APPENDIX E

Environmental Noise Assessment – Bollard Acoustical Consultants, Inc.

Environmental Noise Assessment

Kidder Creek Orchard Camp Use Permit Application – UP 11-15

Etna (Siskiyou County), California

BAC Job # 2017-047

Prepared For:

Kidder Creek Orchard Camps, Inc.

Attn: Mr. Tim Lloyd
P.O. Box 208
Greenview, CA 96037

Prepared By:

Bollard Acoustical Consultants, Inc.

Paul Bollard, President

October 24, 2017

BOLLARD
Acoustical Consultants

Introduction

Kidder Creek Orchard Camp (KCOC) is located at 2700 South Kidder Creek Road in Siskiyou County, CA. Figure 1 shows the KCOC boundaries. Currently KCOC is operating under permit number UP-95-12, which limits activities to a total occupancy of 165, an on-site parking limit of 215, and an average daily traffic volume of 131 vehicles.

Activities and programs currently occurring at KCOC include camping, equestrian riding, archery, crafts, a ropes course, rifle shooting, an adventure course, paintball, and swimming activities at the pond area. The existing camp configuration, which indicates the locations of these activities, is shown on Figure 2.

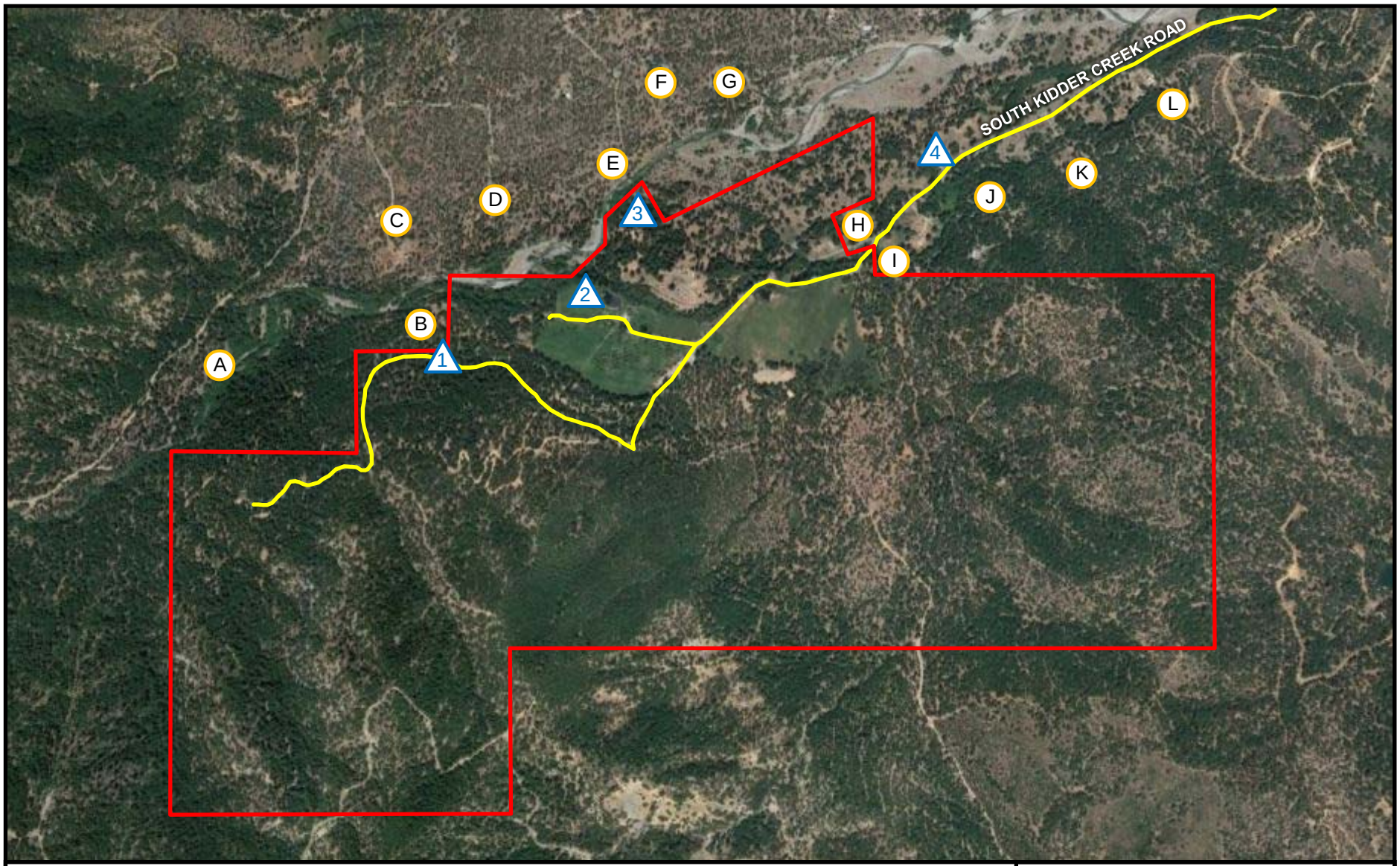
The strategic plan for the KCOC includes enhancing the activities and programs offered by providing improved facilities and accommodations, enhancing the visual appearance of the camp property, improving safety by separating vehicle and pedestrian traffic, and creating a flexible layout that accommodates phased construction. The proposed site plan is shown on Figure 3.

Comparison of the existing camp configuration on Figure 2 against the proposed configuration (project) shown on Figure 3 indicates the changes would primarily consist of the following:

- The creation of a new 7-acre pond for water recreation activities (no motorized watercraft)
- Moving and expanding the equestrian area, and construction of a covered riding arena
- Construction of new cabins
- Construction of two new RV parking areas
- Construction of a new welcome center/dining facility
- Creation of new base camp areas
- Creation of amphitheater areas
- Relocation of the existing sawmill area (to accommodate new pond)

Many of the activities occurring with the KCOC boundaries are not substantive noise sources. Examples of relatively quiet activities include equestrian activities, base camp area activities (with most campers using these areas for eating and sleeping while not engaged in off-site activities such as rafting, hiking, backpacking, etc.), archery, RV parking (generators are not used), ropes course, crafts, etc.

Noise sources associated with existing and proposed KCOC operations include kids playing/shouting while engaged in water activities in the existing pond area and anticipated increased activity in the proposed new pond area, playing field activities (soccer), future amphitheater usage for camp assemblies and/or activities (i.e. movie night), and project-generated traffic.



Legend

- # — Ambient Noise Measurement Sites
- X — Nearest Noise-Sensitive Receivers (Residences)
- Project Site Boundary

Scale (Feet)

0 1,000 2,000

N

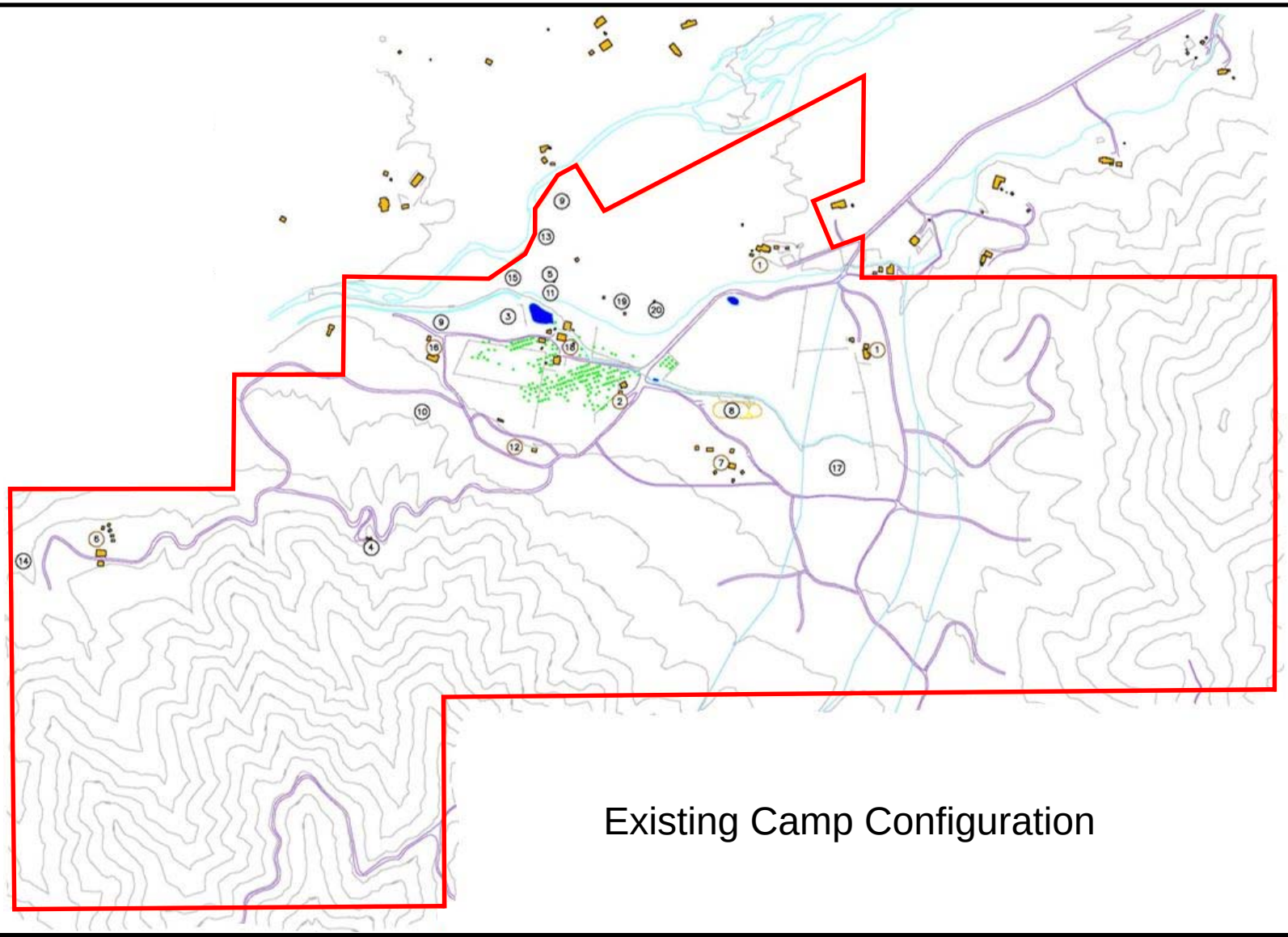
KIDDER CREEK ORCHARD CAMP EXPANSION

Siskiyou County, California

Project Area, Noise Measurement Locations, and Noise-Sensitive Receivers

Figure 1

BOLLARD Acoustical Consultants



Existing Camp Configuration

Legend

1 – Staff Residence
2 – Welcome Center
3 – Small Pond & Rec Area
4 – Water Storage Tank
5 – Water Well
6 – Timber line Camp
7 – Ranch Camp
8 – Equestrian Area
9 – Base Camps (2)
10 – Archery Course
11 – Craft Area
12 – RV Area
13 – Ropes Course
14 – Rifle Range
15 – Adventure Course
16 – Staff House & Retreat
17 – Paintball Course
18 – Multi-Use Area
19 – Sawmill/Storage Area
20 – Fuel & Waste Disposal
Septics
Ponds, Ditches, Creeks
Existing Structures
Orchard
Roads
Project Area

Scale (Feet)
0 750 1,500

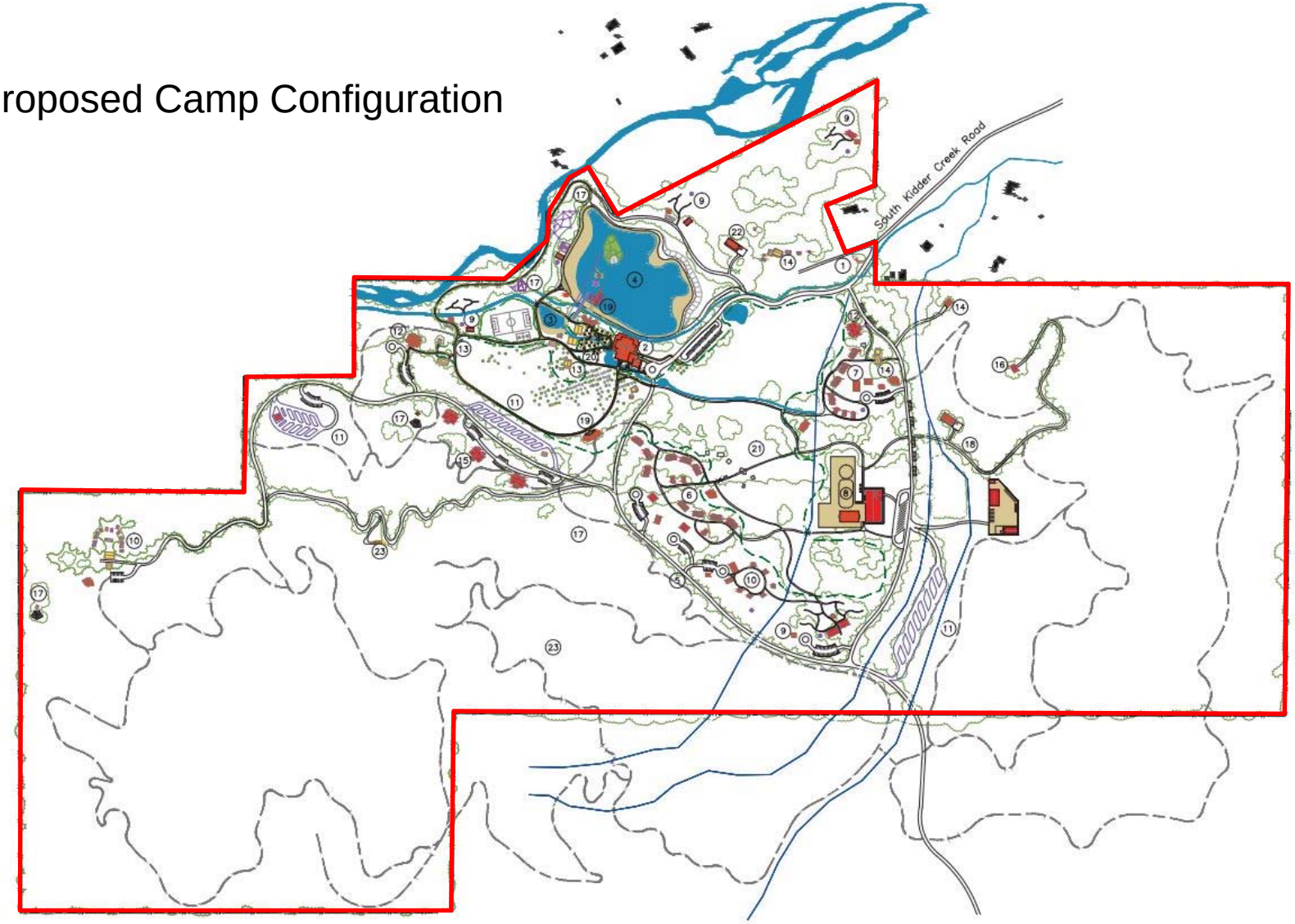
N

KIDDER CREEK ORCHARD CAMP EXPANSION
Siskiyou County, California
Project Site Plan - Existing

Figure 2

BOLLARD Acoustical Consultants

Proposed Camp Configuration



Legend

1 – Main Entrance
2 – Welcome Center
3 – Small Pond & Rec Area
4 – Large Pond & Rec Area
5 – Perimeter Road
6 – The Pines
7 – Ranch Camp
8 – Equestrian Area
9 – Base Camps (4)
10 – High Adventure Camps
11 – Craft Area
12 – RV Areas (3)
13 – Staff/Guest Houses (3)
14 – Staff Residences (3)
15 – Adult Retreat Centers (3)
16 – Worship Pavilion
17 – Rec Areas
18 – Maintenance Facility
19 – Amphitheatre (2)
20 – Picnic Area/Park
21 – Green Belt
22 – Sawmill/Storage Area
23 – Water Storage Tanks
Project Area

Scale (Feet)
0 750 1,500

N

KIDDER CREEK ORCHARD CAMP EXPANSION
Siskiyou County, California
Project Site Plan - Proposed

Figure 3

BOLLARD Acoustical Consultants

Due to the substantial size of the project area, many of the camp facilities and activities are, or will be, located hundreds to thousands of feet from the nearest noise sensitive receptors (residences). However, some proposed camp facilities and activities, such as the proposed 7 acre pond, will be located in relatively close proximity to some existing residences. The existing residences are located primarily to the north of the KCOC boundaries, as well as along South Kidder Creek Road. The locations of the twelve (12) nearest residences to the project site are shown on Figure 1.

