

Memorandum

To: Alexco Keno Hill Mining Corp.

From: Alexco Environmental Group Inc.

CC: Kai Woloshyn, Alexco Resource Corp.

Date: March 31, 2017

Re: 2016 Noise Monitoring Data Summary, Keno, YT

INTRODUCTION

As part of the Keno Hill Silver District Mining Operations Noise Monitoring and Management Plan (the Plan) (AKHM, 2015) Alexco Keno Hill Mining Corp. (AKHM) has been monitoring noise levels in Keno City. The Plan was initially developed to address any potential noise effects that might occur with the addition of the two new mines, Lucky Queen and Onek 990. In addition to noise mitigation measures and the creation of a Noise Disturbance Notification Form and Noise Disturbance Register to track noise disturbance claims, AKHM committed to monitor noise levels within the community at various locations to assess the actual versus predicted noise levels and to determine if the noise abatement measures are effective. These noise data for 2016 can now be used in the context of the no active mining period for the District. Noise data collection for the no active mining period continues in 2017.

The predicted noise levels were presented in the Noise Impact Assessment (NIA) completed by Patching Associates Acoustical Engineering Ltd. (PAAE) conducted during the Yukon Environmental and Socio-Economic Assessment Act (YESAA) process (Project 2011-0315). The NIA identifies the noise sources from the current mining-related activities, noise receptors, and predicts the anticipated noise level from all existing sources and those associated with the addition of Lucky Queen and Onek 990 mining operations.

This memo presents noise monitoring results from 2016 with reference to the data collected since 2013.

NOISE RECEPTORS

AKHM has monitored noise at the five locations selected in the NIA as being potential noise receptors within a 2 km radius study area around Keno City. Since November 2013, noise has also been monitored at a sixth location, the Keno City Campground. These monitoring locations are listed in Table 1 and shown in Figure 1.

Table 1 Representative Locations Assessed in Keno City

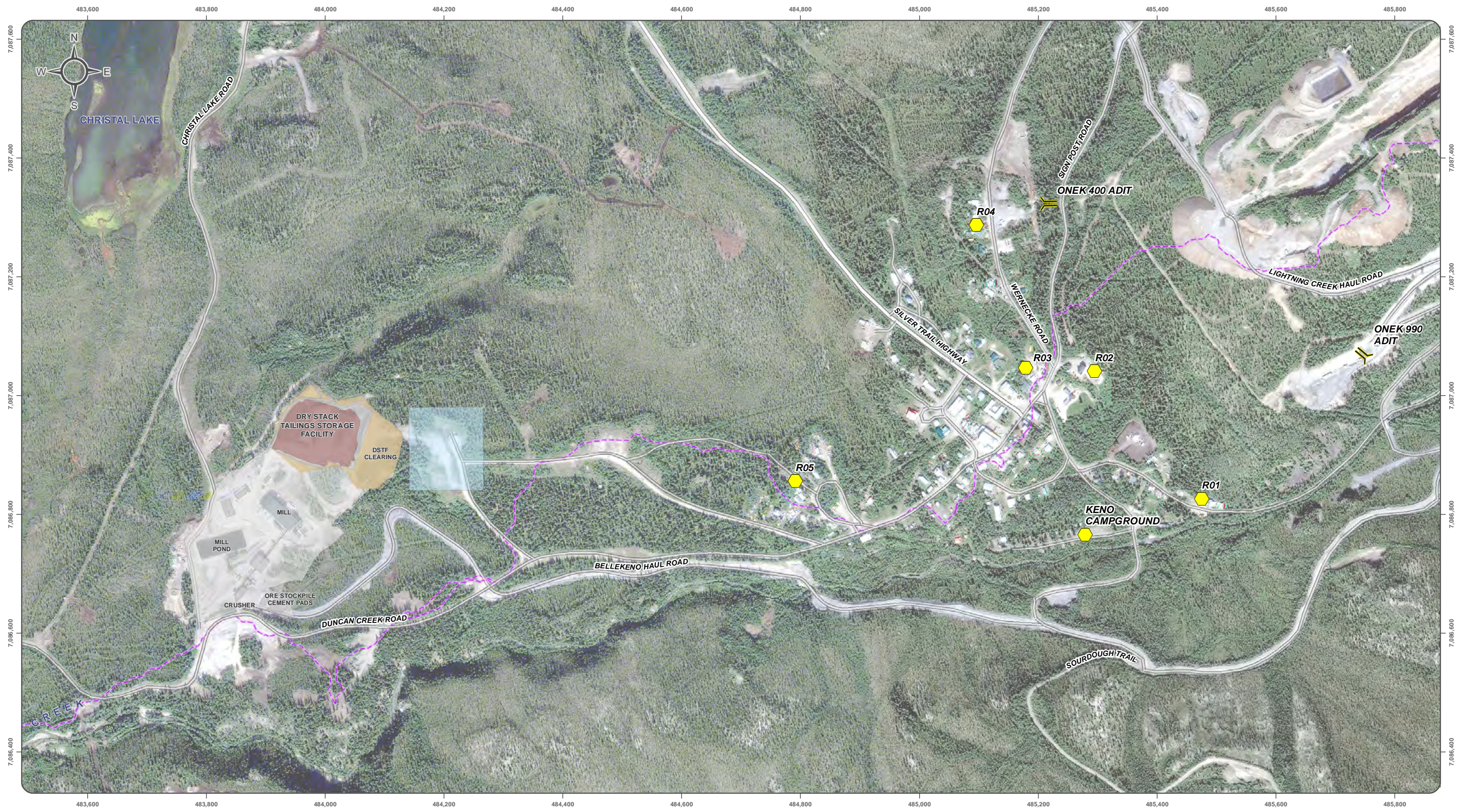
Monitoring Location	GPS Location	Description
R01	N63.90827 W135.29599	East end Residence, north side of Lightning Creek Road
R02	N63.91019 W135.29968	Residence, east side of Sign Post Road
R03	N63.91023 W135.30205	Town Center, north from the Snack Bar
R04	N63.91239 W135.30376	Residence, west side of Wernecke Road
R05	N63.90851 W135.30993	Residence, about 850 m east from the Mill
Campground	N63.90772 W135.29998	Keno City campground

The background noise levels experienced by these locations vary considerably, depending on location and local activities. Climate parameters, such as relative humidity, temperature, and temperature inversions impact the sound level and propagation experienced by each of these receptors.

