** Noise level due to steady insect noise in background
*** Noise level due to two small planes

Table 12 - Ambient Noise Monitoring Data

Session No. 6

Location No. 6

Date 4/11/15

Start Time 1049

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	39	41	45	53	46	68*
2	39	42	45	49	42	60**
3	39	41	44	49	41	57
4	38	40	44	47	40	53

* Noise level due to monitor adjusting equipment
** Noise level due to small plane flyover

Table 13 - Ambient Noise Monitoring Data

Session No. 6

Location No. 8

Date 4/11/15

Start Time 1004

Comments Race at GP track and some wind noise towards end of session

Hour	L50	L25	L8	L2	Leq	Lmax
1	44*	48*	53*	55*	48	62*
2	49*	52*	54*	57*	51	65**
3	43*	47*	52*	55*	47	69***
4	42*	45*	48	51	45	63***

* Noise level due to 2 dirt bikes in 1st hour
** Noise level due to 11 dirt bikes and one small plane flyover in 2nd hour
*** Noise level due to wind gust

Table 14 - Ambient Noise Monitoring Data

Session No. 7

Location No. 1

Date 5/2/15

Start Time 1027

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	42*	43	44	46	42	55
2	35	36	39	42	36	55
3	31	33	39	46	37	56
4	30	32	36	40	38	72**

* Noise level due to crickets in background
** Noise level due to operator movement

Table 15 - Ambient Noise Monitoring Data

Session No. 7

Location No. 4

Date 5/2/15

Start Time 1056

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	31	34	39	46	40	75*
2	33	36	41	44	37	50
3	37	39	42	46	39	53
4	36	38	42	47	39	55

* Noise level due to bird near microphone

Table 16 - Ambient Noise Monitoring Data

Session No. 8

Location No. 1

Date 5/23/15

Start Time 1201

Comments

Hour	L50	L25	L8	L2	Leq	Lmax
1	33	36	39	44	42	48
2	36	39	41	44	38	54
3	39	42	46	47	41	52
4	*	*	*	*	*	*

* No data due to technical difficulties

Table 17 - Ambient Noise Monitoring Data

Session No. 8

Location No. 6

Date 5/23/15

Start Time 1034

Comments Wind noise

Hour	L50	L25	L8	L2	Leq	Lmax
1	43*	45*	48	51	45	62**
2	43*	46*	49	51	45	55
3	40*	42	45	48	42	63***
4	45*	48*	51*	53	47	56

* Noise level primarily due to southwest winds 7-15mph, with some dirt bike activity over 45 dBA
** Noise level due to truck brakes on Cienega
*** Noise level due to strong wind gust

Table 18 – Meteorological Data

Session: 1

Day: Saturday

Date: 10/18/14

Monitoring Location No. 4

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1000	65	44	Clear	------	------	0/0
1030	67	48	Clear	------	NW	1/1.5
1100	71	48	Clear	------	------	0/0
1130	71	50	Clear	------	NW	1/2.5
1200	74	45	Clear	------	NE	1/4
1230	78	39	Clear	------	NE	1/1.5
1300	76	35	Clear	------	NW	1/3
1330	83	30	Clear	------	NE	1/2
1400	77	35	Clear	------	W	3/6

* Wind speed - (average/maximum)

Table 19 – Meteorological Data

Session: 1

Day: Saturday

Date: 5/24/08

Monitoring Location No. 8

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1004	68	58	Clear	------	SW	2/3
1034	69	57	Clear	------	------	------
1104	70	46	Clear	------	SW	3/5
1134	73	43	Clear	------	SW	1/2
1204	75	42	Clear	------	S	4/5
1234	77	36	Clear	------	N	4/5
1304	77	35	Clear	------	NW	2/3
1334	73	33	Clear	------	SE	1/2
1404	74	37	Clear	------	NW	4/6

* Wind speed - (average/maximum)

Table 20– Meteorological Data

Session: 2

Day: Saturday

Date: 11/8/14

Monitoring Location No. 6

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1030	69	37	Mostly clear	------	SE	1/1
1105	70	44	Mostly clear	-------	SE	1/2
1135	75	41	Mostly clear	-----	SE	1/2
1200	78	42	Clear	------	SE	1/4
1220	78	33	Clear	------	SE	1/2
1255	81	24	Clear	------	SE	2/4
1313	78	35	Clear	------	E	5/7
1345	79	30	Clear	------	SE	3/5
1400	81	31	Clear	------	SE	1/4