Due to the potential noise generating of project construction and operations, and the potential vibration generation during project construction (no appreciable vibration generating activities occur at the project site), KCOC has retained Bollard Acoustical Consultants, Inc. (BAC) to prepare this analysis of potential noise and vibration impacts resulting from the proposed project. Specifically, the purposes of this analysis are to quantify existing ambient noise and vibration levels in the immediate project vicinity, to assess changes in noise and vibration levels which would result from the proposed project, to compare those changes against applicable CEQA and Siskiyou County criteria, and, if necessary, to recommend appropriate noise and/or vibration mitigation measures to reduce any identified impacts to a level of insignificance. The report contains the results of BAC's analysis.

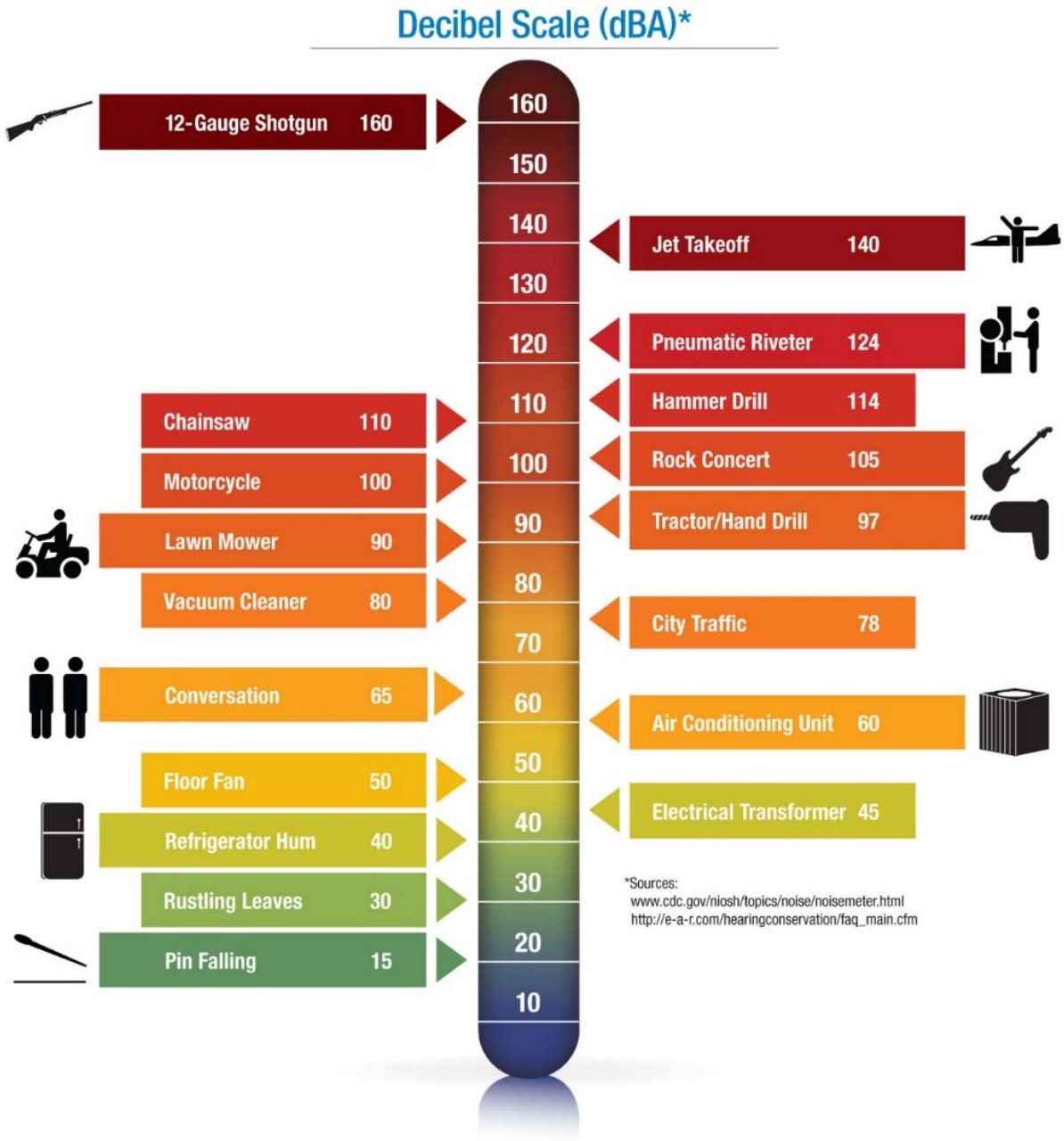
Noise & Vibration Fundamentals

Noise

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are called sound. Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. As a result, the decibel scale was devised. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB. Another useful aspect of the decibel scale is that changes in levels (dB) correspond closely to human perception of relative loudness. Appendix A contains definitions of Acoustical Terminology. Figure 4 shows common noise levels associated with various sources.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by weighing the frequency response of a sound level meter by means of the standardized A-weighing network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels in decibels.

Figure 4
Typical A-Weighted Sound Levels of Common Noise Sources



Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}) over a given time period (usually one hour).The L_{eq} is the foundation of the Day-Night Average Level noise descriptor, L_{dn}, and shows very good correlation with community response to noise generated by transportation noise sources.

The Day-Night Average Level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment. L_{dn}-based noise standards are commonly used to assess noise impacts associated with traffic, railroad and aircraft noise sources.

Vibration

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that noise is generally considered to be pressure waves transmitted through air, while vibration is usually associated with transmission through the ground or structures. As with noise, vibration consists of an amplitude and frequency. A person's response to vibration will depend on their individual sensitivity as well as the amplitude and frequency of the source.

Vibration can be described in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of velocity in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration in terms of peak particle velocity as well as RMS velocities.

As vibrations travel outward from the source, they excite the particles of rock and soil through which they pass and cause them to oscillate. Differences in subsurface geologic conditions and distance from the source of vibration will result in different vibration levels characterized by different frequencies and intensities. In all cases, vibration amplitudes will decrease with increasing distance. The maximum rate, or velocity of particle movement, is the commonly accepted descriptor of the vibration "strength".

Human response to vibration is difficult to quantify. Vibration can be felt or heard well below the levels that produce any damage to structures. The duration of the event has an effect on human response, as does frequency. Generally, as the duration and vibration frequency increase, the potential for adverse human response increases.

According to the Transportation and Construction-Induced Vibration Guidance Manual (Caltrans, June 2004), operation of construction equipment and construction techniques generate ground vibration. Traffic traveling on roadways can be a source of vibration, but traffic rarely generates vibration amplitudes high enough to cause structural or cosmetic damage, or to reach thresholds of annoyance.

Regulatory Setting

State of California

The State of California has established regulatory criteria that are applicable to this assessment. Specifically, Appendix G of the State of California Environmental Quality Act (CEQA) Guidelines are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. According to Appendix G of the CEQA guidelines, the project would result in a significant noise or vibration impact if the project would result in the following:

A. exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

B. a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; pool on going use

C. a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; construction

D. exposure of persons to or generation of excessive groundborne vibration or noise levels;

E. for a project located within an ALUP or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, the project would expose people residing or working in the project area to excessive noise levels;

F. or a project within the vicinity of a private airstrip, the project would expose people residing or working in the project area to excessive noise levels.

The noise standards of Siskiyou County are presented in the following section. If the project were to result in exceedance of applicable Siskiyou County criteria, a significant noise and/or vibration impact is identified.

CEQA does not define what constitutes a substantial permanent or temporary noise level increase. However, it is generally recognized that a 3 dB or greater increase in noise levels due to a project would be considered significant where exterior noise levels would exceed 60 dB (for residential uses). Where pre-project ambient conditions are at or below 60 dB, a 5 dB increase is commonly applied as the standard of significance.

It should be noted that audibility is not a test of significance according to CEQA. If this were the case, any project which added any audible amount of noise to the environment would be considered unacceptable according to CEQA. However, CEQA requires a substantial increase in noise levels before noise impacts are identified, not simply an audible change.

The project is not located in the vicinity of either public or private use airports. As a result, CEQA criteria E & F would not apply to this project.

Siskiyou County General Plan Noise Standards

Table 13 of the Siskiyou County General Plan Noise Element contains ranges of acceptable noise levels for a variety of land use types. That table, which is reproduced below as Table 1, identifies acceptable noise environments of 60 dB L_{dn} for residential land uses. In addition, the Noise Element also identifies that interior community noise levels (CNEL), with windows closed, attributable to exterior sources, shall not exceed a CNEL of 45 dB in any habitable room.

Table 1
Land Use Compatibility for Exterior Community Noise

Land Use Category	Noise Ranges (L_{dn})			
	1	2	3	4
Auditoriums, concert halls, amphitheaters, music halls Passively-used open space (quiet or contemplation areas of public parks)	50	50-55	55-70	70
Residential. All Dwellings including single-family, multi-family, group quarters, mobile homes, etc. Transient lodging, hotels, motels. School classrooms, libraries, churches. Hospitals, convalescent homes, etc. Actively utilized playgrounds, neighborhood parks, golf courses.	60	60-65	65-75	75
Office buildings, personal business and professional services. Light commercial. Retail, movie theaters, restaurants. Heavy commercial. Wholesale, industrial, manufacturing, utilities, etc.	65	65-70	70-75	75

Notes:

Noise Range 1
Acceptable land use. No special noise insulation or noise abatement requirements unless the proposed development is itself considered a source of incompatible noise for a nearby land use (i.e., and industry locating next to residential uses).

Noise Range 2
New construction or development allowed only after necessary noise abatement features are included in design. Noise studies may be required if the proposed development is itself considered a source of incompatible noise for a nearby land use.

Noise Range 3
New construction or development should generally be avoided unless a detailed analysis of noise reduction requirements is completed and needed noise abatement features included in design.

Noise Range 4
New construction or development generally not allowed.

Source: Siskiyou County General Plan Noise Element, Table 13

Vibration Criteria

The Siskiyou County General Plan does not have adopted vibration standards. As a result, Caltrans-recommended criteria are applied for this project, as described below. Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. The Caltrans publication, *Transportation-and Construction-Induced Vibration Guidance Manual*, provides guidelines for acceptable vibration limits for transportation and construction projects in terms of the induced peak particle velocity (PPV). Those standards are reproduced below in Table 2.

Table 2
Vibration Criteria for Structures

	Maximum PPV (in/sec)	
Structure and Condition	**Transient Sources[1]**	**Continuous or Frequent Intermittent Sources[2]**
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old building	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial building	2.00	0.50

Notes:
1 Transient sources create a single isolated vibration event.
2 Continuous/frequent intermittent sources include repetitive single events.

Current Caltrans research illustrates that there are different thresholds of perception for different types of vibration sources. Section XI(b) of Appendix G of the CEQA guidelines requires that a project result in exposure of persons to, or generation of, *excessive* groundborne vibration levels or groundborne noise levels, for the finding of a significant impact. The CEQA guidelines specifically mention “excessive” vibration, rather than just perceptible vibration. Because the general range at which vibration becomes distinctly to strongly perceptible ranges from 0.1 – 0.50 in/sec ppv (Caltrans 2004), project-generated vibration levels exceeding 0.1 inches/second PPV at the nearest residences are considered significant for this study.

Existing Noise Sources and Ambient Noise Levels

The existing noise environment within the overall project area varies depending on proximity to kidder creek (water noise), South Kidder Creek Road (traffic noise), or various camp activities. To quantify the existing ambient noise environment at locations representative of the noise environment on the project site and at the nearest sensitive receptors to the project site, BAC conducted long-term noise level measurements at four (4) locations indicated on Figure 1 at various times between June 15 and June 30, 2017. Photographs of the noise measurement sites and general camp area photos are included in Appendix D.

Noise measurement Site 1 was intended to be representative of existing ambient conditions at Receptor B, which was located in close proximity. Noise measurement Site 1 was also intended to be representative of ambient conditions at Receptors C, D, F & G, which are located roughly comparable distances from water noise generated by Kidder Creek flow.

Noise measurement Site 2 was specifically selected to capture the noisiest on-site aspects of KCOC operations. Specifically, Site 2 was located 130 feet from the center of the existing pond where swimming activities currently occur, and 270 feet from the center of the soccer field. This data was used to project noise impacts at the nearest residences resulting from both existing operations and the creation of the new pond area.

Noise measurement Site 3 was specifically selected to be representative of average ambient conditions at Receptor E, as that receptor and the sound level meter at Site 3 were located equal distances from kidder creek generated flow noise. Because there was no camp or other typical human activity in the vicinity of Site 3, maximum noise levels measured at that location are believed to be lower than maximum noise levels occurring at Receptor E. As a result, maximum noise level data collected at noise measurement Site 1 was used to assess noise impacts at Receptor E relative to CEQA guidelines. That assessment is included in a subsequent section of this report.