MINING ACTIVITIES TIMELINE

Mining took place at Bellekeno, and milling at the Keno District Mill throughout 2013, until these were suspended on September 3rd, 2013. Operations at Onek 990 ceased at the end of May 2013. Exploration activities at Flame & Moth took place from late March to early November 2014. The remaining months: September 2013 through March 2014, and December 2014 to December 2016, can be considered baseline conditions as no mining or exploration activities were taking place near Keno City at that time.

Care and Maintenance activities associated with the closed mines are minor but ongoing from September 2013 to present, which includes activities such as maintaining roads, and other small construction activities at the mill site, with the exception of the collaring of the Flame and Moth portal.



Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on March 2016
 Data obtained from EBA: "As built" spatial data: Mill pond (Y.E.S.), Mill structure, and current DSTF footprints, Roads (In House survey December 11th 2011).
 Design spatial data: Conveyance and water collection, diversion ditches and berm.

Datum: NAD 83; Projection: UTM Zone 8N

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1:6,000 (when printed on 11 x 17 inch paper)

0 50 100 150 200 Meters

- Adit
- Noise Monitoring Station
- Building/Structures
- DSTF 322k Tonnes Design
- Current DSTF
- Mill Site Footprint
- Land Disposition Garbage Dump
- Watershed Boundaries
- Silver Trail Highway
- Secondary Road



KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 1

NOISE MONITORING STATIONS

MARCH 2016

D:\Project\AIP\Projects\Keno_Area_Mines\Bellekeno\GIS\mxd\Overview_Maps\Specific_Topics\Noise_Monitoring_Stns_20160330.mxd
 (Last edited by: amatahevska; 3/30/2016 11:19 AM)

MONITORING EQUIPMENT

The noise monitoring profiles collected between April 2013 and November 2014 were measured using an Extech Integrating Sound Level Datalogger (Model 407780) to capture average dBA over a single ten minute period. The wind speed, wind direction, temperature and precipitation data from the Flame and Moth Meteorological Station, on top of the dry stack tailings facility, associated with each noise monitoring event have been reported as these can have a significant effect on measured noise levels. Any notable noise sources associated with the monitoring event were also documented where possible. The results from 31 monitoring events from April 2013 to November 2014 are presented in Appendix A.

Starting in December 2014, noise monitoring readings were collected with a Casella CEL-63X Sound Level Meter and a Casella CEL-495 Microphone. The microphone was mounted on a tri-pod at approximately 1.5 meters above ground and surrounded by a windscreen provided by Casella for use with this microphone to reduce wind impacts as required for outdoor sound measurements. The sound level meter and battery power source were housed inside a weather-proof case which was held in a locked metal box for extra security.

In 2015, 24 hr period data were able to be collected in January and August through November; equipment issues preventing the collection of 24 hr period data for the remainder of the year. In 2016, 24 hr period data were collected every month, however not all stations could be monitored every month due to battery or other equipment issues, or the temperature being below operating conditions for the equipment.

RESULTS

In 2016, a total of 46 24 hr period sampling events took place over 12 months. The LA_{eq} values for all of these measurements ranged from 21.4 to 111.8 dB, with a median of 38.7 dB. The LA_{eq} is an equivalent continuous sound level which would contain the same sound energy as the varying sound record. The LA_{eq} value exceeds the LAF_{10} value for these measurements 67% of the time, indicating that these 24 hr noise monitoring events are characterized by short-term events and not general background levels.

The difference between the LA_{eq} and the LAF_{90} provides an indication if the LA_{eq} has been heavily influenced by short term noise events (difference greater than 10dB) or if the LA_{eq} indicates a very steady noise background level (difference less than 5dB). Approximately 53% of the LA_{eq} values are heavily influenced by short term events, compared to 18% which show a very steady noise environment. As 2016 represents baseline conditions, much of the short term noise events was presumably road traffic, such as the water truck or local vehicle traffic.

Approximately 65% of the LA_{eq} measurements in 2016 exceeded the predicted levels from the NIA range (from 32 to 39 dB) and of those that exceeded, 35% represent steady to very steady baseline conditions. Baseline noise levels were greater than those predicted in the NIA on several occasions in 2014 and 2015 as well, indicating that many of the notable noise sources are not linked to Keno mining or milling operations.

Noise levels (LA_{eq}) at the campground were generally steady or very steady and ranged from 15.5 to 44.5 dB in 2016. 44% of the measurements were less than 5dB from the LAF_{90} , indicating these values represent very steady background data, and only one measurement is greater than 10 dB from the LAF_{90} .

The Casella sound meter is calibrated in the field before and after each set of measurements. This calibration data is recorded with the noise monitoring records. The drift can be affected by temperature or too long a period from factory calibration. If the drift is greater than ± 3.0 dB not all data is recorded. Since drift increases as temperature decreases, it is important to keep the sound level meter and microphone as warm as possible. During periods of extended low temperatures, the data validity may need to be assessed. In 2016, calibration drift remained smaller than ± 3 dB for all 24 hr sampling events. However, in December 2016 the equipment failed to run at all as the temperature was too cold.