* Wind speed - (average/maximum)

Table 21 – Meteorological Data

Session: 2

Day: Saturday

Date: 11/8/14

Monitoring Location No. 1

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1022	71	37	Clear	------	SE	1/2
1052	71	36	Clear	------	SE	1/2
1122	75	32	Clear	------	SE	1/2
1152	78	31	Clear	------	SE	1/2
1222	76	37	Clear	------	SE	1/2
1252	76	39	Clear	------	SW	1/2
1322	76	39	Clear	------	S	1/2
1352	76	41	Clear	------	0	0/0
1422	74	41	Clear	------	S	1/2

* Wind speed - (average/maximum)

Table 22 – Meteorological Data

Session: 3

Day: Saturday

Date: 1/17/15

Monitoring Location No. 8

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1015	63	68	Partial	------	------	0/0
1045	64	68	Sunny	------	S	3/4
1115	63	69	Sunny	------	S	1/2
1145	63	68	Partial	------	------	------
1215	63	70	Partial	------	S	1/1
1245	61	65	Partial	------	NE	2/3
1315	68	60	Partial	------	S	2/2
1345	64	65	Sunny	------	NE	2/3
1415	65	65	Sunny	------	N	3/5

* Wind speed - (average/maximum)

Table 23 – Meteorological Data

Session: 3

Day: Saturday

Date: 1/17/15

Monitoring Location No. 4

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1120	64	57	Scattered	------	------	0/0
1150	64	60	Scattered	------	N	1/2
1217	66	62	Scattered	------	N/NE	2/3
1250	69	65	Scattered	------	N/NE	1/2
1315	73	58	Scattered	------	N/NW	1/2
1350	71	68	Scattered	------	N	1/6
1415	75	57	Scattered	------	N	3/6
1446	76	50	Patchy	------	NW	2/4
1518	71	57	Scattered	------	NW	1/3

* Wind speed - (average/maximum)

Table 24 – Meteorological Data

Session: 4

Day: Saturday

Date: 2/21/15

Monitoring Location No. 6

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1006	60	49	Clear	------	SE	1/2
1030	60	52	Clear	------	SE	1/2
1100	61	59	Clear	------	W	4/5
1130	61	59	Clear	------	W	4/5
1200	61	68	Clear	------	W	1/2
1230	64	67	Clear	------	W	2/3
1300	64	68	Clear	------	W	4/8
1330	63	70	Clear	------	W	4/6
1400	64	69	Clear	------	W	2/4

* Wind speed - (average/maximum)

Table 25 – Meteorological Data

Session: 4

Day: Saturday

Date: 2/21/15

Monitoring Location No. 1

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1020	54	74	Clear	------	NW	1/1
1030	56	72	Clear	------	NW	1/1
1059	58	70	Clear	------	NW	1/1
1120	59	66	Clear	------	NW	1/1
1200	63	62	Clear	------	W	5/7
1230	65	58	Clear	------	NW	8/9
1315	65	58	Clear	------	NW	1/3
1330	65	58	Clear	------	NW	2/4
2	65	58	Clear	------	NW	1/3

* Wind speed - (average/maximum)

Table 26 – Meteorological Data

Session: 5

Day: Saturday

Date: 3/21/15

Monitoring Location No. 8

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1045	60	59	Clear	------	NE	3/4
1115	59	64	Clear	------	NW	3/5
1145	61	64	Clear	------	NW	4/5
1215	63	61	Clear	------	NW	3/4
1245	66	52	Haze	------	NW	3/5
1315	69	36	Slight Haze	------	NW	3/5
1345	70	37	Slight Haze	------	NW	3/5
1415	70	39	Slight Haze	------	NW	3/5
1445	71	46	Clear	------	NW	3/5

* Wind speed - (average/maximum)

Table 27– Meteorological Data

Session: 5

Day: Saturday

Date: 3/21/15

Monitoring Location No. 4

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1030	61	59	Clear	------	N/NW	1/2
1100	61	59	Clear	------	N/NW	2/4
1130	65	58	Clear	------	N/NW	2/3
1200	66	57	Clear	------	NW	2/3
1230	70	52	Clear	------	W	2/4
1300	70	43	Clear	------	W	2/4
1330	71	42	Clear	------	W	2/4
1400	72	43	Clear	------	W	2/6
1430	72	42	Clear	------	W	2/6