Noise measurement Site 4 was specifically selected to capture traffic noise on South Kidder Creek Road. The microphone located at measurement Site 4 was approximately 100 feet from the centerline of South Kidder Creek Road. That data was used to extrapolate existing ambient conditions at the existing residences located along that roadway.

Larson Davis Laboratories (LDL) Model 820 and 831 precision integrating sound level meters were used for the noise level measurements. The meters were calibrated before use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The sound level meters were placed in the field on June 15th, 2017, and retrieved on July 3, 2017, for a total monitoring period of 18 days. During the noise monitoring period, KCOC staff reported that normal camp operations were in effect.

It should be noted that, although the four (4) sound level meters were in the field for 18 days, due to both battery life and sound level meter memory constraints, the actual duration of time monitoring at each location varied. Specifically, 11 complete days were logged at Site 1, 10

complete days were logged at Site 2, 15 complete days were logged at Site 3, and 18 complete days were logged at Site 4. The data collected represents a statistically significant sample of ambient data at each of the four locations, and provided sufficient data to establish baseline conditions for this study. The ambient noise measurement results are summarized in Table 3 with the detailed results provided in a graphical format in Appendix B.

Table 3
General Ambient Noise Measurement Results Summary[1]
Kidder Creek Orchard Camp Expansion – Siskiyou County, CA

Site[2]	Date	Average Noise Level (dB L_{eq}) Daytime[3]	Average Noise Level (dB L_{eq}) Nighttime[4]	Maximum Noise Level (dB L_{max}) Daytime[3]	Maximum Noise Level (dB L_{max}) Nighttime[4]	Day-Night Average (dB L_{dn})
1	6/15/17	44	42	66	50	49
	6/16/17	44	42	63	54	49
	6/17/17	43	41	63	51	48
	6/18/17	45	42	64	56	50
	6/19/17	44	42	66	50	49
	6/20/17	43	41	60	50	48
	6/21/17	43	41	63	50	48
	6/22/17	43	42	63	56	49
	6/23/17	44	43	65	54	50
	6/24/17	43	41	63	53	48
	6/25/17	46	40	66	51	49
	Average	**44**	**42**	**64**	**52**	**49**
2	6/23/17	55	52	72	58	60
	6/24/17	53	53	68	60	60
	6/25/17	53	52	61	56	59
	6/26/17	59	51	77	53	62
	6/27/17	57	51	75	55	61
	6/28/17	53	52	67	57	60
	6/29/17	54	52	69	55	60
	6/30/17	56	51	73	54	59
	7/1/17	52	51	66	55	57
	7/2/17	52	50	63	57	58
	Average	**54**	**52**	**69**	**56**	**60**
3	6/15/17	50	50	51	51	56
	6/16/17	50	51	53	50	57
	6/17/17	50	51	56	50	57
	6/18/17	50	51	54	50	57
	6/19/17	51	51	52	50	58
	6/20/17	50	51	51	50	57
	6/21/17	49	50	51	50	57
	6/22/17	49	50	52	49	56
	6/23/17	48	50	51	51	56
	6/24/17	49	49	53	50	56
	6/25/17	50	50	56	50	56
	6/26/17	49	50	54	50	56
	6/27/17	48	48	52	50	55
	6/28/17	47	48	51	50	54
	6/29/17	47	48	51	50	54
	Average	**49**	**50**	**53**	**50**	**56**
4	6/15/17	45	42	61	51	49
	6/16/17	44	43	61	53	50
	6/17/17	43	44	60	53	50
	6/18/17	44	45	61	53	51
	6/19/17	43	45	61	53	51

Table 3
General Ambient Noise Measurement Results Summary[1]
Kidder Creek Orchard Camp Expansion – Siskiyou County, CA

Site[2]	Date	Average Noise Level (dB L_{eq}) Daytime[3]	Average Noise Level (dB L_{eq}) Nighttime[4]	Maximum Noise Level (dB L_{max}) Daytime[3]	Maximum Noise Level (dB L_{max}) Nighttime[4]	Day-Night Average (dB L_{dn})
	6/20/17	44	45	61	53	52
	6/21/17	43	44	60	53	51
	6/22/17	43	45	61	52	51
	6/23/17	43	45	61	53	51
	6/24/17	44	44	61	53	50
	6/25/17	46	43	61	56	51
	6/26/17	45	43	63	53	50
	6/27/17	43	43	63	51	50
	6/28/17	43	43	62	52	50
	6/29/17	42	42	63	51	49
	6/30/17	43	42	62	55	50
	7/1/17	43	43	62	59	50
	7/2/17	42	41	61	54	49
	Average	**44**	**43**	**61**	**53**	**50**

Notes:

1 Detailed noise measurement results, are provided in Appendix B
2 Measurement site locations are shown on Figure 1.
3 Daytime hours are 7 AM – 10 PM.
4 Nighttime hours are 10 PM – 7 AM.

Source: Bollard Acoustical Consultants, Inc. (2017)

The Table 3 data indicate that typical measured average noise levels were generally comparable at sites 1 and 4, and highest at site 2. The elevated noise levels at site 2 were due to activities at the existing small pond area and soccer field.

The ambient noise survey results are important because the California Environmental Quality Act (CEQA) criteria, which are presented in detail in a later section of this report, require evaluation of project noise generation relative to ambient noise conditions. Therefore, ambient noise conditions must be quantified in order to allow the required analysis of relative changes in noise levels due to a project.

The ambient noise level data are also important in that they indicate that measured existing ambient noise levels at Sites 1, 3 and 4, which are considered representative the nearest residences to the project site, were all below the Siskiyou County General Plan noise level standard of 60 dB L_{dn} during every day of the survey. Because the measurement results included noise generated by existing KCOC activities, it can be concluded that existing KCOC activities were within compliance with the applicable County noise standards.

Project-Generated Noise Sources

As mentioned previously, Figures 2 and 3 show the locations of existing and proposed project facilities and activities, respectively. Of the proposed improvements and creation of new facilities, the development of the large pond area at the northern end of the property, and the construction of amphitheaters, have been identified as the primary on-site noise sources associated with the

proposed project. As a result, the following analysis focuses on noise exposure from these sources. The noise measurement results and BAC staff observations indicate that the other camp activities and facilities are either not appreciably noise-generating or that they are located in areas well removed or substantially shielded from view of the nearby residences by intervening topography. The following noise study also includes an evaluation of off-site traffic noise level increases on South Kidder Creek Road resulting from the project, and construction-related noise and vibration levels at the nearest noise-sensitive uses.

Evaluation of Noise Impacts Resulting from On-Site Activities at Nearest Residences to West and North

Large Pond Area Activities

The main noise source of concern for this project is noise generated from the proposed large pond area at the northern end of the project site, as identified on Figure 3. The nearest noise-sensitive uses to the proposed pond are identified on Figure 1 as being Receptors D-G.

Assessment Relative to the Siskiyou County General Plan Noise Criteria

The primary noise source associated with the proposed large pond area will be shouting campers. For the assessment of large pond area noise generation relative to the Siskiyou County General Plan, BAC utilized the long-term ambient data from measurement site 2, reported in Table 3. As mentioned previously, noise level measurements at site 2 were intended to be representative of noise generated from camp activities at the existing small pond area at the north end of the project area.

According to Table 3, ambient noise levels measured at site 2 ranged from 55 to 66 dB L_{dn} (average of 59 dB L_{dn}) at a distance of approximately 130 feet from the center of the existing small pond area. According to information obtained from the client, the capacity for activities at the large pond will be larger than those currently occurring at the small pond. To account for the increase in future activities at the large pond area, an upward adjustment of +3 dB was conservatively applied to the measured ambient noise levels measured levels at site 2. Assuming standard spherical spreading loss (-6 dB per doubling of distance), future noise exposure was projected from the center of the proposed large pond area to the nearest noise-sensitive uses (residences). The results of those projections are presented in Table 4.

Table 4
Predicted Large Pond Area Noise Generation at Nearest Residences
Kidder Creek Orchard Camp Expansion – Siskiyou County, California

Receptor[1]	Distance to Center of Large Pond & Recreation Area (feet)[2]	Predicted Exterior Noise Level, L_{dn}/CNEL (dBA)[3]	Exceedance of County Noise Standard?
D	1,500	42	No
E	900	46	No
F	1,500	42	No
G	1,400	42	No
Siskiyou County Exterior Noise Standard (Residential):	**60**		

Notes:
1 Nearest potentially affected receptors are shown on Figure 1.
2 Distances measured from center of proposed large pond area to nearest receivers.
3 Predicted levels are based on a sound attenuation rate of 6 dB per doubling of distance and a reference noise level of 63 dB L_{dn} at a distance of 130 feet.

Source: Bollard Acoustical Consultants, Inc. (2017)

The Table 4 data indicate that predicted noise exposure from the proposed large pond area would satisfy the Siskiyou County 60 dB L_{dn} exterior noise level standard at each of the nearest residences. As a result, no additional consideration of large pond area exterior noise mitigation measures would be warranted for this project relative to the Siskiyou County General Plan.

As indicated in Table 4, exterior noise levels from the proposed large pond area are predicted to range from 42-46 dB L_{dn} at the nearest residences. Standard construction (wood or stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof), results in an exterior to interior noise reduction of at least 25 dB with windows closed and approximately 15 dB with windows open. As a result, noise levels from the proposed large pond area are also predicted to satisfy the Siskiyou County 45 dB CNEL interior noise level standard within those nearest residences by a wide margin even with windows in the open configuration.

Assessment Relative to State of California (CEQA) Noise Criteria

For the assessment of large pond area noise generation relative to the CEQA noise criteria, BAC utilized the same methodology described in the previous section. Assuming standard spherical spreading loss (-6 dB per doubling of distance), future noise exposure was projected from the center of the proposed large pond area to the nearest noise-sensitive uses (residences) to the west and north. The results of those projections are presented in Table 5.

Table 5 shows the predicted noise levels from large pond area activities at the nearest existing noise-sensitive receivers to the project site. Table 5 also shows existing ambient conditions, existing ambient conditions plus predicted large pond area noise levels, and the increases in ambient noise levels which would result from activities at the large pond area.

Table 5
Predicted Noise Generation at Nearest Residences & Project-Related Increases
Kidder Creek Orchard Camp Large Pond Area

	Existing Ambient, dBA			Existing Plus Project, dBA			Project-Related Increase		
	L_{eq}	L_{max}	L_{dn}	L_{eq}	L_{max}	L_{dn}	L_{eq}	L_{max}	L_{dn}
D	44	64	49	45	66	50	1	2	1
E	49	53	56	50	67	56	1	3	0
F	44	64	49	45	66	50	1	2	1
G	44	64	49	45	66	50	1	2	1

Source: Bollard Acoustical Consultants, Inc. (2017)

As mentioned previously, it is generally recognized that a 3 dB or greater increase in noise levels due to a project would be considered significant where exterior noise levels would exceed 60 dB (for residential uses), or a 5 dB increase where pre-project ambient conditions are at or below 60 dB. As shown in Table 5, increases in ambient noise levels at the nearest residences were below 3 dB relative to measured existing conditions. As a result, no significant impacts from increases in ambient noise levels at the nearest residences would result from activities at the proposed large pond area.

Amphitheater Activities

As noted on Figure 3, the Master Plan identifies future amphitheaters at two locations on the project site. The closest proposed amphitheater location would be on the southwest side of the proposed new pond, approximately 1,100 feet from the nearest residence (Receptor E). The other amphitheater location is identified as being approximately 700 feet further south, or 1,800 feet from the nearest residence (Receptor E). Both amphitheater locations indicate that the sound system (presumably a P/A system), would face away from the nearest residences.

Based on the site plans shown in the project description, the seating area of the amphitheaters would be approximately 50 feet deep. Given the relatively small size of the amphitheaters, it is likely that the P/A system associated with either amphitheater would generate maximum noise levels of approximately 80 dBA at a distance of 50 feet from amphitheater speakers. Because the amphitheater speakers would face away from the nearest residences, a noise reduction of at least 10 dB can conservatively be assumed due to the directionality of P/A speakers.

Based on a sound level decay rate of 6 dB per doubling of distance from the speakers, sound generated by the amphitheater P/A system (70 dBA at 50 feet) would attenuate to approximately 43 dBA Lmax at the nearest residence from the closest amphitheater and approximately 39 dBA at the further amphitheater location. These predicted sound levels do not include any downward adjustments for shielding by intervening topography.

A computed maximum sound level of approximately 43 dBA at the nearest residence would translate to an Ldn of below 40 dBA, which would be well within compliance with County noise standards. Furthermore, the predicted maximum noise levels would be below existing maximum

sound levels currently experienced at the nearest residences. As a result, no adverse noise impacts associated with either amphitheater location are identified relative to either CEQA or Siskiyou County noise criteria provided the following operational parameters of the amphitheaters are adhered to:

1. Amphitheater usage should be limited to daytime hours.

2. Maximum sound output from the amphitheater P/A speakers should be set not to exceed approximately 80 dB at a distance of 50 feet from the front of the speakers.

Evaluation of Off-Site Traffic Noise Level Increases Resulting from the Project

Construction of this project would result in increased traffic on South Kidder Creek Road. To establish baseline ambient noise levels at the residences located along South Kidder Creek Road, BAC utilized the long-term ambient data from measurement Site 4. That data is reported in Table 3. The Site 4 data was projected to the distances of the nearest residences to South Kidder Creek Road (Receptors H-L shown on Figure 1). In addition to Receptors H-L on Figure 1, a residence on the north side of South Kidder Creek Road, approximately 350 feet west of South Kidder Loop, was identified as being as close as 70 feet to the centerline of South Kidder Creek Road. Changes in traffic noise levels resulting from the project were evaluated at this residence as well.

The project Traffic Impact Analysis (TIA) forecast future traffic volumes on South Kidder Creek Road based on an assumed 844 persons at the Camp, including guests and staff. Based on 844 persons present at the camp, the TIA computed that the peak Saturday project trip generation would be 1,448 daily trips. However, in response to concerns expressed by local residents, KCOC has proposed as a condition of approval that the daily occupancy be limited to 622 persons. Using the same multiplier applied in the TIA, the computed peak Saturday project trip generation computes to approximately 1067 trips.

BAC utilized the Federal Highway Administration Highway Traffic Noise Prediction Model to predict the traffic noise levels at the nearest residences to both the project site (Receptors H through L, as well as the closest residence to that roadway (70 feet from the centerline). The FHWA Model Inputs and predicted levels are provided in Appendix C of this report.