Table 2 presents all 24 hr period noise data available to date (all data runs with <24 hours have been excluded), and associated meteorological parameters obtained from the district mill weather station (averaged from hourly data for the corresponding 24 hr period). The existing 2013 and 2014 noise data are provided in Appendix A.

Table 2 2014-2016 24 hr Noise Data and Corresponding Meteorological Data

Station	Start Date & Time	LAeq (dB)	LAF 10% (dB)	LAF 90% (dB)	LAeq > LAF10	LAeq - LAF90 (dB)	LZeq	LAleq	LAE	LCeq	LCeq-LAeq	Calibration Drift	Temp. (°C)	R.H. (%)	Avg. WS (m/s)
R01	14/12/2014 10:30	43.1	N/A	N/A			72.7	45.3	92.4	59.4	16.4	-4.8	-4.4	92.6	n/a
R02	15/12/2014 16:20	44.3	N/A	N/A			77.1	49.6	93.7	64.3	20	-4.8	-1.9	76.4	1.35
R03	17/12/2014 10:00	58.6	N/A	N/A			59.4	62	108	59.2	0.6	-4.8	-8.4	94.4	0.70
R05	18/12/2014 10:30	42.0	N/A	N/A			50.6	45.2	91.3	48.5	6.6	-4.8	-13.6	90.7	0.60
Cmpgr.	22/12/2014 12:30	25.4	N/A	N/A			43.5	27.4	74.8	38	12.6	-4.8	-9.6	93.8	n/a
R01	10/01/2015 10:15	28.8	N/A	N/A			38.2	33.4	78.2	35.6	6.8	-4.8	-10.2	93.7	n/a
R02	11/01/2015 15:50	33.8	N/A	N/A			43.8	36	83.2	40.3	6.5	-4.8	-10.1	93.3	n/a
R03	13/01/2015 8:40	28.6	N/A	N/A			40.7	31.6	78	37.9	9.3	---	-7.3	95.3	n/a
R04	14/01/2015 9:45	36.5	N/A	N/A			51.4	41.8	85.9	47.6	11.1	-4.8	-9.4	93.9	n/a
R05	15/01/2015 12:30	37.5	N/A	N/A			47.8	42.1	86.9	41.1	3.6	-4.8	-1.8	99.0	0.52
Cmpgr.	22/01/2015 8:30	23.2	N/A	N/A			28	23.4	72.6	22.5	-0.7	---	-9.8	93.6	0.47
N/A	13/08/2015 11:00	34.2	35.5	22.5	No	11.70	56.1	36.6	83.6	51.4	17.2	0.3	8.6	63.3	1.57
N/A	14/08/2015 13:30	111.8	116.0	45.5	No	66.30	123.9	119.1	161.2	118	6.2	0.3	9.7	68.4	1.68
N/A	16/08/2015 14:00	49.2	48.0	46.5	Yes	2.70	62.6	52.6	98.6	61.3	12.1	0.3	11.3	67.5	1.56
N/A	23/08/2015 11:00	60.6	61.0	60.0	No	0.60	62.7	61.2	110	62	1.4	0.3	8.3	84.0	1.38
N/A	24/08/2015 13:00	41.9	38.5	20.5	Yes	21.40	54.1	47.2	91.3	52	10.1	0.3	7.7	87.2	0.95
N/A	12/09/2015 10:00	---	8.5	8.0			---	---	57.7	---	-1.1	0.3	4.6	79.4	1.73
N/A	14/09/2015 10:15	---	8.5	8.0			---	---	57.7	---	-1.1	0.3	3.3	87.8	1.00
N/A	15/09/2015 10:30	---	8.5	8.0			---	---	57.7	---	-1.1	0.3	1.4	93.6	1.09
N/A	17/09/2015 6:00	---	8.5	8.0			---	---	57.7	---	-1.1	0.3	5.2	84.6	1.58
N/A	18/09/2015 13:15	---	8.5	8.0			---	---	57.6	---	-1.1	0.3	2.5	81.2	1.65
N/A	17/10/2015 12:40	30.4	31.5	20.0	No	10.40	44.8	35.8	79.8	40.5	10.1	0.3	3.3	94.8	0.76
N/A	18/10/2015 16:33	58.9	59.5	58.5	No	0.40	61	59.4	108.3	59.8	0.9	0.3	4.1	85.3	0.84
R05	14/11/2015 11:30	32.8	17.0	15.0	Yes	17.80	42.4	33.6	82.2	39.2	6.4	0.3	-18.4	86.5	n/a
R01	16/11/2015 8:30	34.7	19.5	16.0	Yes	18.70	51.2	37	84	49.2	14.5	0.3	-17.4	87.3	n/a
R04	17/11/2015 10:00	21.3	18.0	15.5	Yes	5.80	46.4	27.3	70.6	36.3	15	0.3	-21.0	83.9	n/a
R02	19/11/2015 9:00	33.1	16.0	15.5	Yes	17.60	46.9	40.3	82.4	44.2	11.1	0.3	-28.4	76.7	n/a
R03	21/11/2015 9:40	39.7	17.5	16.0	Yes	23.70	47.8	46	89	46.3	6.6	0.3	-9.0	94.0	n/a
Cmpgr.	07/01/2016 11:30	23.2	20	15.5	Yes	7.70	38.1	30.2	72.5	75.8	7.8	0.1	-16.1	81.8	0.63
R03	08/01/2016 18:45	28.3	19.5	16.5	Yes	11.80	40	35.9	77.7	74.6	4.5	-0.2	-11.5	90.4	0.44
R01	09/01/2016 19:30	39.0	20.0	15.5	Yes	23.50	48.9	41.7	88.4	79.3	6.4	-0.2	-14.6	89.7	0.51
R05	10/01/2016 20:30	30.6	20.5	15.5	Yes	15.10	44.1	35.5	80	71.6	5.7	-0.2	-18.2	86.5	0.33
N/A	14/01/2016 17:00	25.4	17.0	15.5	Yes	9.90	36.5	33.6	74.7	68.1	6.6	0.1	-8.1	94.5	n/a
R04	15/02/2016 17:00	25.5	19.0	15.5	Yes	10.00	48.5	33.9	74.9	68.1	6.3	0.3	-7.8	89.0	1.12
R03	17/02/2016 10:00	23.9	19.0	15.0	Yes	8.90	40.3	30.2	73.3	66.8	11.6	-2.1	-22.9	77.9	0.45