* Wind speed - (average/maximum)

Table 28 – Meteorological Data

Session: 6

Day: Saturday

Date: 4/11/15

Monitoring Location No. 8

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1005	62	42	Partially Cloudy	------	NW	2/3
1035	63	43	Partially Cloudy	------	NW	1/2
1103	66	44	Partially Cloudy	------	N	2/4
1130	68	40	Partially Cloudy	------	N	1/2
1200	69	42	Partially Cloudy	------	N	1/4
1230	69	38	Partially Cloudy	------	N	3/5
1300	72	35	Partially Cloudy	------	N	3/5
1330	73	41	Partially Cloudy	------	N	3/5
1400	71	39	Partially Cloudy	------	N	2/5

* Wind speed - (average/maximum)

Table 29 – Meteorological Data

Session: 6

Day: Saturday

Date: 4/11/15

Monitoring Location No. 6

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1030	64	37	Clear	------	S	1/2
1056	65	35	Clear	------	S	1/2
1125	62	34	Clear	------	S	1/3
1206	69	34	Clear	------	S	3/5
1232	69	36	Clear	------	S	3/4
1338	73	35	Clear	------	SE	2/3
1358	72	36	Clear	------	NE	4/8
1430	74	34	Clear	------	NE	4/9
1449	75	32	Clear	------	NE	3/7

* Wind speed - (average/maximum)

Table 30 – Meteorological Data

Session: 7

Day: Saturday

Date: 5/2/15

Monitoring Location No. 4

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1116	66	54	Clear	------	S/SW	2/3
1145	71	43	Clear	------	S/SW	2/4
1205	76	35	Clear	------	S	5/9
1220	77	32	Clear	------	S/SW	2/4
1240	75	41	Clear	------	S	5/9
1330	78	31	Clear	------	S	5/9
1400	73	36	Clear	------	S	3/6
1424	77	28	Clear	------	SE	5/9
1453	73	31	Clear	------	SE	7/12

* Wind speed - (average/maximum)

Table 31 – Meteorological Data

Session: 7

Day: Saturday

Date: 5/2/2015

Monitoring Location No. 1

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1030	74	48	Clear	------	S	1/2
1100	70	61	Clear	------	SE	1/2
1130	71	58	Clear	------	SE	1/1
1200	72	55	Clear	------	SE	1/2
1230	73	51	Clear	------	S	1/2
1300	73	49	Clear	------	SE	1/2
1330	75	49	Clear	------	SE	1/2
1400	75	49	Clear	------	E	1/2
1430	75	41	Clear	------	SE	1/2

* Wind speed - (average/maximum)

Table 32 – Meteorological Data

Session: 8

Day: Saturday

Date: 5/23/15

Monitoring Location No. 1

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1130	56	67	Sight	------	SW	1/2
1200	57	66	Slight	------	SW	2/3
1224	57	65	Slight	------	SW	2/3
1236	57	60	Slight	------	SW	3/5
1303	68	53	Clear	------	W/NW	4/6
1356	56	41	Clear	------	S	4/6
1407	56	47	Clear	------	W	5/7
1444	61	62	Clear	------	E	2/4
1458	59	57	Clear	------	E	3/5

* Wind speed - (average/maximum)

Table 33 – Meteorological Data

Session: 8

Day: Saturday

Date: 5/23/15

Monitoring Location No. 6

Time	Air Temp. (°F)	Humidity (%)	Cloud Cover	Precipitation	Wind Direction	Wind Speed* -Avg/Max- (mph)
1030	55	69	Full Cloud	------	W/SW	7/11
11	55	65	Mostly Cloudy	------	W	7/14
1130	57	60	Mostly Cloudy	------	SW	10/15
1200	57	47	Mostly Cloudy	------	SW	8/13
1230	58	61	Mostly Cloudy	------	SW	6/10
1300	57	57	Mostly Cloudy	------	SW	8/12
1330	60	47	Partial	------	SW	7/10
1400	58	51	Partial	------	SW	12/19
1430	58	49	Partial	------	SW	12/19

* Wind speed - (average/maximum)