As shown in Appendix C, the results of the FHWA traffic noise prediction modeling indicate that the worst-case traffic noise exposure at the nearest residence to South Kidder Creek Road (70 feet from the centerline), would be approximately 52 dB Ldn. At Receptors H – L (see Figure 1), the predicted project-generated traffic noise levels range from 39 to 44 dB Ldn. Each of these levels is well below the Siskiyou County 60 dB Ldn exterior noise level standard for residential uses.

As indicated in Table 3, the computed average existing Ldn at noise measurement Site 4, which was located 100 feet from the centerline of South Kidder Creek Road, was 50 dB Ldn. At the

nearest residence located 70 feet from that roadways, the computed ambient level from the Site 4 measurement results is 52 dB Ldn. As a result, at even the closest residence to South Kidder Creek Road, a substantial increase in ambient noise levels resulting from the proposed expansion of the KCOC is not expected. As a result, traffic noise impacts resulting from the proposed expansion are predicted to be less than significant.

Evaluation of Construction Noise at Nearest Existing Residences

During project construction, heavy equipment would be used for grading excavation, paving, and building construction, which would increase ambient noise levels when in use. Noise levels would vary depending on the type of equipment used, how it is operated, and how well it is maintained. Noise exposure at any single point outside the project site would also vary depending on the proximity of construction activities to that point. Standard construction equipment, such as graders, backhoes, loaders, and trucks, would likely be used for this work.

The range of maximum noise levels for various types of construction equipment at a distance of 50 feet is presented in Table 6. The noise values represent maximum noise generation, or full-power operation of the equipment. As one increases the distance between equipment, or increases separation of areas with simultaneous construction activity, dispersion and distance attenuation reduce the effects of combining separate noise sources.

Table 6
Construction Equipment Noise Emission Levels

Equipment	Typical Sound Level (dBA) 50 Feet from Source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Dozer	85
Generator	81
Grader	85
Impact wrench	85
Jackhammer	88
Loader	85
Pneumatic tool	85
Pump	76
Roller	74
Saw	76

Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, Table 12-1. (May 2006)

The existing noise-sensitive uses within the project vicinity are identified on Figure 1. The closed receivers are located approximately 400+ feet from proposed construction activities on the project site. As shown in Table 6, construction activities typically generate noise levels averaging approximately 80 dBA at a reference distance of 50 feet from the construction activities. The noise levels from construction operations decrease at a rate of approximately 6 dB per doubling of distance from the source. At the nearest residence, located approximately 400 feet away, maximum noise levels from construction activities would attenuate to approximately 60 dB Lmax. This level is not expected to substantially exceed existing maximum noise levels currently received by nearby residences.

Given the distance between the nearest residences and project construction activities, the relatively short duration of construction, and the fact that construction activities would be limited to daytime hours, project construction activities are not expected to result in significant adverse noise impacts at the nearest sensitive receptors. Nonetheless, to reduce the potential for annoyance at those nearby residences during construction activities, the following measures are recommended:

- Project construction activities should be limited to daytime hours unless conditions warrant that certain construction activities occur during evening or early morning hours.
- All noise-producing project equipment and vehicles using internal-combustion engines shall be equipped with manufacturers-recommended mufflers and be maintained in good working condition.
- All mobile or fixed noise-producing equipment used on the project site that are regulated for noise output by a federal, state, or local agency shall comply with such regulations while in the course of project activity.
- Electrically powered equipment shall be used instead of pneumatic or internal-combustion-powered equipment, where feasible.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas shall be located as far as practicable from noise-sensitive receptors.
- Construction site and access road speed limits shall be established and enforced during the construction period.

Evaluation of Construction Vibration at Nearest Existing Residences

During project construction, the heavy equipment would be used for grading excavation, paving, and building construction, would generate very localized vibration in the immediate vicinity of the construction. Based on the project site plan, the distances from the on-site construction activity and nearest existing residences to the project area would be approximately 400+ feet.

To quantify reference vibration levels commonly generated by construction equipment, the publication*, Transportation and Construction Vibration Guidance Manual* (Caltrans, September 2013), was utilized. Table 18 of that publication, which is reproduced below as Table 7, contains reference peak particle velocity data for such equipment.

Table 7
Vibration Amplitudes for Construction Equipment

Vibration Source	Measurement Distance, ft.	Peak Particle Velocity (in/sec)
Vibratory Roller	25	0.210
Large Bulldozers	25	0.089
Loaded Trucks	25	0.076
Jackhammer	25	0.035

Source: Bollard Acoustical Consultants, Inc. (BAC)

The vibration data shown in Table 7 indicate that, with the exception of the vibratory roller, heavy equipment-generated vibration levels are below the thresholds for annoyance and damage to structures even at the very close measurement locations of 25 feet from the operating equipment. As a result, at the nearest residences located hundreds of feet from proposed construction operations, project construction-related vibration levels are expected to be well below the threshold of perception. As a result, no construction-generated vibration mitigation measures would be warranted for this project.

Conclusions & Recommendations

This analysis concludes that, with practical and feasible noise mitigation measures, noise generated by the proposed project would not result in adverse noise impacts relative to CEQA and Siskiyou County noise criteria at the nearest residences. In addition, increases in off-site traffic noise exposure as a result of the project are also predicted to be less than significant at existing noise-sensitive uses in the project vicinity.

Project construction noise and vibration as a result of the improvements and expansion of the camp are predicted to be less than significant at the nearest noise-sensitive uses to the project area provided the mitigation measures cited under the construction noise section previously in this report are implemented.

Similarly, noise generated at the proposed amphitheater locations is expected to be less than significant at the nearest noise-sensitive uses to the project area provided the mitigation measures cited under the amphitheater noise section previously in this report are implemented.

These conclusions are based on the collected noise level data in the project vicinity, the project site plans shown on Figures 2 and 3, on information contained in the project TIA and noise modeling conducted using the FHWA model. Deviations from the project site plans shown in Figure 3 or the permitting of unusually loud activities could cause future noise levels to differ from those predicted in this analysis. Bollard Acoustical Consultants, Inc. (BAC) is not responsible for exceedances of County or CEQA noise criteria caused by such deviations.

This concludes BAC's noise assessment for the proposed Kidder Creek Orchard Camp Expansion in Siskiyou County, California. Please contact BAC at (916) 663-0500 or paulb@bacnoise.com with any questions regarding this assessment.

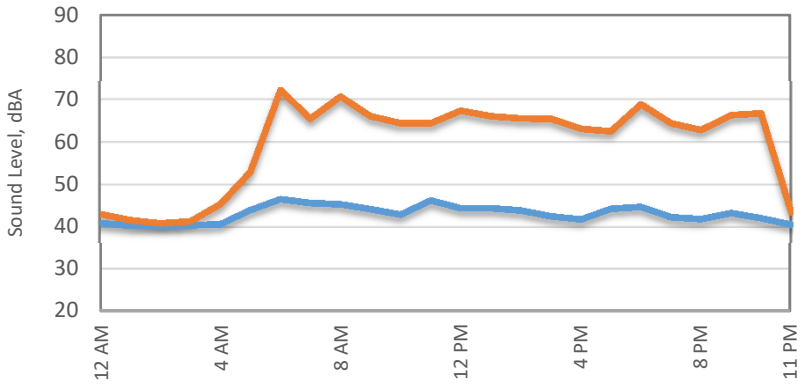
Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the Maximum level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
SEL	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.

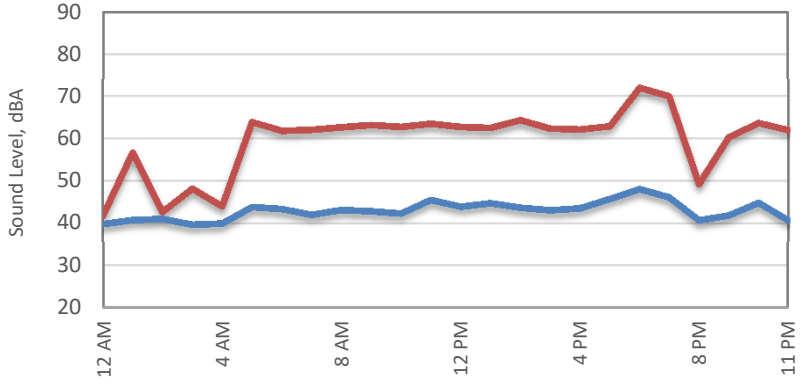
Appendix B-1
Kidder Creek Ambient Noise Monitoring
Thursday, June 15, 2017 - Sunday, June 18, 2017
Site 1

Thursday, June 15, 2017



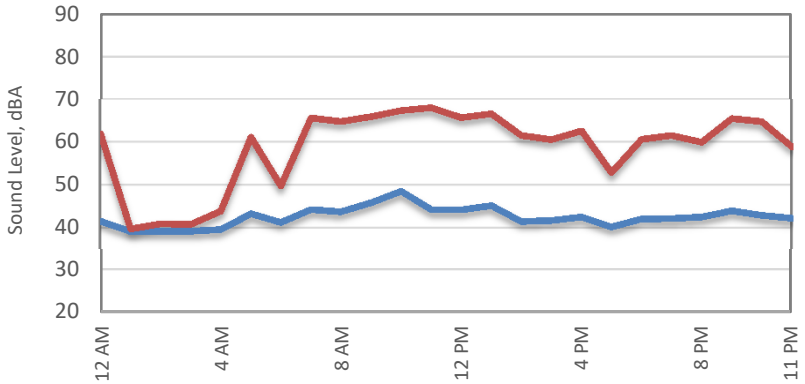
Ldn, dB = 49

Friday, June 16, 2017



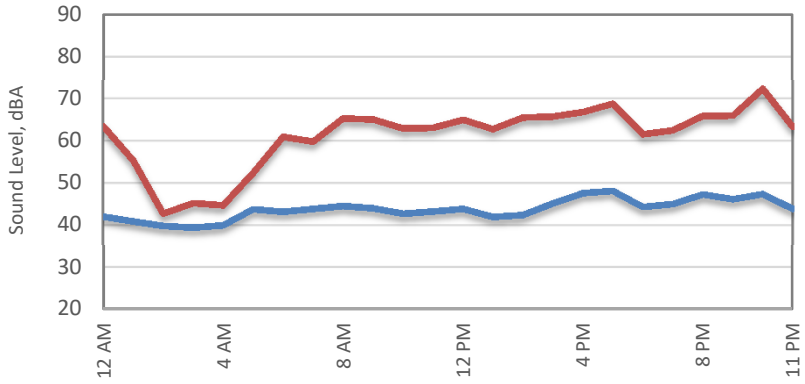
Ldn, dB = 49

Saturday, June 17, 2017



Ldn, dB = 48

Sunday, June 18, 2017

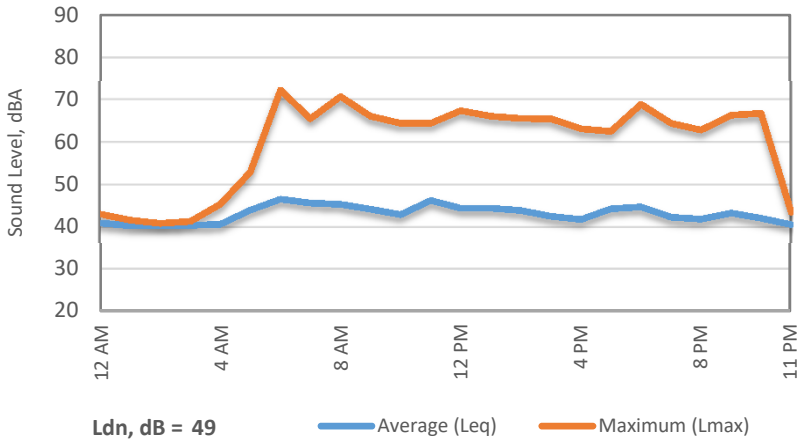


Ldn, dB = 50

BOLLARD
Acoustical Consultants

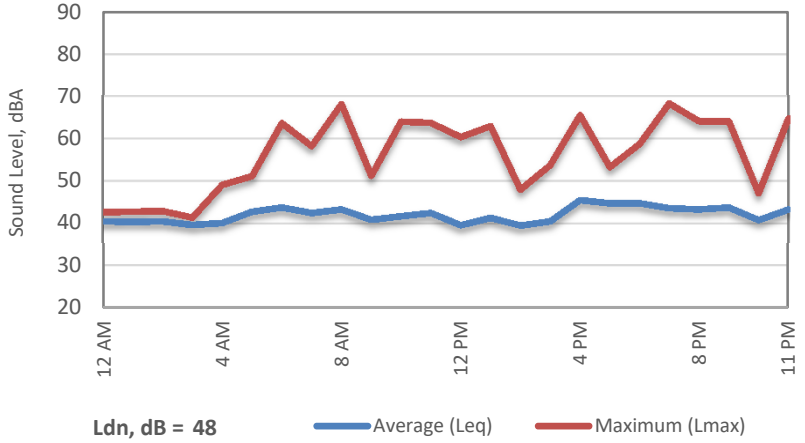
Appendix B-2
Kidder Creek Ambient Noise Monitoring
Monday, June 19, 2017 - Thursday, June 22, 2017
Site 1

