



Memorandum

To: Yukon Government Energy Mines and Resources, and Yukon Government Tourism and Culture Branch

From: Holly Goulding, Access Consulting Group

CC: Kai Woloshyn, Alexco Resource Corp.

Date: March 17, 2014

Re: Keno Hill Silver District Mining Operations – Noise Monitoring Reporting Q4

INTRODUCTION

As part of the Keno Hill Silver District Mining Operations Noise Management Plan (the Plan) Alexco Keno Hill Mining Corp. (AKHM) has been monitoring noise levels in Keno City. The Plan was 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.

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 for Q4 October to December, 2013 (and also includes January and February 2014) and a summary of any noise complaints received over this time period in the Noise Complaint Registry.

NOISE RECEPTORS

AKHM has monitored noise at the five locations selected in the NIA as being potential noise receptors within the 2 km radius study area around Keno City. Starting in November 2013, noise has also been monitored at the Keno City campground. These 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 850m east from the Mill
Cmpgrnd	N63.90772 W135.29998	Keno City campground

The background noise levels experienced by these locations vary considerably, depending on location and local activities. Past and proposed Lucky Queen and Onek 990 mining operations are in addition to normal fluctuations in background levels. Climate parameters, such as relative humidity, temperature, and temperature inversions impact the sound level and propagation experienced by each of these receptors.

MONITORING TIMING

For the period from October 2013 to February 2014 three monitoring events took place during the month of November, two events took place in the months of December and January, and one event took place in February for a total of 8 monitoring events. No mining or milling took place in the Keno Hill Silver District for the entire measurement period.

RESULTS

The results from the 8 monitoring events from November 2013 to February 2014, in addition to results from all previous monitoring events, are presented in Appendix A. All readings were taken using an Extech integrating sound level datalogger model 407780 to measure average dBA over 10 minutes. The wind speed, wind direction, temperature and precipitation data from the Keno District Mill weather station 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 was also documented.

Noise levels measured at all testing locations were well within or below the 50-90 dBA range deemed “what is socially acceptable for daytime noise limits” as defined in the past YESAB assessment for the Bellekeno Mine development (Project 2009-0030). Only one measurement was above 50 dBA, occurring on January 20th at R05 (68.1 dBA), corresponding to the grader going by.

Figure 2 shows the noise levels measured compared to the predicted current and proposed mining operations noise levels plus ambient sound levels from the NIA. Many of the measurements exceeded the predicted levels, which range from 32 to 39 dBA, despite the fact that operations have temporarily ceased.

At R03 and R04 measurements exceeded the predictions on November 16th, December 31st and January 29th; in addition at R03 predictions were exceeded on November 29th and January 20th. Observations for these events included bird and animal activity, people and vehicles, including the water truck and grader, and the flagpole dinging in the wind.

At R05 two measurements exceeded the predictions, the January 20th exceedance discussed above, and another on November 16th associated with animals and human activity at a distance of approximately 200m from the sound meter. For R01, only the February 5th measurement exceeded the predicted noise levels, associated with animal noises and ice cracking.

During the measurement period only three measurements were taken at R02, and all were below the predicted noise level. Finally, at the campground all measurements were close to or below 30 dBA.

Given that all measurements were made during the temporary shutdown period, these observations indicate that baseline noise levels in Keno City are greater than those predicted in the NIA and that many of the notable noise sources are not linked to Keno mining or milling operations.