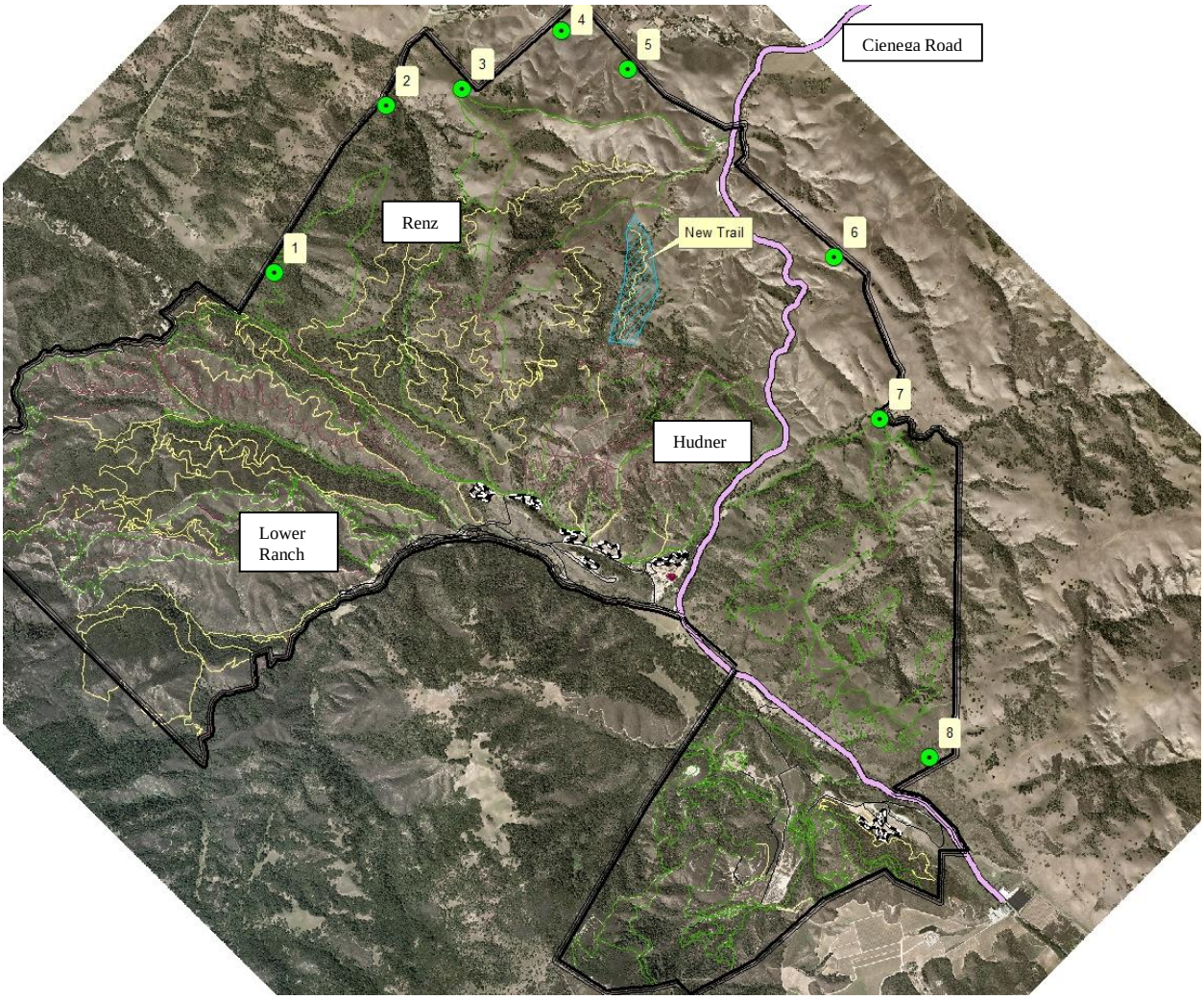

FIGURE 1: Measurement Locations

GLOSSARY OF ACOUSTICAL TERMS

A-Weighted Sound Level (dBA):

The sound pressure level in decibels as measured on a sound level meter using the internationally standardized A-weighting filter or as computed from sound spectral data to which A-weighting adjustments have been made. A-weighting de-emphasizes the low and very high frequency components of the sound in a manner similar to the response of the average human ear. A-weighted sound levels correlate well with subjective reactions of people to noise and are universally used for community noise evaluations.

Airborne Sound:

Sound that travels through the air, as opposed to structure-borne sound.

Ambient Noise:

The prevailing general noise existing at a location or in a space, which usually consists of a composite of sounds from many sources near and far.

Background Noise:

The general composite non-recognizable noise from all distant sources, not including nearby sources or the source of interest. Generally background noise consists of a large number of distant noise sources and can be characterized by L_{90} or L_{99}.