Monday, June 19, 2017



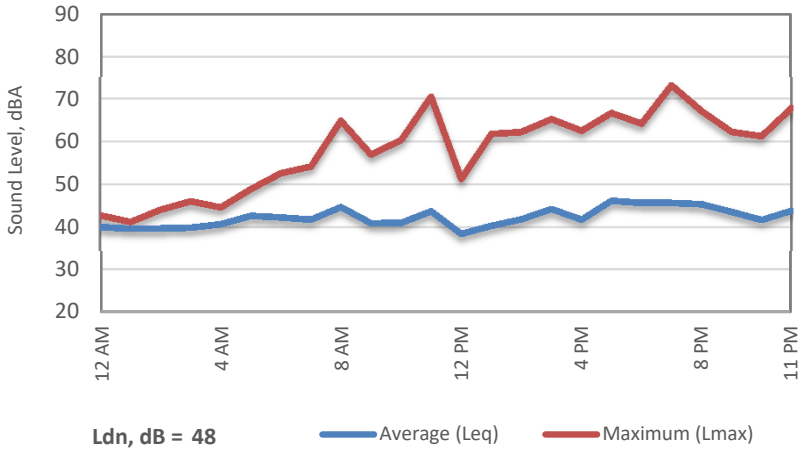
Ldn, dB = 49

Tuesday, June 20, 2017



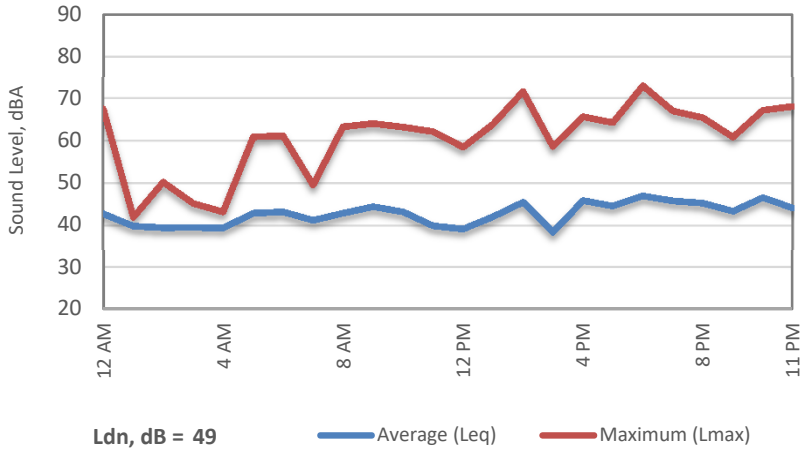
Ldn, dB = 48

Wednesday, June 21, 2017



Ldn, dB = 48

Thursday, June 22, 2017

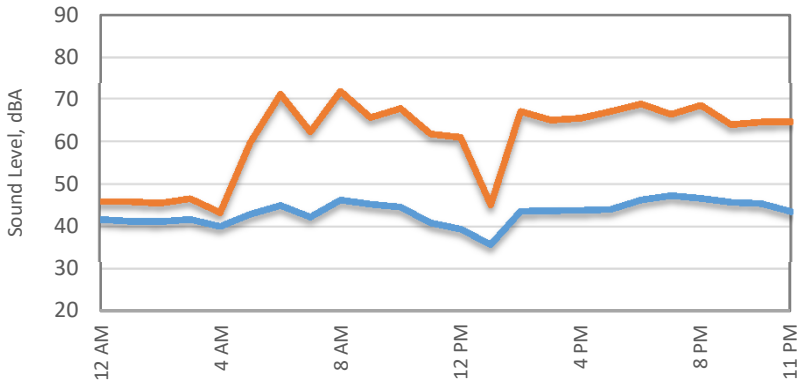


Ldn, dB = 49

BOLLARD
Acoustical Consultants

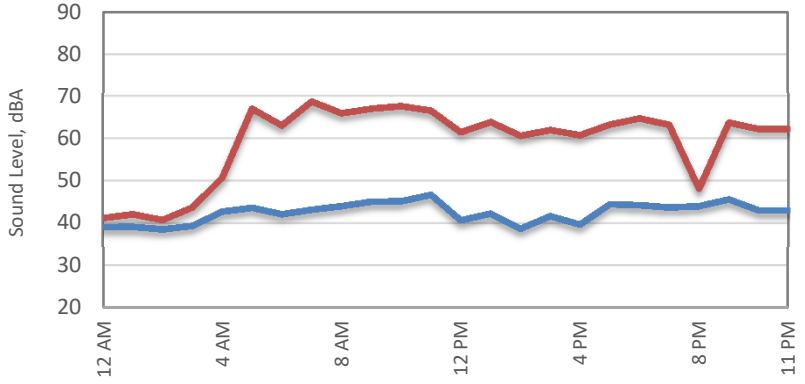
Appendix B-3
Kidder Creek Ambient Noise Monitoring
Friday, June 23, 2017 - Sunday, June 25, 2017
Site 1

Friday, June 23, 2017



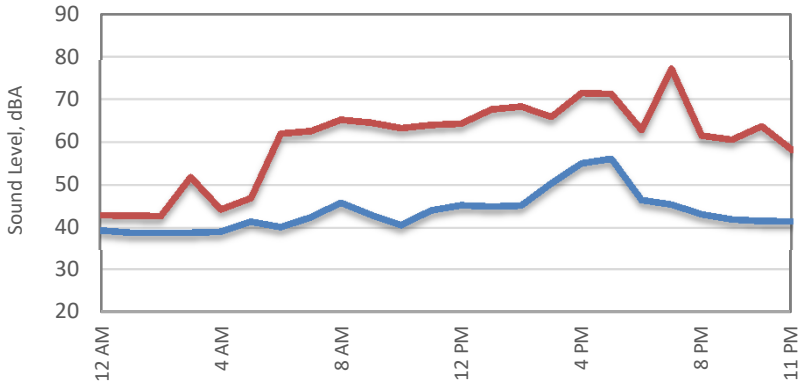
Ldn, dB = 50

Saturday, June 24, 2017



Ldn, dB = 48

Sunday, June 25, 2017

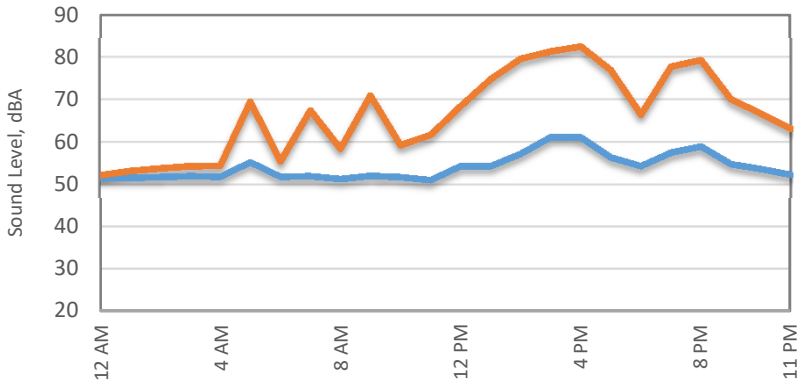


Ldn, dB = 49

BOLLARD
Acoustical Consultants

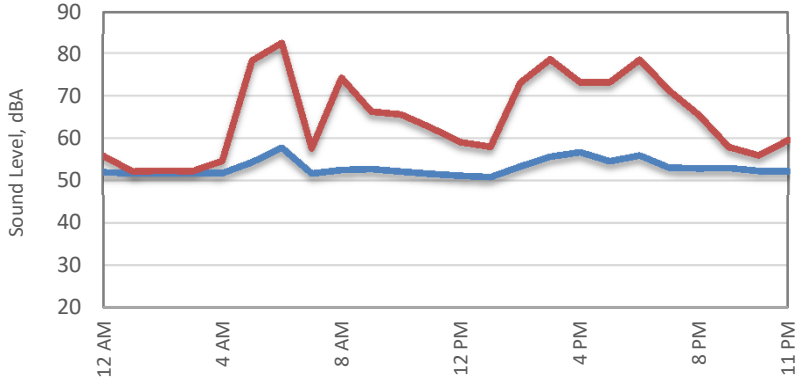
Appendix B-4
Kidder Creek Ambient Noise Monitoring
Friday, June 23, 2017 - Monday, June 26, 2017
Site 2

Friday, June 23, 2017



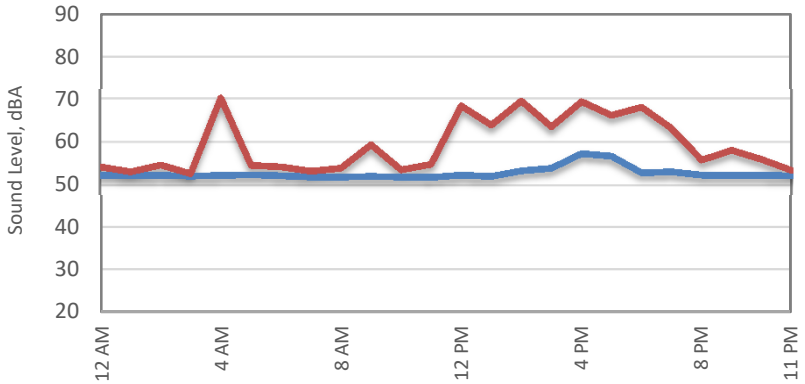
Ldn, dB = 60

Saturday, June 24, 2017



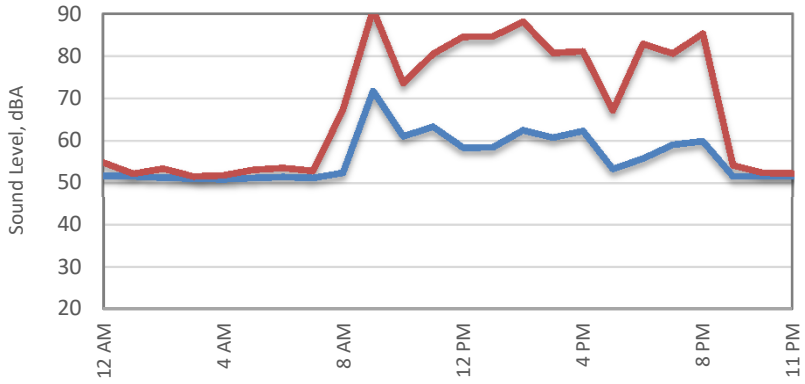
Ldn, dB = 60

Sunday, June 25, 2017



Ldn, dB = 59

Monday, June 26, 2017

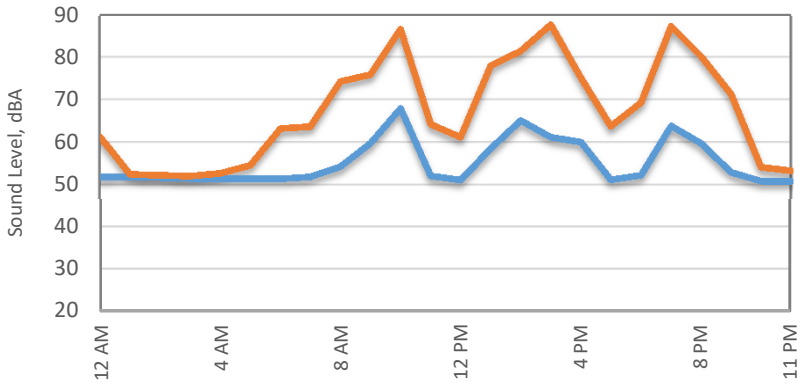


Ldn, dB = 62

BOLLARD
Acoustical Consultants

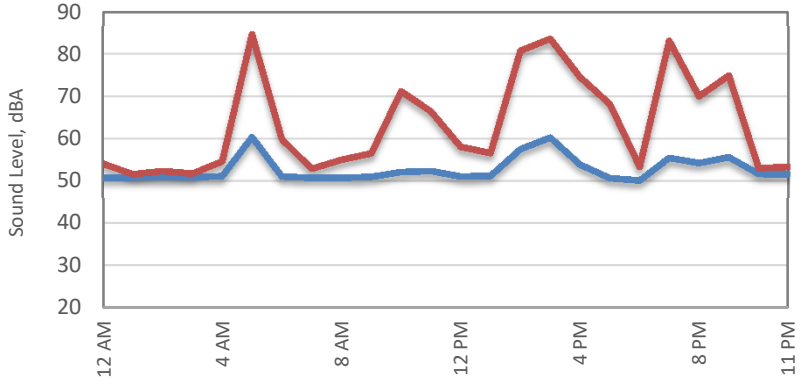
Appendix B-5
Kidder Creek Ambient Noise Monitoring
Tuesday, June 27, 2017 - Friday, June 30, 2017
Site 2

Tuesday, June 27, 2017



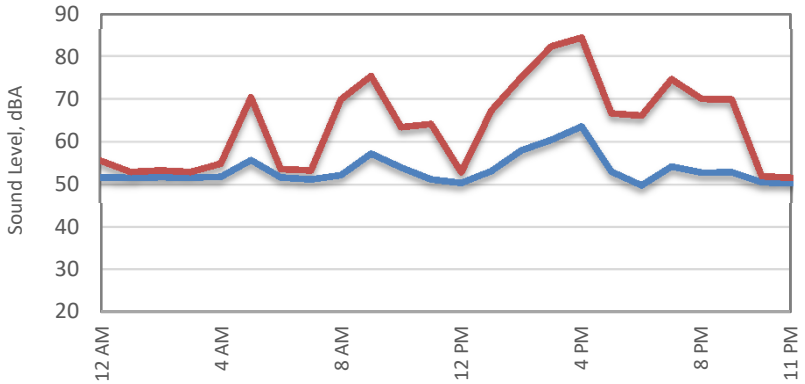
Ldn, dB = 61

Wednesday, June 28, 2017



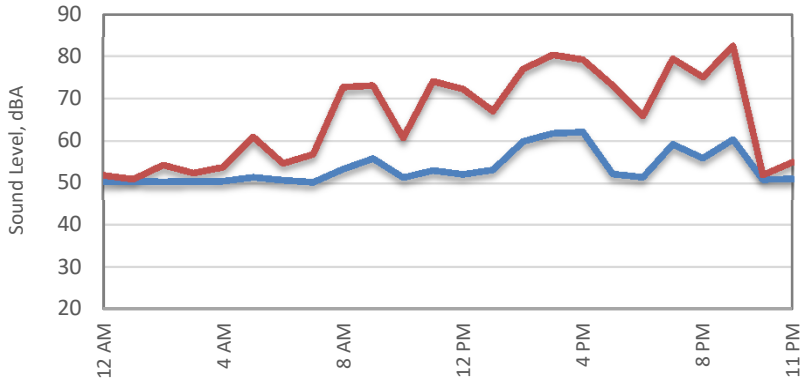
Ldn, dB = 60

Thursday, June 29, 2017



Ldn, dB = 60

Friday, June 30, 2017

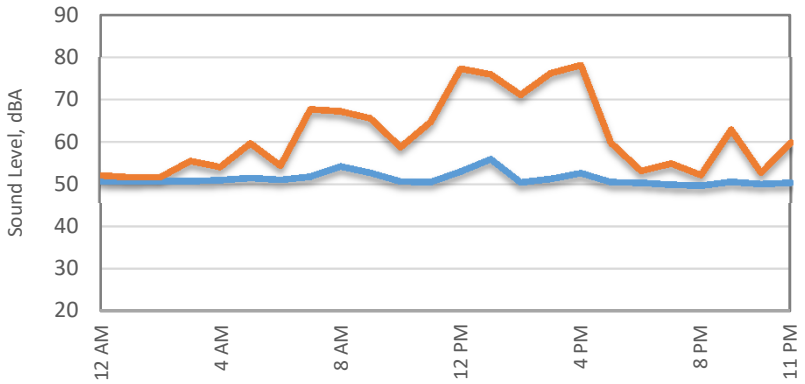


Ldn, dB = 59

BOLLARD
Acoustical Consultants

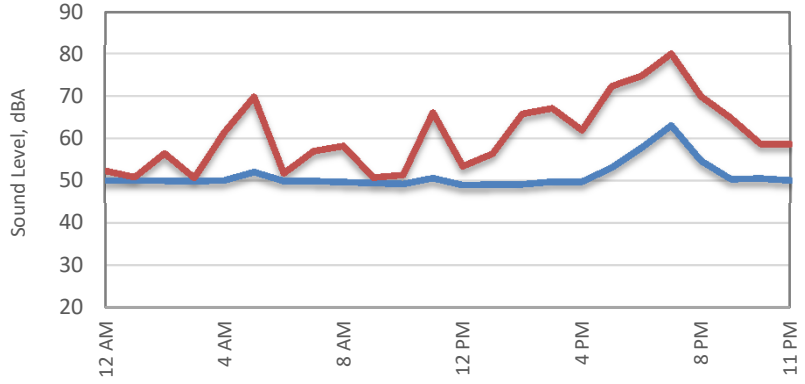
Appendix B-6
Kidder Creek Ambient Noise Monitoring
Saturday, July 1, 2017 - Sunday, July 2, 2017
Site 2