Station	Start Date & Time	LAeq (dB)	LAF 10% (dB)	LAF 90% (dB)	LAeq > LAF10	LAeq - LAF90 (dB)	LZeq	LAeq	LAE	LCeq	LCeq-LAeq	Calibration Drift	Temp. (°C)	R.H. (%)	Avg. WS (m/s)
Ball diamond	25/02/2016 9:00	----	18.5	15.5	Yes	n/a	43.7	24.4	69.3	56.2	9.2	-0.2	-5.5	81.4	1.27
R01	28/02/2016 10:40	22.4	20.5	16.5	Yes	5.90	55.1	26.1	71.8	65	15.6	-0.5	-2.8	85.0	0.92
R04	12/03/2016 17:30	37.5	25.0	15.5	Yes	22.00	56.9	44.4	86.8	82	3.8	0.4	-5.3	62.8	1.03
N/A	14/03/2016 10:32	44.9	24.0	21.0	Yes	23.90	49	48.2	94.2	91.6	2.9	0.1	-7.6	88.2	0.87
R05	15/03/2016 11:32	26.1	22.0	17.0	Yes	9.10	56.1	32.5	75.5	65.4	13.8	-0.1	-6.2	91.4	0.86
R03	17/03/2016 10:00	111.8	115.5	45.5	No	66.30	127.7	120.4	161.2	136.7	7.8	-0.1	-4.9	70.9	1.09
Cmpgr.	18/03/2016 11:00	27.7	30.5	18.5	No	9.20	57.5	31.3	77.1	63.7	12.9	-0.1	-7.8	72.8	1.89
N/A	01/04/2016 15:00	54.4	46.0	30.5	Yes	23.90	61.6	64.7	103.7	108.5	4.9	0.2	3.5	67.2	1.25
R05	15/04/2016 11:46	31.9	30.0	18.0	Yes	13.90	54.3	34.4	81.2	67.1	9.1	-0.1	3.2	63.6	1.51
R03	16/04/2016 13:00	41.0	34.5	17.0	Yes	24.00	60.8	43.7	90.4	75.3	12.1	----	3.7	57.2	1.56
R04	18/04/2016 15:30	28.0	27.0	17.0	Yes	11.00	56.3	36.1	77.4	72	11.9	-0.1	0.5	64.2	1.73
R02	23/04/2016 8:30	29.1	28.5	16.5	Yes	12.60	65.9	38	78.5	66.9	20.1	0.1	7.3	59.3	1.44
Cmpgr.	24/04/2016 9:05	35.2	34.5	27.5	Yes	7.70	52.4	36.9	84.5	67.9	14.3	-0.1	7.6	59.9	1.28
R01	25/04/2016 12:00	39.1	39.5	36.5	No	2.60	55.1	39.5	88.4	73.4	13.5	-0.1	5.7	57.5	1.78
R01	15/05/2016 8:40	49.3	50.5	48.0	No	1.30	57.5	49.7	98.7	66.3	3.3	-0.1	12.2	47.4	2.30
R02	16/05/2016 11:10	44.4	42.5	24.5	Yes	19.90	64.9	56.9	93.8	84.1	10.7	----	5.9	71.5	3.12
R03	18/05/2016 13:00	38.7	38.5	24.5	Yes	14.20	60.2	40.4	88.1	76.9	13.6	0.1	7.5	66.6	1.88
R04	19/05/2016 14:15	39.2	34.0	21.5	Yes	17.70	59.5	46.8	88.6	81	6.3	-0.2	10.3	56.7	1.57
Cmpgr.	21/05/2016 8:30	47.1	48.5	44.5	No	2.60	56.8	47.8	96.4	79.2	7.7	----	16.6	39.4	1.47
R05	22/05/2016 11:30	41.0	44.0	30.5	No	10.50	52.8	42.8	90.4	69.9	10.3	-0.2	9.9	66.2	1.72
R01	13/06/2016 8:40	50.9	51.0	50.0	No	0.90	53.8	54.5	100.2	85.4	2.5	----	11.1	78.0	1.63
R05	19/06/2016 8:40	39.7	42.5	31.5	No	8.20	53	41.6	89.1	70.4	7.5	0.1	19.6	26.9	2.28
R04	20/06/2016 13:40	38.5	34.0	21.0	Yes	17.50	55.6	48.8	87.9	82.7	10	0.1	10.3	79.6	1.47
R03	29/06/2016 13:00	48.0	44.0	22.5	Yes	25.50	61	53.6	97.3	91.1	10.8	-0.2	15.5	67.8	1.35
Cmpgr.	30/06/2016 18:00	51.1	51.0	15.5	Yes	35.60	57	60.1	100.5	95.4	5	0.1	12.7	83.3	0.69
R05	17/07/2016 8:30	40.5	42.0	30.5	No	10.00	52.9	43.3	89.9	75.8	8.9	----	14.8	64.6	2.50
Cmpgr.	18/07/2016 14:30	48.3	46.5	44.5	Yes	3.80	54.1	56.6	97.6	90.1	4.7	-0.1	11.2	82.5	1.61
R03	30/07/2016 19:30	40.3	38.5	27.0	Yes	13.30	61.1	46.4	89.7	84.8	14	----	13.7	69.0	2.00
R01	31/07/2016 20:00	91.0	92.5	61.5	No	29.50	105.5	97.9	140.3	128.2	5.4	0.2	12.5	65.7	1.93
N/A	18/08/2016 16:35	94.1	71.0	35.0	Yes	59.10	109.9	101.7	143.5	132.6	7.9	-0.2	9.6	87.0	0.84
N/A	20/08/2016 13:00	38.1	40.0	29.0	No	9.10	52.3	40.5	87.4	75.3	10.4	0.1	10.6	72.3	1.55
Cmpgr.	21/09/2016 17:05	44.3	46.0	40.5	No	3.80	59.3	47.9	93.7	77.5	5.1	----	10.1	36.8	2.63
R01	22/09/2016 17:51	46.5	47.0	45.0	No	1.50	64.8	46.9	95.8	72.8	5.2	0.1	7.2	56.4	2.47
R04	23/09/2016 20:15	33.9	33.5	23.5	Yes	10.40	57.2	38.1	83.3	72	13.8	-0.1	4.1	59.1	1.85
R05	24/09/2016 20:40	77.2	73.5	39.5	Yes	37.70	89.3	89.8	126.6	122.1	4.5	0.2	0.9	94.4	0.88
N/A	28/09/2016 15:30	37.0	31.0	22.5	Yes	14.50	58.5	39.8	86.3	77.2	13.7	----	1.0	66.7	1.90
N/A	25/10/2016 10:00	36.0	35.5	26.0	Yes	10.00	63.4	40.8	85.3	81	22.3	-0.1	-15.2	89.0	0.54