Community Noise Equivalent Level (CNEL):

The Leq of the A-weighted noise level over a 24-hour period with a 5 dB penalty applied to noise levels between 7 p.m. and 10 p.m. and a 10 dB penalty applied to noise levels between 10 p.m. and 7 a.m.

Day-Night Sound Level (L_{dn}):

The Leq of the A-weighted noise level over a 24-hour period with a 10 dB penalty applied to noise levels between 10 p.m. and 7 a.m.

Decibel (dB):

The decibel is a measure on a logarithmic scale of the magnitude of a particular quantity (such as sound pressure, sound power, and sound intensity) with respect to a standardized quantity.

Energy Equivalent Level (L_{eq}):

The level of a steady noise which would have the same energy as the fluctuating noise level

integrated over the time period of interest. L_{eq} is widely used as a single-number descriptor of environmental noise. L_{eq} is based on the logarithmic or energy summation and it places more emphasis on high noise level periods than does L_{50} or a straight arithmetic average of noise level over time. This energy average is not the same as the average sound pressure levels over the period of interest, but must be computed by a procedure involving summation or mathematical integration.

Frequency (Hz):

The number of oscillations per second of a periodic noise (or vibration) expressed in Hertz (abbreviated Hz). Frequency in Hertz is the same as cycles per second.

Groundborne Noise:

Noise propagated through soil and building structures. It is normally radiated by the ground in open air and by walls, floors and ceilings inside a building as a result of vibration which, after being produced by a source some distance away, travels through the soil in the form of elastic waves.

Impulse Noise

Sound with a very fast rise time and of brief duration. The American National Standards Institute (ANSI) defines the rise time of impulse noises to be not more than 35 milliseconds and the duration of not more than 500 milliseconds to the time when the level is 30 dB below the peak.

Octave Band - 1/3 Octave Band:

One octave is an interval between two sound frequencies that have a ratio of two. For example, the frequency range of 200 Hz to 400 Hz is one octave, as is the frequency range of 2000 Hz to 4000 Hz. An octave band is a frequency range that is one octave wide. A standard series of octaves is used in acoustics, and they are specified by their center frequencies. In acoustics, to increase resolution, the frequency content of a sound or vibration is often analyzed in terms of 1/3 octave bands, where each octave is divided into three 1/3 octave bands.

Sound Exposure Level (SEL):

Metric composed of the average level of noise with a correction to account for the duration of the noise. It is a very useful indicator for rating transient sounds or discrete events such as truck or airplane passby.

Sound Pressure Level (SPL):

The sound pressure level of sound in decibels is 20 times the logarithm to the base of 10 of the ratio of the RMS value of the sound pressure to the RMS value of a reference sound pressure. The standard reference sound pressure is 20 micro-pascals as indicated in ANSI S1.8-1969, "Preferred Reference Quantities for Acoustical Levels".

Statistical Distribution Descriptors (L_1, L_{10}, L_{50}, L_{90}, etc):

Also called Exceedance Levels, they represent the level of the noise (A-weighted for environmental studies) which is exceeded a percentage of the duration of the measurement period, as denoted by the subscript. So, for instance, L_{10} is the level of the noise exceeded for 10% of the measurement period (usually 1 hour in long-term environmental studies)

L_{99} and L_{90} are descriptors of the typical minimum or "residual" background noise (or vibration) levels observed during a measurement period, normally made up of the summation of a large number of sound sources distant from the measurement position and not usually recognizable as individual noise sources. Generally, the prevalent source of this residual noise is distant street traffic. L_{90} and L_{99} are barely influenced by occasional local motor vehicle passbys. However, they can be influenced by stationary sources such as air conditioning equipment.

L_{50} represents a long-term statistical median noise level over the measurement period and does reveal the long-term influence of local traffic.

L_{10} describes typical levels or average for the maximum noise levels occurring, for example, during nearby passbys of trains, trucks, buses and automobiles, when there is relatively steady traffic. Thus, while L_{10} does not necessarily describe the typical maximum noise levels observed at a point, it is strongly influenced by the momentary maximum noise level occurring during vehicle passbys at most locations.

L_1, the noise level exceeded for 1% of the time is representative of the occasional, isolated maximum or peak level which occurs in an area. L_1 is usually strongly influenced by the maximum short-duration noise level events which occur during the measurement time period and are often determined by aircraft or large vehicle passbys.