Saturday, July 1, 2017



Ldn, dB = 57

Sunday, July 2, 2017

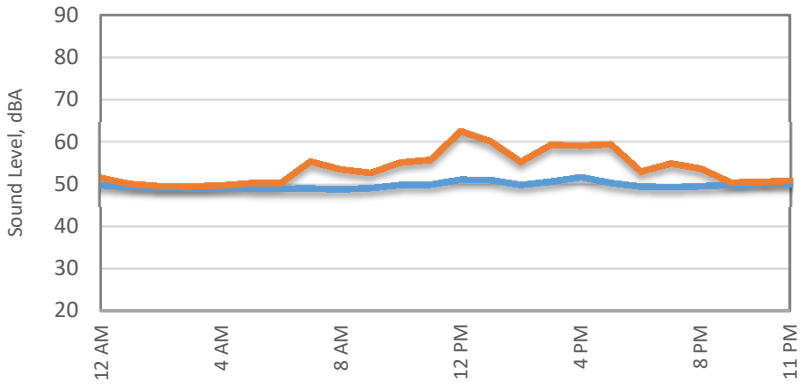


Ldn, dB = 58

BOLLARD
Acoustical Consultants

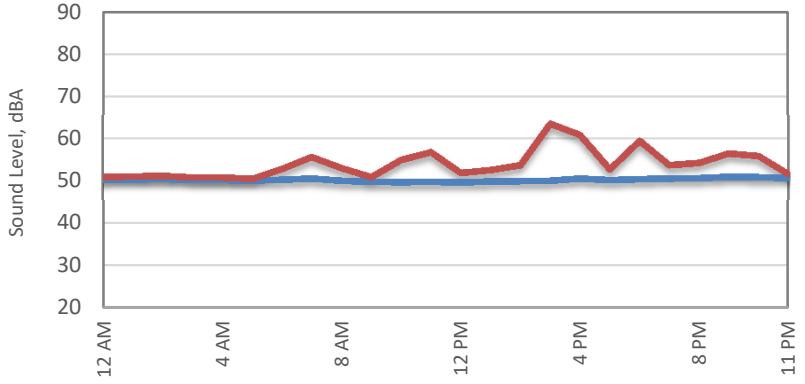
Appendix B-7
Kidder Creek Ambient Noise Monitoring
Thursday, June 15, 2017 - Sunday, June 18, 2017
Site 3

Thursday, June 15, 2017



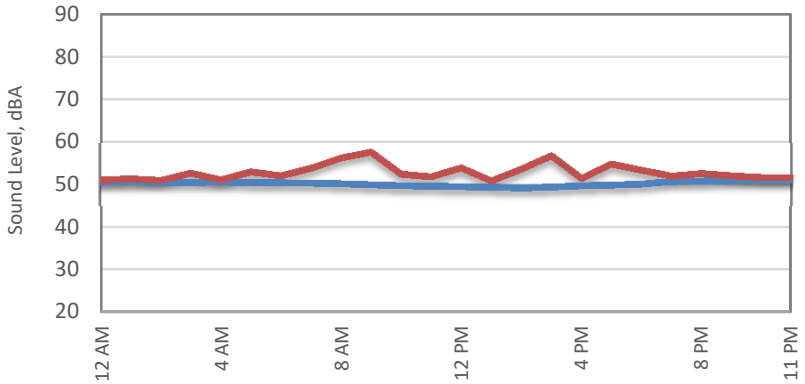
Ldn, dB = 56

Friday, June 16, 2017



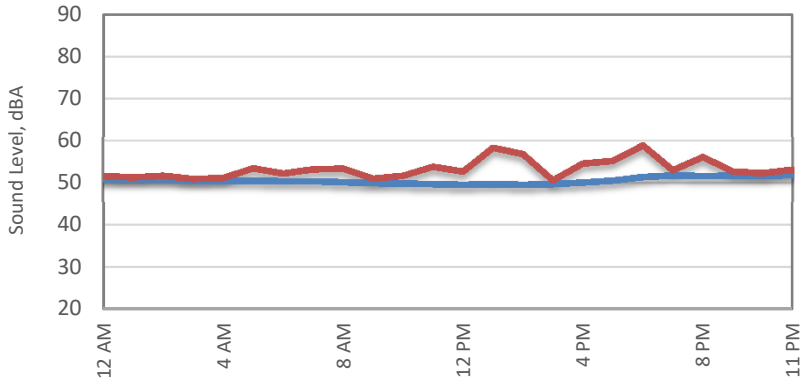
Ldn, dB = 57

Saturday, June 17, 2017



Ldn, dB = 57

Sunday, June 18, 2017

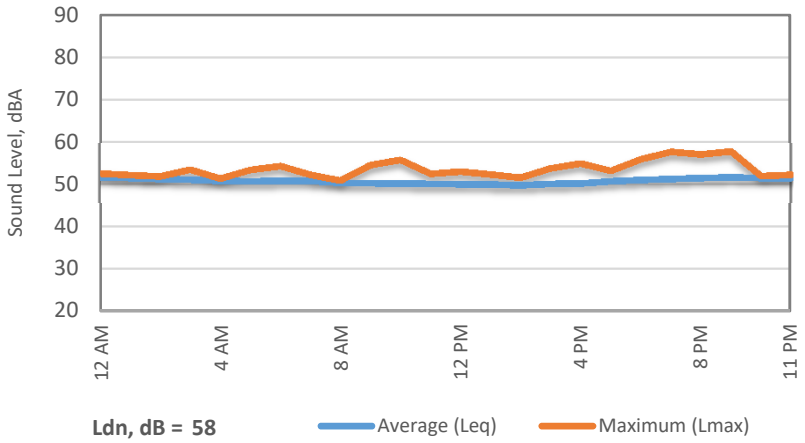


Ldn, dB = 57

BOLLARD
Acoustical Consultants

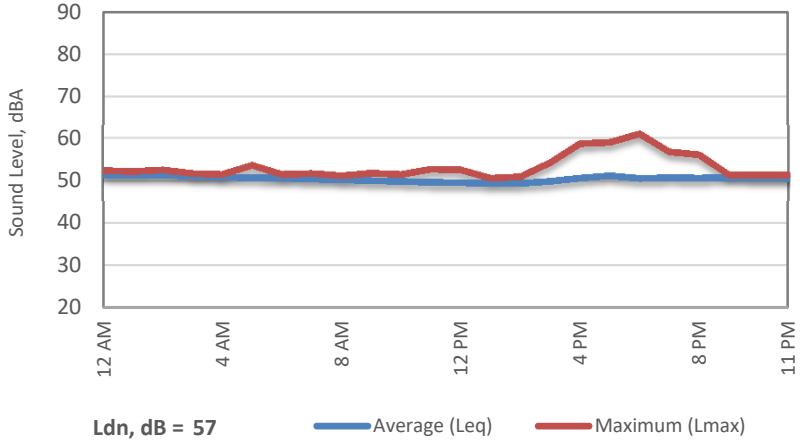
Appendix B-8
Kidder Creek Ambient Noise Monitoring
Monday, June 19, 2017 - Thursday, June 22, 2017
Site 3

Monday, June 19, 2017



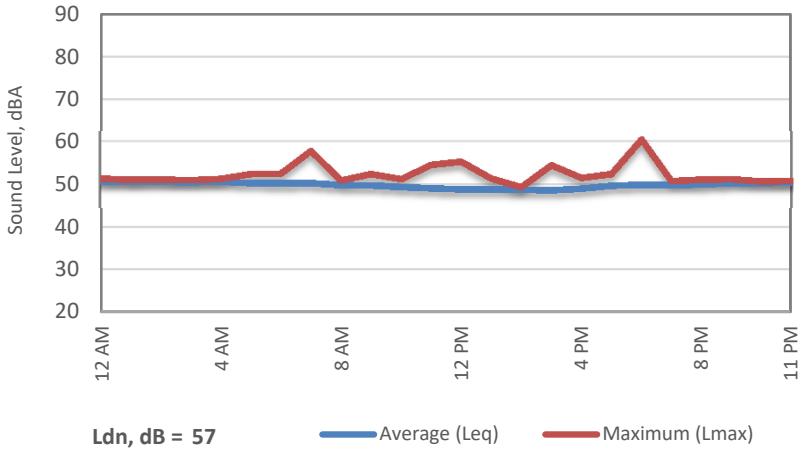
Ldn, dB = 58

Tuesday, June 20, 2017



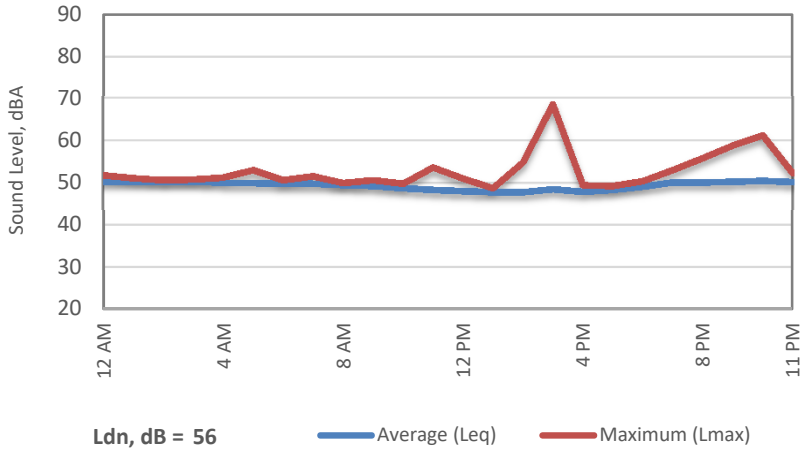
Ldn, dB = 57

Wednesday, June 21, 2017



Ldn, dB = 57

Thursday, June 22, 2017

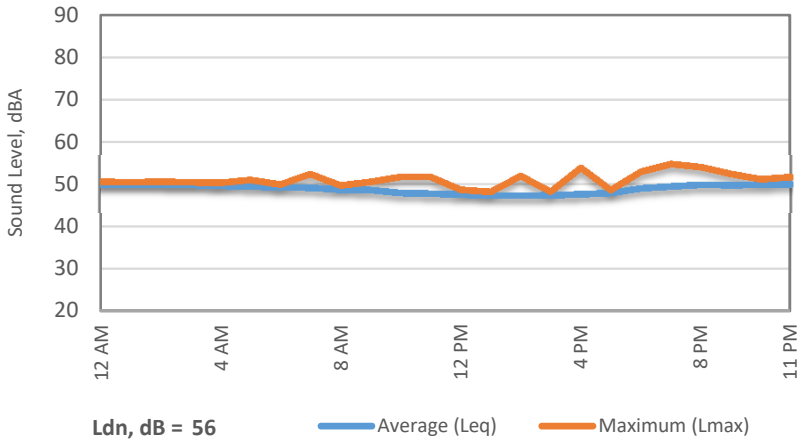


Ldn, dB = 56

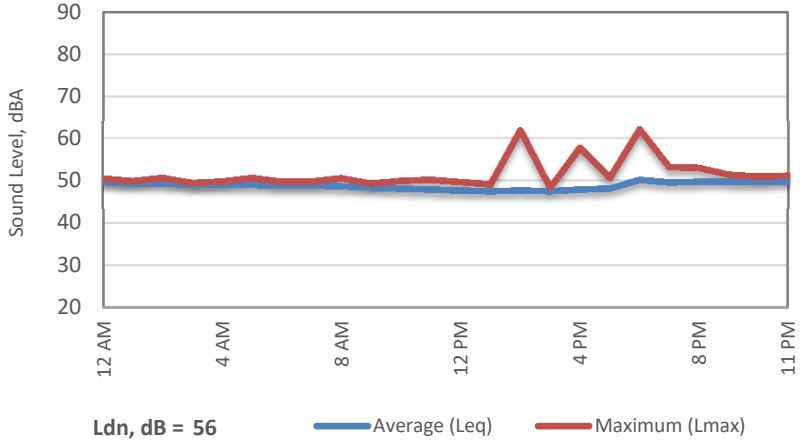
BOLLARD
Acoustical Consultants

Appendix B-9
Kidder Creek Ambient Noise Monitoring
Friday, June 23, 2017 - Monday, June 26, 2017
Site 3