Station	Start Date & Time	LAeq (dB)	LAF 10% (dB)	LAF 90% (dB)	LAeq > LAF10	LAeq - LAF90 (dB)	LZeq	LAleq	LAE	LCeq	LCeq-LAeq	Calibration Drift	Temp. (°C)	R.H. (%)	Avg. WS (m/s)
N/A	26/10/2016 11:00	33.2	34.5	25.0	No	8.20	59.3	35.6	82.6	70.6	22.2	-0.1	-10.7	92.1	0.66
R01	11/11/2016 7:15	40.4	40.5	37.5	No	2.90	53.6	42.4	89.8	83.4	7.1	----	1.3	69.8	1.90

Legend:

Yes	When LAeq > LAF10
<5	LAeq - LAF90 (dB) less than 5
>10	LAeq - LAF90 (dB) greater than 10
Red	Calibration Drift greater than 3.0 dB

NOISE COMPLAINTS

No formal noise complaints were received by AKHM in 2016.

CONCLUSION

Noise levels measured at all noise receptors were well within or below the 50-90 dBA range deemed to be socially acceptable for daytime noise limits, with the exception of 3 anomalous data points. The majority of the LA_{eq} measurements in 2016 exceeded the predicted levels from the NIA range and of those that exceeded, 35% represent steady to very steady baseline conditions, despite the absence of mining and milling operations in the Keno Hill Silver District in 2016. Continued monthly monitoring over a 24-hour interval provides further data which can better inform noise monitoring thresholds.

REFERENCES

Alexco Keno Hill Mining Corp., Noise Monitoring and Management Plan, Keno Hill Silver District Mining Operations, June 2015

APPENDIX A

Keno Noise Monitoring Data September 2013 to December 2014

Keno Noise Monitoring Data

Date	Location	Time	Temp (°C)	Wind	Precipitation	DBA	Observations
08/04/2013	R01	12:26	2	Windy SSE	None	52.0	
08/04/2013	R02	12:05	2	Windy SSE	None	58.6	
08/04/2013	R03	11:45	2	Windy SSE	None	52.4	
08/04/2013	R04	11:25	2	Windy SSE	None	67.2	A dog barked 2 times.
08/04/2013	R05	11:04	2	Windy SSE	None	48.5	
10/04/2013	R01	11:33	-6	Light SSW	None	42.1	
10/04/2013	R02	13:00	-6	Light SSW	None	42.5	
10/04/2013	R03	12:40	-6	Light SSW	None	49.0	Doors slamming. People talking.
10/04/2013	R04	12:20	-6	Light SSW	None	39.4	
10/04/2013	R05	12:00	-6	Light SSW	None	39.1	
06/05/2013	R01	15:30	2	Wind West	None	35.1	Backup alarm at Onek. Tarps flapping in wind.
06/05/2013	R02	15:30	2	Slight breeze	None	34.4	
06/05/2013	R03	15:30	2	Windy	None	44.8	Dog barking. Boart truck.
06/05/2013	R04	15:30	2	Slight breeze	None	32.8	
06/05/2013	R05	15:30	2	Slight breeze	None	37.5	Dog barking.
19/05/2013	R01	10:25	-2	Light (<10km/h) N	Light snow	69.6	Creek flowing loud. Squirrels making noise. Tarp flapping. Volvo going by on the BKR.
19/05/2013	R02	10:10	-2	Light (<10km/h) E	Light snow	43.2	Creek flowing below. A few birds chirping. Boart pickup went by.
19/05/2013	R03	9:55	-2	Light (<10km/h) E	Light snow	56.3	A few birds. Talking and trucks in town in the distance. Water truck went by.
19/05/2013	R04	9:30	-2	Light (<10km/h) E	Light snow	46.6	Lots of birds calling and a woodpecker pecking close by.
19/05/2013	R05	8:55	-2	Light (<10km/h) E	Light snow	36.4	A few birds and a squirrel chirping.
18/06/2013	R01	16:25	22	Light (<10km/h) S	None	48.6	Creek flowing. Leaves rustling.
18/06/2013	R02	16:10	22	Light (<10km/h) S	None	46.8	Volvo on BKR. 2 vehicles drove past. Gusts of wind rustling trees. Chainsaw nearby in town.
18/06/2013	R03	15:55	22	Light (<10km/h) S	None	44.8	People talking and walking close by. 2 Vehicles driving through town and 1 driving by.
18/06/2013	R04	15:40	21	Light (<10km/h) S	None	34.9	Wind rustling leaves. Birds calling.
18/06/2013	R05	14:55	21	Light (<15km/h) S	None	37.6	Wind rustling leaves. Volvo on the BKR.
24/07/2013	R01	11:07	23	light (<20km/h) S	None	48.7	Leaves rustling. Creek nearby. Birds chirping.
24/07/2013	R02	10:55	23	light (<10km/h) S	None	40.4	Three vehicles driving nearby. Leaves rustling.
24/07/2013	R03	10:43	23	light (<10km/h) S	None	47.7	Backup alarm at Mill. Leaves rustling. Someone in town hammering. Two vehicles drove by.
24/07/2013	R04	10:30	23	light (<10km/h) SE	None	38.0	Backup alarm at Mill. Mill crusher. Leaves rustling. Car drove by twice. Car on Silver Trail.
24/07/2013	R05	10:14	23	Calm	None	38.0	Backup alarm at Mill. Volvo down BKR. Mill crusher.
16/11/2013	R01	14:11	-20	Calm	None	27.8	Birds.
16/11/2013	R02	13:51	-20	Calm	None	31.9	Squirrel, ravens, birds noise.
16/11/2013	R03	13:35	-20	Calm	None	34.9	Squirrel, ravens, birds noise+ truck.
16/11/2013	R04	13:20	-20	Calm	None	40.6	Lots of ravens activity, birds.
16/11/2013	R05	14:27	-20	Calm	None	38.1	Birds, truck plus door slamming + humain voive + dog barking. All at about 200 meters from sound meter.
17/11/2013	R01	12:46	-30	Calm	None	25.4	Birds.
17/11/2013	R02	12:25	-30	Calm	None	27.6	Birds, squirrel and vehicle.
17/11/2013	R03	12:07	-30	Calm	None	31.1	Ravens, squirrel and vehicle.
17/11/2013	R04	11:48	-30	Calm	None	35.9	Ravens.
17/11/2013	R05	13:01	-30	Calm	None	23.8	Quiet.
29/11/2013	Cmpgrnd	15:08	-23	Calm	None	26.4	Chainsaw in town, birds chirping.
29/11/2013	R01	14:52	-23	Calm	None	27.4	Birds chirping, snowmobile in distance.
29/11/2013	R03	14:36	-23	Calm	None	46.7	Ravens, chainsaw and dog barking in the distance, water truck drove by and backed up (alarm) nearby.
29/11/2013	R04	14:20	-23	Calm	None	29.0	squirrels and little birsds in distance, ravens flying by, someone coughing, doors closing nearby, dog barking.
29/11/2013	R05	13:59	-24	Calm	None	30.7	Raven calling, snowmobile in distance, squirrel nearby.
13/12/2013	Cmpgrnd	10:55	-20	N-W Calm	None	25.2	Quiet, birds signing once.
13/12/2013	R01	10:35	-20	N-W Calm	None	24.4	Quiet.
13/12/2013	R02	10:17	-20	N-W Calm	None	32.1	Raven, birds, squirrel.
13/12/2013	R03	10:02	-20	N-W Calm	None	27.3	Raven, birds, squirrel.
13/12/2013	R04	9:44	-20	N-W Calm	None	31.2	Raven flying and walking around. Birds signing.
13/12/2013	R05	11:13	-20	N-W Calm	None	27.1	Quiet, squirrel.