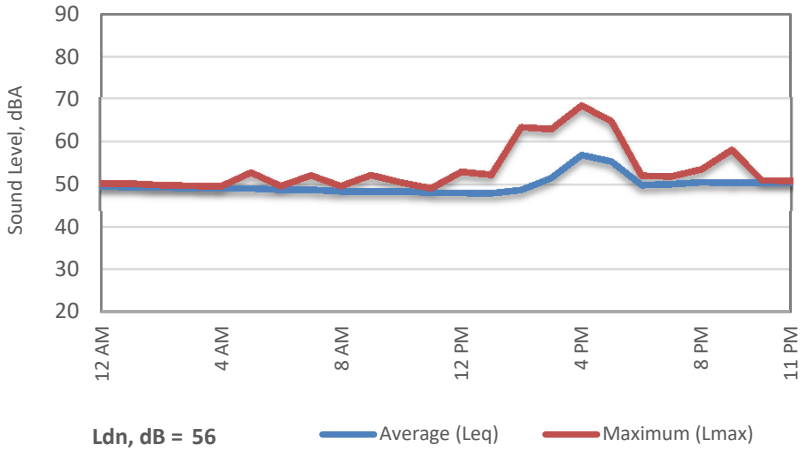
Friday, June 23, 2017



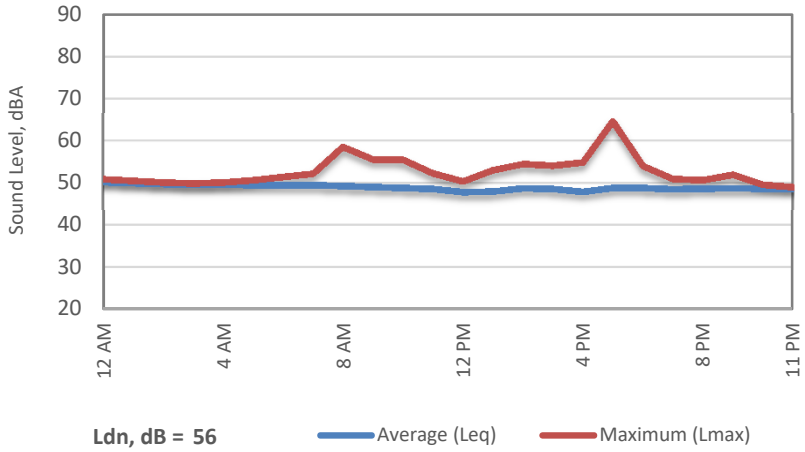
Saturday, June 24, 2017



Sunday, June 25, 2017



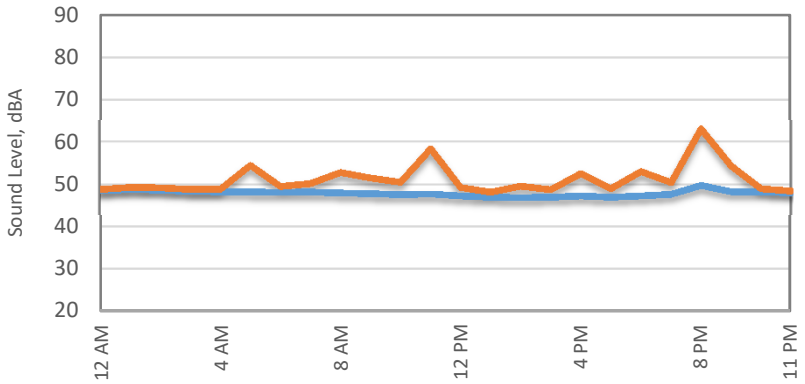
Monday, June 26, 2017



BOLLARD
Acoustical Consultants

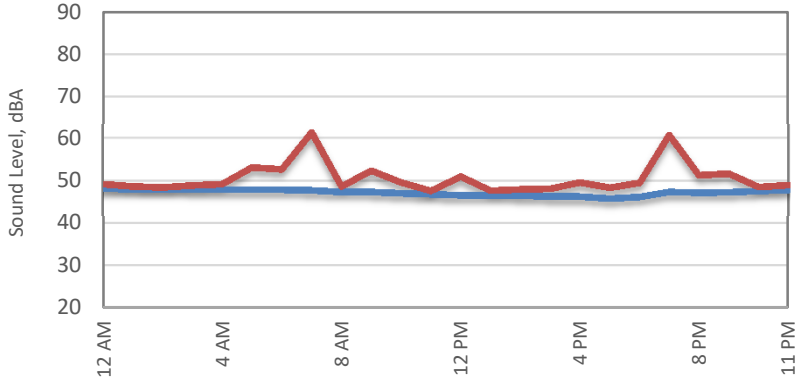
Appendix B-10
Kidder Creek Ambient Noise Monitoring
Tuesday, June 27, 2017 - Thursday, June 29, 2017
Site 3

Tuesday, June 27, 2017



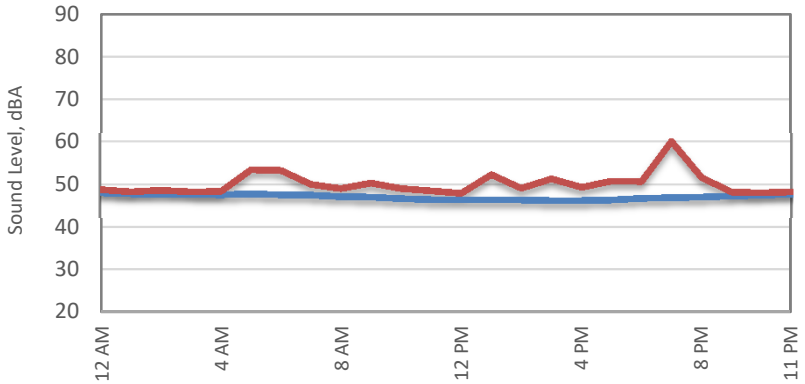
Ldn, dB = 55

Wednesday, June 28, 2017



Ldn, dB = 54

Thursday, June 29, 2017

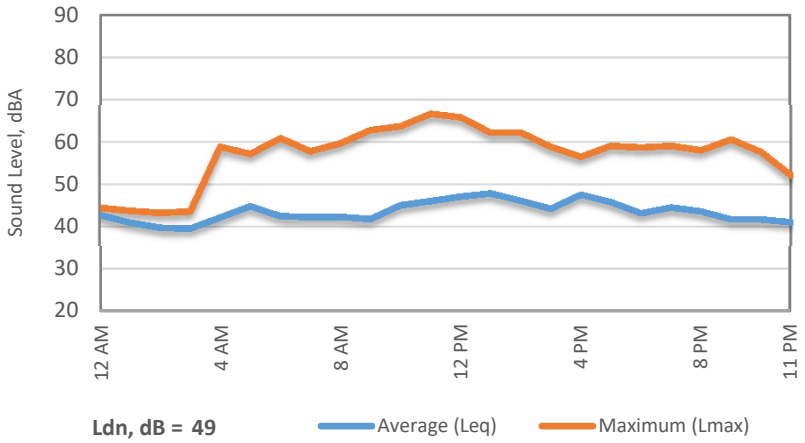


Ldn, dB = 54

BOLLARD
Acoustical Consultants

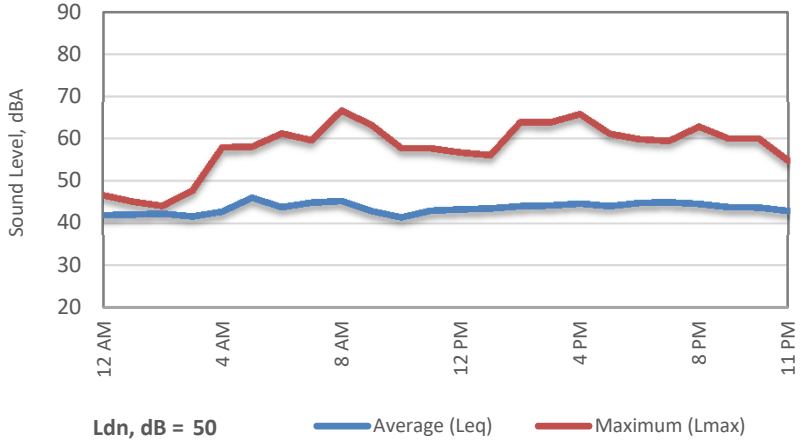
Appendix B-11
Kidder Creek Ambient Noise Monitoring
Thursday, June 15, 2017 - Sunday, June 18, 2017
Site 4

Thursday, June 15, 2017



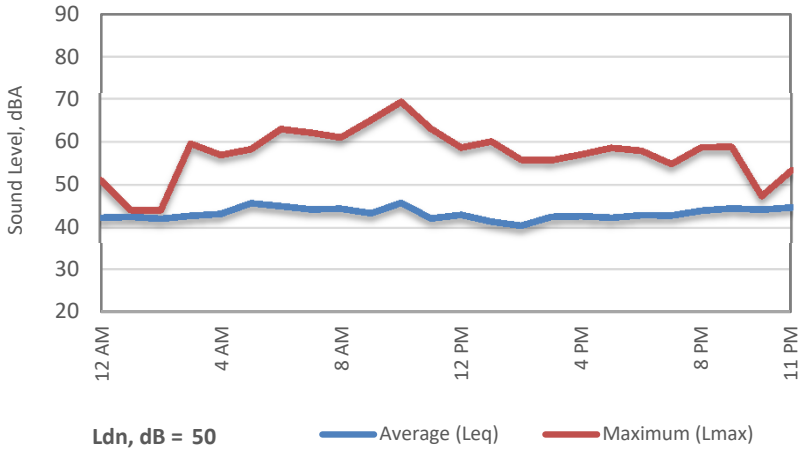
Ldn, dB = 49

Friday, June 16, 2017



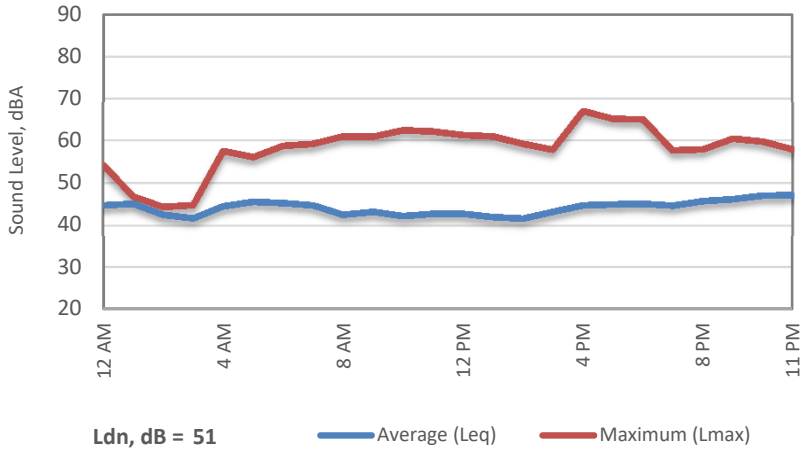
Ldn, dB = 50

Saturday, June 17, 2017



Ldn, dB = 50

Sunday, June 18, 2017

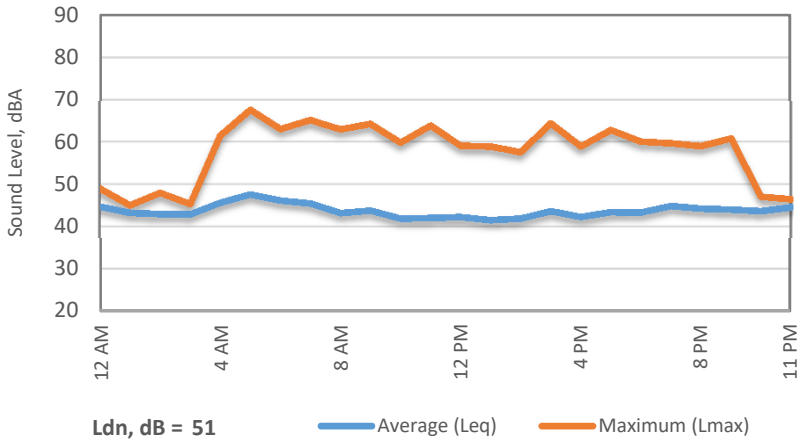


Ldn, dB = 51

BOLLARD
Acoustical Consultants

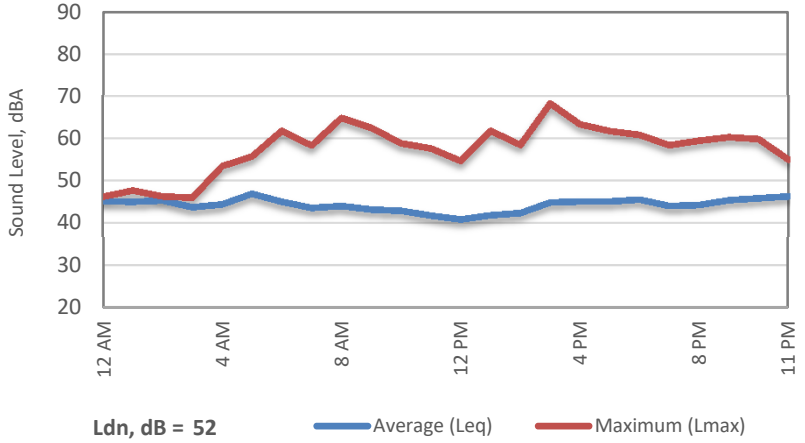
Appendix B-12
Kidder Creek Ambient Noise Monitoring
Monday, June 19, 2017 - Thursday, June 22, 2017
Site 4