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Date	Location	Time	Temp (°C)	Wind	Precipitation	DBA	Observations
31/12/2013	R05	13:52	-18	calm	None	30.7	A few little birds chirping.
31/12/2013	R04	14:06	-18	Calm	None	44.0	lots of ravens flying, calling. Dog chewing on bone nearby. Person walking by, closing door.
31/12/2013	R03	14:20	-17	Light (<10km/h)S	None	35.8	Two vehicles drove through town. Flagpole dinging in the wind. People talking, walking in town.
31/12/2013	R01	14:34	-17	Calm	None	26.4	Little birds chirping. Raven flew by.
31/12/2013	Cmpgrnd	14:49	-17	Calm	None	25.2	Ravens calling in distance. Someone coughing. Little birds chirping.
20/01/2014	R04	14:04	-14	Calm	None	49.8	Distant grader. Birds. Vehicle.
20/01/2014	R03	14:24	-13	Calm	None	45.6	Distant grader. Birds.
20/01/2014	Cmpgrnd	14:39	-13	Calm	None	30.7	Distant grader.
20/01/2014	R01	15:13	-14	Calm	None	38.8	Distant grader. Vehicle.
20/01/2014	R05	14:56	-14	Calm	None	68.1	Grader went by.
29/01/2014	R05	15:07	-12	Calm	None	26.6	Squirrels, whiskeyjack calling nearby.
29/01/2014	R04	15:23	-12	Calm	None	33.5	Small bird chirping, ravens calling and flying by.
29/01/2014	R03	15:36	-12	Calm	None	41.1	Ravens calling, truck driving by, squirrel chatting, small bird chirping.
29/01/2014	R01	15:50	-12	Calm	None	26.1	Squirrel chatting, door closing in distance, birds calling, neighbour getting firewood.
29/01/2014	Cmpgrnd	16:06	-12	Calm	None	23.5	Squirrel chatting, bird chirping, ravens flying over and calling.
05/02/2014	R05	12:55	-20	light (5km/h)	None	28.4	Raven calling, squirrel chattering.
05/02/2014	R04	13:12	-20	light(<5km/h)	None	31.2	Small bird chirping, ravens calling and flying, door closing in distance X3, neighbour getting firewood.
05/02/2014	R03	13:27	-20	light(<5km/h)	None	26.5	Ravens calling in distance. Squirrel chattering, small birds, truck creaking.
05/02/2014	R01	13:40	-18	light(<5km/h)	None	43.0	Squirrel chattering, ice inside old dump truck (beside sample site) cracked loudly, birds chirping.
05/02/2014	Cmpgrnd	13:59	-19	light(<5km/h)	None	26.0	Small birds chirping, ravens in distance.
26/02/2014	R05	14:14	-9	Calm	None	32.5	Water truck running nearby, driving. Squirrel chattering, little birds calling.
26/02/2014	R04	14:31	-8	Calm	None	35.4	Ravens calling, person walking by and into house.
26/02/2014	R03	14:56	-8	Calm	None	30.9	Lots of squirrels chattering, dog barking in distance, small birds chirping, radio from neighbours house, raven calling.
26/02/2014	R01	15:10	-8	Calm	None	27.7	Little birds chirping. Squirrels.
26/02/2014	Cmpgrnd	15:26	-8	Calm	None	31.2	Someone chainsawing in town. Birds chirping.
05/03/2014	R05	14:19	-14	Calm	None	28.0	Raven calling in distance. Lots of little birds chirping nearby.
05/03/2014	R04	14:37	-14	Slight breeze	None	30.1	Ravens calling nearby. Squirrels chattering. Helicopter in distance. Little birds chirping. Ravens flying by.
05/03/2014	R03	14:50	-13	light (<10km/h)	None	40.1	Vehicle in town idling. Lots of little birds chirping. Raven calling. Flags tinging on flagpoles. Helicopter in distance.
05/03/2014	R01	15:04	-13	calm	None	26.9	Vehicle driving through town and by twice.
05/03/2014	Cmpgrnd	15:19	-14	very slight breeze	None	28.5	lots of little birds chorping. Rvns in distance. Helicopter faintly in distance.
29/03/2014	R05	14:31	-3	Slight breeze	None	28.7	little birds chirping. Ravens in distance. Helicopter in distance. Backup alarm in town.
29/03/2014	R04	14:48	0	light (10 km/h)	None	34.8	Lots of small birds calling nearby. Squirrel chattering.
29/03/2014	R03	15:00	0	light (10 km/h)	None	29.8	Ravens calling closeby. Small birds calling. Diamond drill and equipment working in distance. Wind chimes. Someone scraping snow.
29/03/2014	R01	15:13	0	Slight breeze	None	31.3	Flags hitting flagpoles. Lots of small birds calling nearby. Raven calling. Squirrel chattering. Squirrel climbing on sign nearby.
29/03/2014	Cmpgrnd	15:34	0	Slight breeze	None	27.6	Small birds. Squirrel chattering. Steel pipe made sound as it expanded.
09/04/2014	R01	10:04	-10	Calm	None	45.9	Small birds calling. Bulldozer (drillers) going down Duncan creek road in distance. Someone working on something in town. Raven calling.
09/04/2014	R02	9:55	-10	Calm	None	44.7	Pickup , backup alarm. Birds.
09/04/2014	R03	9:24	-10	Calm	None	29.8	Water truck x 2, delivering.
09/04/2014	R04	9:00	-10	Calm	None	33.8	Water truck x 2, delivering.
09/04/2014	R05	10:47	-10	Calm	None	28.0	Ravens.
09/04/2014	Cmpgrnd	10:32	-10	Calm	None	25.2	Ravens.
18/04/2014	R01	15:43	2	Calm	None	32.0	Squirrel.
18/04/2014	R02	16:22	2	Calm	Snow/rain	30.0	Birds, loader, backup alarm far away.
18/04/2014	R03	15:20	2	Calm	Snow	61.4	Car, birds.
18/04/2014	R04	15:04	2	Calm	Snow	36.2	Loader, backup alarm. Car +horn. People talking, dog barking.
18/04/2014	R05	16:37	2	Calm	None	31.6	Ravens, birds.
18/04/2014	R05	16:37	2	Calm	None	31.6	Birds.

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Date	Location	Time	Temp (°C)	Wind	Precipitation	DBA	Observations
18/04/2014	Cmpgrnd	15:04	2	Calm	Rain/snow	34.2	Birds.
11/05/2014	R01	9:14		strong N wind	None	45.7	Birds, creek.
11/05/2014	R02	8:58		Light N wind	None	40.7	Birds, car, house doors slamming.
11/05/2014	R03	8:42		Light N wind	None	40.3	Birds.
11/05/2014	R04	8:27		calme	None	34.4	Birds.
11/05/2014	R05	10:21		Light N wind	None	38.8	Wind in trees, bear or moose cracking branches.
11/05/2014	Cmpgrnd	9:30		Light N wind	None	52.4	Creek.
29/05/2014	R01	10:50		Light SW wind	None	43.4	Creek.
29/05/2014	R02	10:30		Light SW wind	None	31.5	Raven, truck.
29/05/2014	R03	9:50		Light SW wind	None	44.3	Raven, car, truck running idle, starting.
29/05/2014	R04	9:40		Light SW wind	None	33.6	Ravens.
29/05/2014	R05	11:40		Light SW wind	None	32.7	Birds.
29/05/2014	Cmpgrnd	11:20		Light SW wind	None	47.9	Creek.
01/06/2014	R01	15:49		strong wind all directions	None	46.1	Creek, wind, dog barking.
01/06/2014	R02	15:33		strong wind all directions	None	36.8	Doors slamming x 2.
01/06/2014	R03	15:20		strong wind all directions	None	40.8	Truck, trailer, horn.
01/06/2014	R04	15:03		light wind all directions	None	31.8	ATV far away.
01/06/2014	R05	16:18		strong wind all directions	None	35.7	Silent.
01/06/2014	Cmpgrnd	16:03		strong wind all directions	None	50.0	Creek.
26/06/2014	R01	12:52		strong N wind	None	47.0	Wind in trees,creek, birds.
26/06/2014	R02	12:38		strong N wind	None	57.3	Wind in trees, car, chainsaw, ravens, people talking.
26/06/2014	R03	12:25		N wind	None	49.0	Wind in trees, ATV, music, car, ravens.
26/06/2014	R04	12:09		N wind	None	33.5	Wind in trees, birds.
26/06/2014	R05	13:30		N wind	None	42.3	Wind in trees, birds.
26/06/2014	Cmpgrnd	13:11		N wind	None	50.5	Wind in trees, creek.
05/08/2014	R01	10:14		N wind	None	42.8	Wind in trees, creek, birds.
05/08/2014	R02	9:51		N wind	None	34.6	Truck running, people talking, door slamming, wind.
05/08/2014	R03	9:33		N wind	None	39.6	Truck running, people talking, wind.
05/08/2014	R04	9:19		N wind	None	38.7	Car starting, door slamming,, car passing by, wind.
05/08/2014	R05	11:47		N wind	None	36.9	Wind in willows.
05/08/2014	Cmpgrnd	11:17		N wind	None	46.1	Creek, wind, people talking.
23/08/2014	R01	13:36		N wind	None	45.1	Creek, house building.
23/08/2014	R02	13:19		N wind	None	67	Pickup truck, motor running.
23/08/2014	R03	13:07		N wind	None	32	Dog barking x 2, vehicles.
23/08/2014	R04	12:43		N wind	None	36.3	Ravens.
23/08/2014	R05	15:44		N wind	None	38.6	Dump truck, vehicles, drill far away.
23/08/2014	Cmpgrnd	13:54		N wind	None	48.9	Creek, vehicles.
03/09/2014	R01	16:01		W wind, strong	None	49.9	Wind + creek.
03/09/2014	R02	15:47		W wind, strong	None	47.8	Dogs barking, ATV's, wind, door slamming.
03/09/2014	R03	15:35		W wind, strong	None	52.7	2 trucks drove by, dogs barking, wind.
03/09/2014	R04	15:22		W wind, strong	None	37.9	Wind, ravens.
03/09/2014	R05	16:29		W wind, strong	None	41.6	Drill, wind.
03/09/2014	Cmpgrnd	16:15		W wind, strong	None	51.1	Wind, creek, vehicles.
18/09/2014	R01	16:02		NW little wind	None	45.3	Strong wind, creek.
18/09/2014	R02	15:48		NW little wind	None	53.9	ATVs, birds.
18/09/2014	R03	15:35		NW little wind	None	39.2	ATVs, birds.
18/09/2014	R04	15:22		NW little wind	None	32.5	Birds.
18/09/2014	R05	16:30		NW little wind	None	43.1	Little wind, leaves in wind.
18/09/2014	Cmpgrnd	16:15		NW little wind	None	48.9	Strong wind, creek.
15/10/2014	R01	14:28		No Wind	None	42.5	Creek, ravens, birds.
15/10/2014	R02	14:14		No Wind	None	46.7	Car, ravens, birds, squirrels.

Keno Noise Monitoring Data

Date	Location	Time	Temp (°C)	Wind	Precipitation	DBA	Observations
15/10/2014	R03	14:00		No Wind	None	40.2	Car, ravens.
15/10/2014	R04	13:40		No Wind	None	29.6	Squirrel, birds, door slamming.
15/10/2014	R05	15:31		No Wind	None	28.8	Ravens, birds.
15/10/2014	Cmpgrnd	14:46		No Wind	None	45.7	Creek, ravens, birds.
25/10/2014	R01	9:33		No Wind	None	38.0	Calm, creek, ravens, birds.
25/10/2014	R02	9:08		No Wind	None	30.2	Calm, ravens, birds.
25/10/2014	R03	8:53		No Wind	None	27.8	Calm, ravens, birds.
25/10/2014	R04	8:37		No Wind	None	31.0	Calm, ravens, birds.
25/10/2014	R05	10:36		No Wind	None	39.2	Calm, ravens.
25/10/2014	Cmpgrnd	10:22		No Wind	None	38.3	Calm, creek, ravens.
14/11/2014	R01	10:57		No Wind	None	67.4	Water truck, squirrel, creek.
14/11/2014	R02	10:37		No Wind	None	33.8	Calm.
14/11/2014	R03	10:10		No Wind	None	37.8	Car x 2.
14/11/2014	R04	9:56		No Wind	None	31.6	Ravens, calm.
14/11/2014	R05	11:30		No Wind	None	33.3	Calm.
14/11/2014	Cmpgrnd	11:12		No Wind	None	38.2	Creek, truck.
23/11/2014	R01	9:45		No Wind	None	26.5	Squirrel.
23/11/2014	R02	9:22		No Wind	None	27.9	Ravens.
23/11/2014	R03	9:01		No Wind	None	53.9	Ravens, truck x2.
23/11/2014	R04	8:46		No Wind	None	40.7	Ravens, truck idling.
23/11/2014	R05	10:12		No Wind	None	33.3	Ravens.
23/11/2014	Cmpgrnd	9:58		No Wind	None	22.7	Ravens.
01/12/2014							Noise Monitoring converted to 24 hours from 10 min measurements in December 2014

*All readings are taken using an Extech integrating sound level datalogger model 407780 to measure DBA for 10 min. Reading from 16/11/13 taken with an Casella CEL-63X model. (Laeq, Db.)