Monday, June 19, 2017



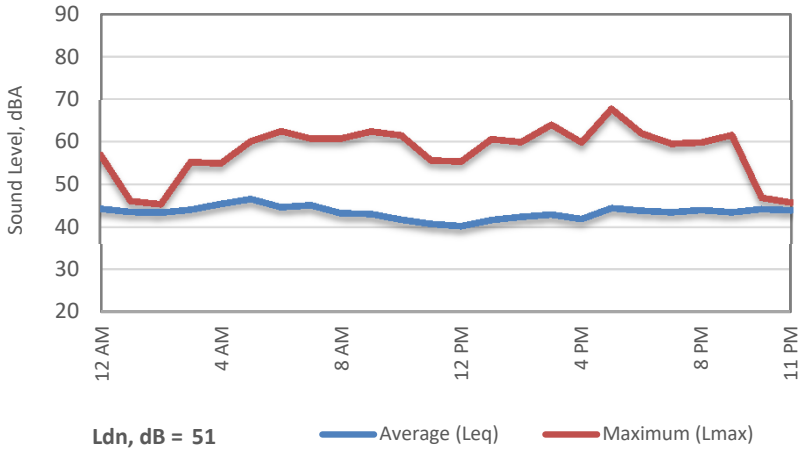
Ldn, dB = 51

Tuesday, June 20, 2017



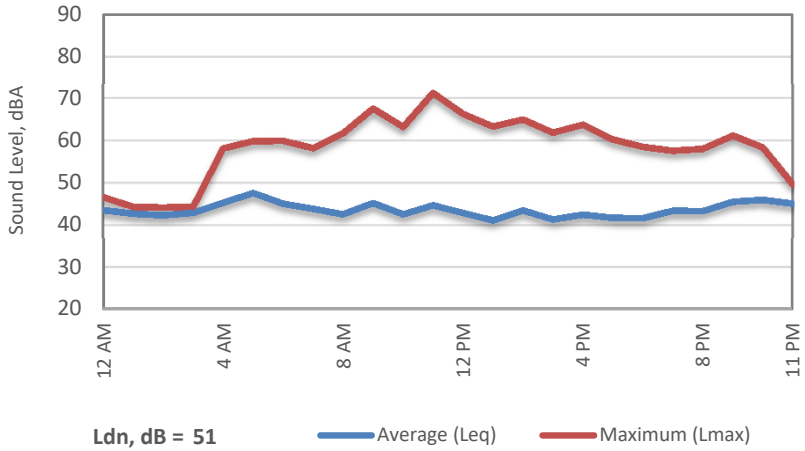
Ldn, dB = 52

Wednesday, June 21, 2017



Ldn, dB = 51

Thursday, June 22, 2017

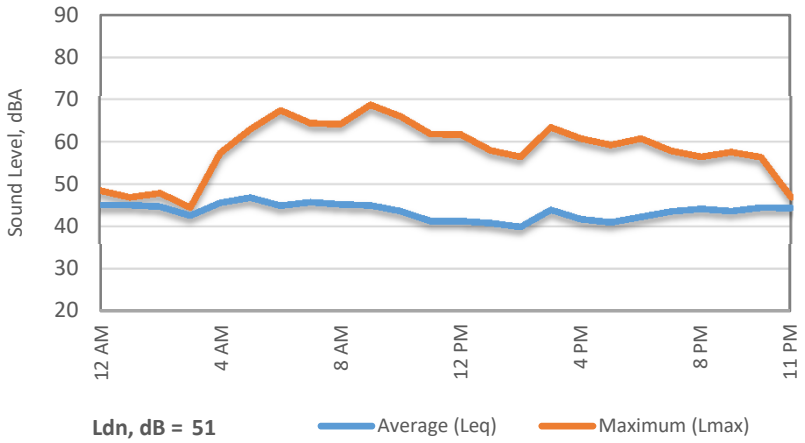


Ldn, dB = 51

BOLLARD
Acoustical Consultants

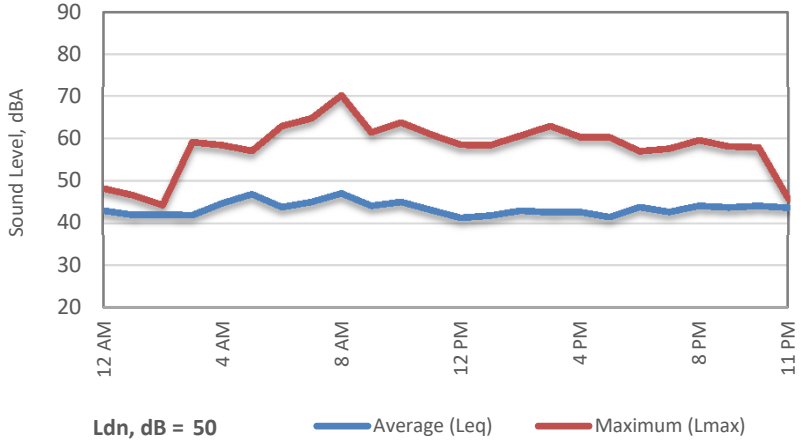
Appendix B-13
Kidder Creek Ambient Noise Monitoring
Friday, June 23, 2017 - Monday, June 26, 2017
Site 4

Friday, June 23, 2017



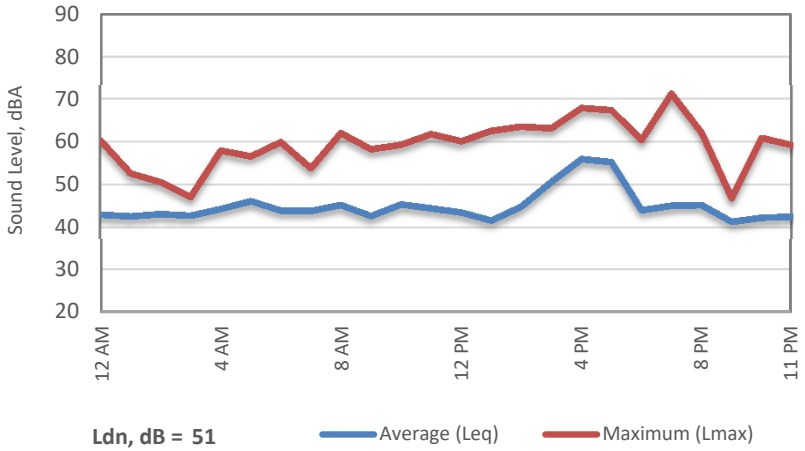
Ldn, dB = 51

Saturday, June 24, 2017



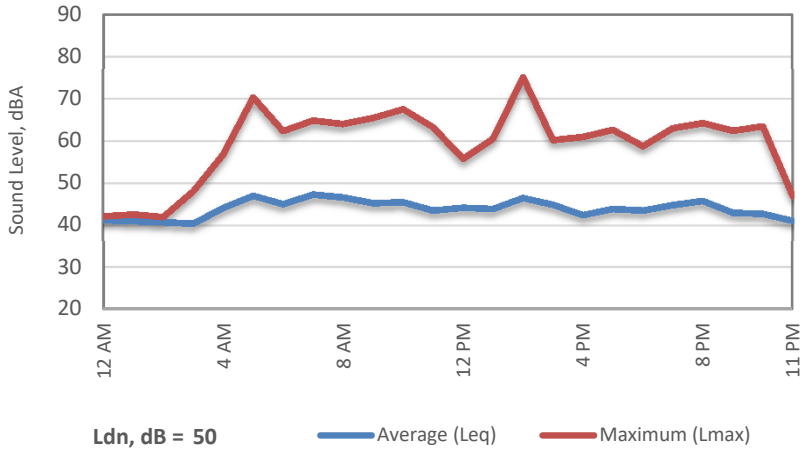
Ldn, dB = 50

Sunday, June 25, 2017



Ldn, dB = 51

Monday, June 26, 2017

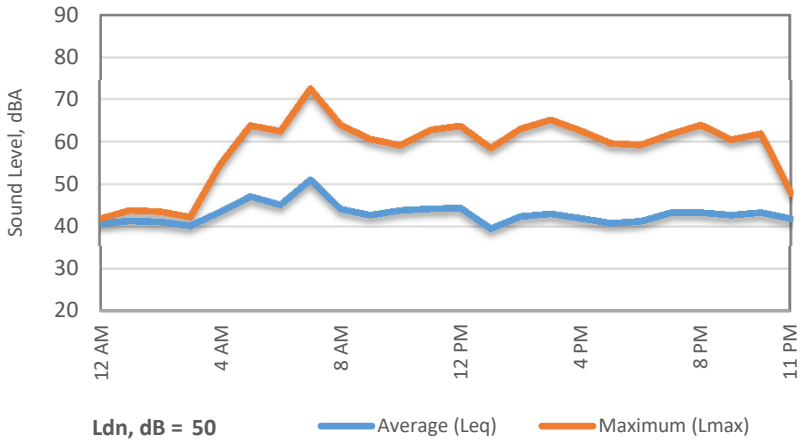


Ldn, dB = 50

BOLLARD
Acoustical Consultants

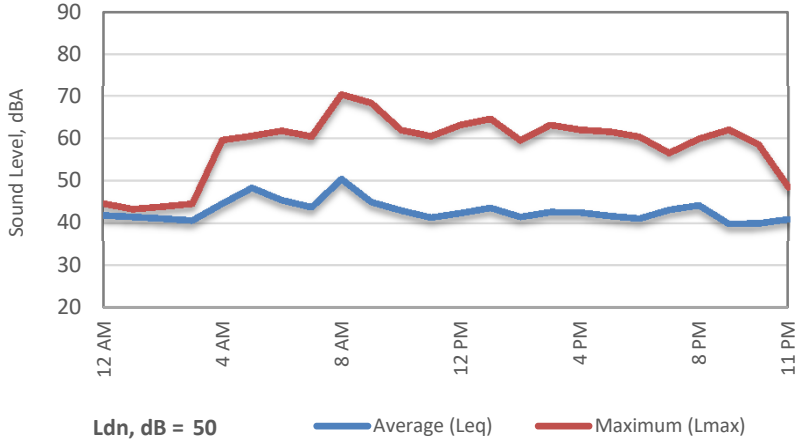
Appendix B-14
Kidder Creek Ambient Noise Monitoring
Tuesday, June 27, 2017 - Friday, June 30, 2017
Site 4

Tuesday, June 27, 2017



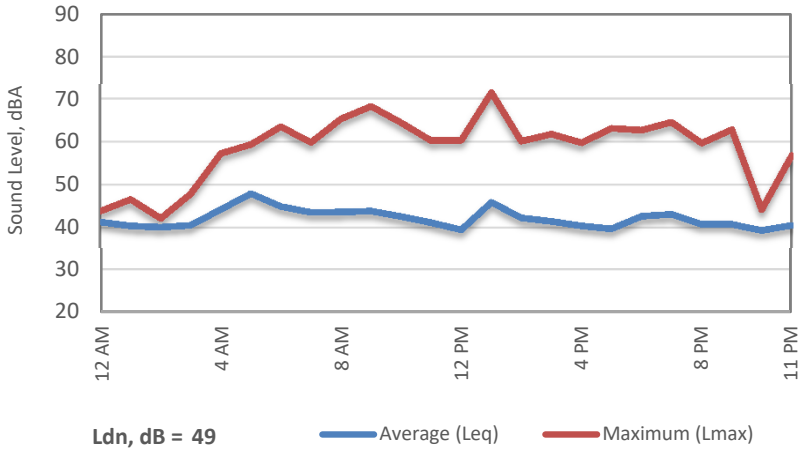
Ldn, dB = 50

Wednesday, June 28, 2017



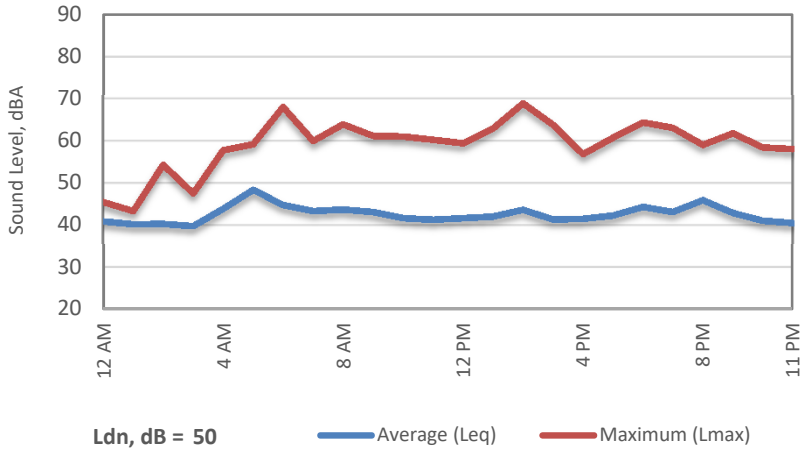
Ldn, dB = 50

Thursday, June 29, 2017



Ldn, dB = 49

Friday, June 30, 2017

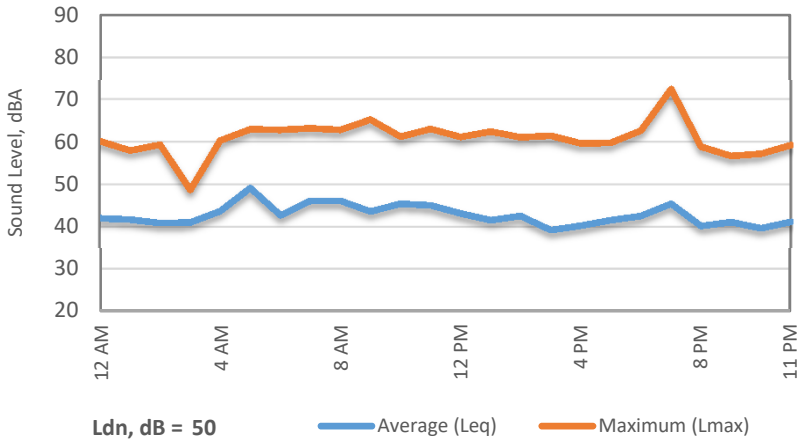


Ldn, dB = 50

BOLLARD
Acoustical Consultants

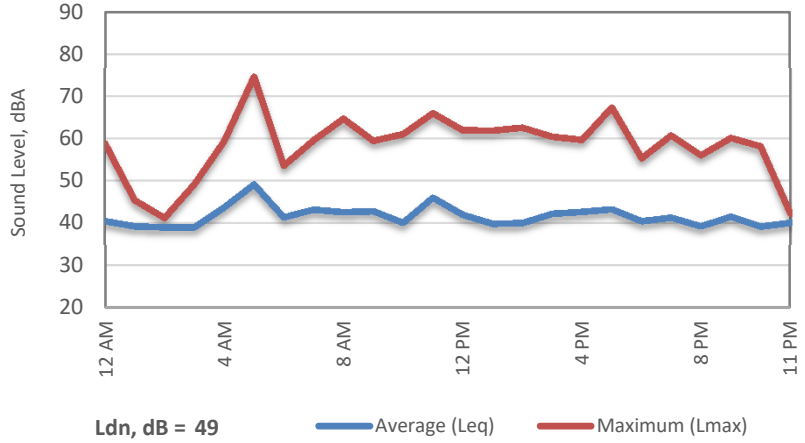
Appendix B-15
Kidder Creek Ambient Noise Monitoring
Saturday, July 1, 2017 - Sunday, July 2, 2017
Site 4

Saturday, July 1, 2017



Ldn, dB = 50

Sunday, July 2, 2017



Ldn, dB = 49

BOLLARD
Acoustical Consultants

Appendix C-1

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2017-047 Kidder Creek Orchard Camp Expansion
Description: Projected Worst-Case Saturday Traffic Volumes (Weekday volumes would be lower)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Receptor	Roadway Name	Receptor	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	South Kidder Creek	H	1,067	95		5	20	0.0	30	220	0
2	South Kidder Creek	I	1,067	95		5	20	0.0	30	270	0
3	South Kidder Creek	J	1,067	95		5	20	0.0	30	300	0
4	South Kidder Creek	K	1,067	95		5	20	0.0	30	500	0
5	South Kidder Creek	L	1,067	95		5	20	0.0	30	380	0
6	South Kidder Creek	Closest	1,067	95		5	20	0.0	30	70	0

Appendix C-2

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2017-047 Kidder Creek Orchard Camp Expansion
Description: Projected Worst-Case Saturday Traffic Volumes (Weekday volumes would be lower)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Receptor	Roadway Name	Receptor	Autos	Medium Trucks	Heavy Trucks	Total
1	South Kidder Creek	H	39	43	17	44
2	South Kidder Creek	I	37	42	16	43
3	South Kidder Creek	J	37	41	15	42
4	South Kidder Creek	K	33	38	12	39
5	South Kidder Creek	L	35	40	14	41
6	South Kidder Creek	Closest	46	51	25	52

Appendix D-1
Noise Measurement Site Photos

Noise Measurement Site 1

Noise Measurement Site 2

Noise Measurement Site 3

Noise Measurement Site 4

Appendix D-2
General Site Photos

Ropes Course

Adventure Course

Soccer Field

Existing Pond Area

Shooting Range

Appendix D-3
General Site Photos

Camp Area

Kidder Creek

Base Camp Area

Base Camp Area

Screened View of Receptor “E”

Screened View of Receptor “B”