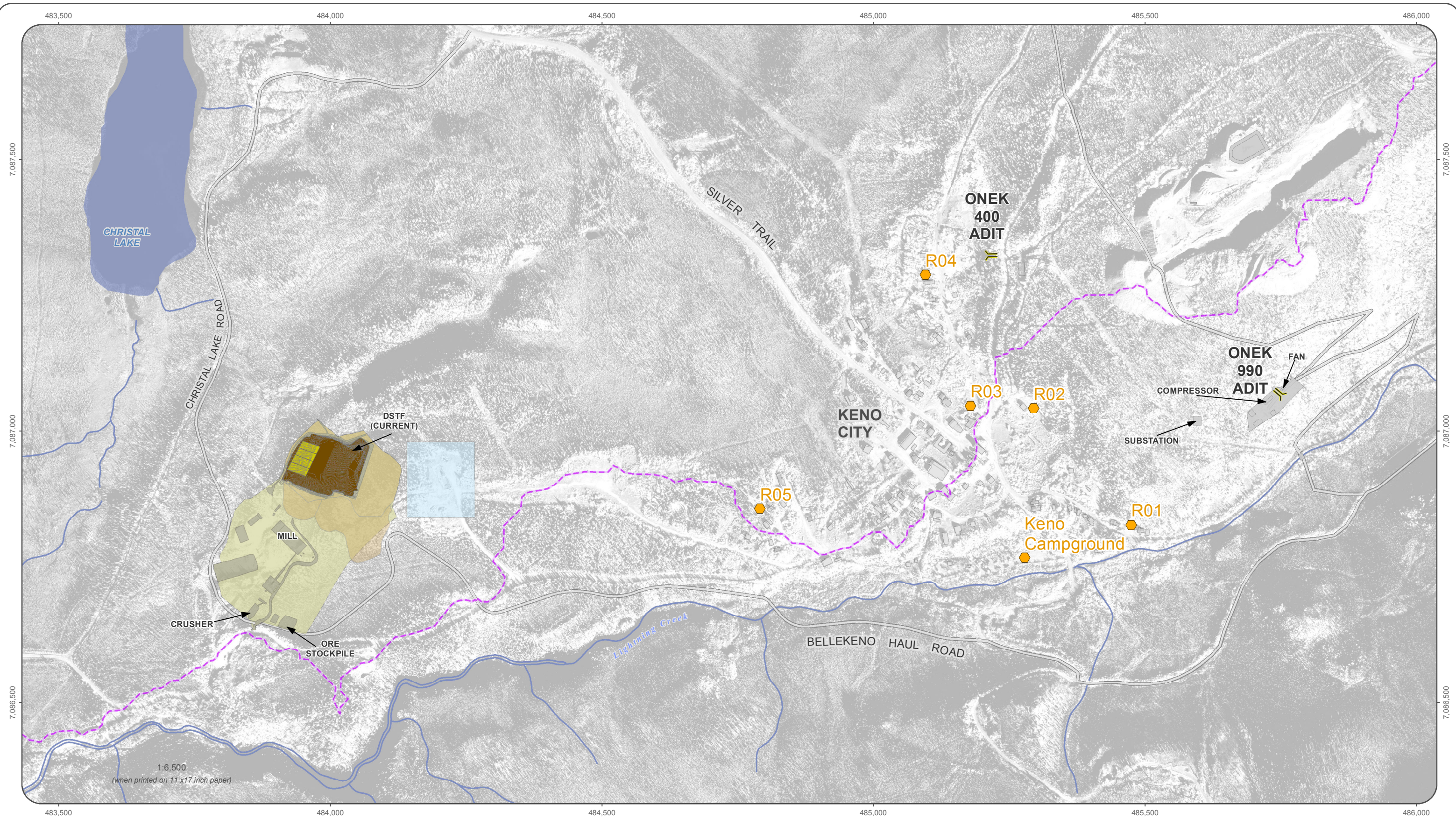
NOISE COMPLAINTS

No noise complaints received by Keno residents were provided by Alexco to Access Consulting.

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. Compared to the predicted current and proposed mining operations noise levels plus ambient sound levels from the NIA, many of the measurements exceed the predicted levels, which range from 32 to 39 dBA, despite the temporary cessation of mining and milling operations in the Keno Hill Silver District. It is recommended that proposed mining operations noise levels plus ambient sound levels generated in the NIA be revised using the noise monitoring data collected during the temporary closure period prior to the re-commencement of mining in the Keno Hill Silver District.

Given the short measurement interval of 10 minutes, measurements could have been influenced by fluctuations in background levels and climate parameters impacting noise levels and propagation. Thus, over a longer interval of measurement it is possible that lower noise levels might have been measured.



Aerial photography flight date: July 13th 2006. Ortho-rectification produced by Challenger Geomatics Ltd. 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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Noise Monitoring Station	Watershed Boundaries	Land Disposition Garbage Dump
Roads	Mill Site Footprint	Buildings/Structures
Watercourse	DSTF Cover and Revegetation Phase I	DSTF 322,000 Tonnes Design
		As Built, DSTF, Sept2013



KENO HILL SILVER DISTRICT MINING OPERATIONS

FIGURE 1
NOISE MONITORING STATIONS

MARCH 2014

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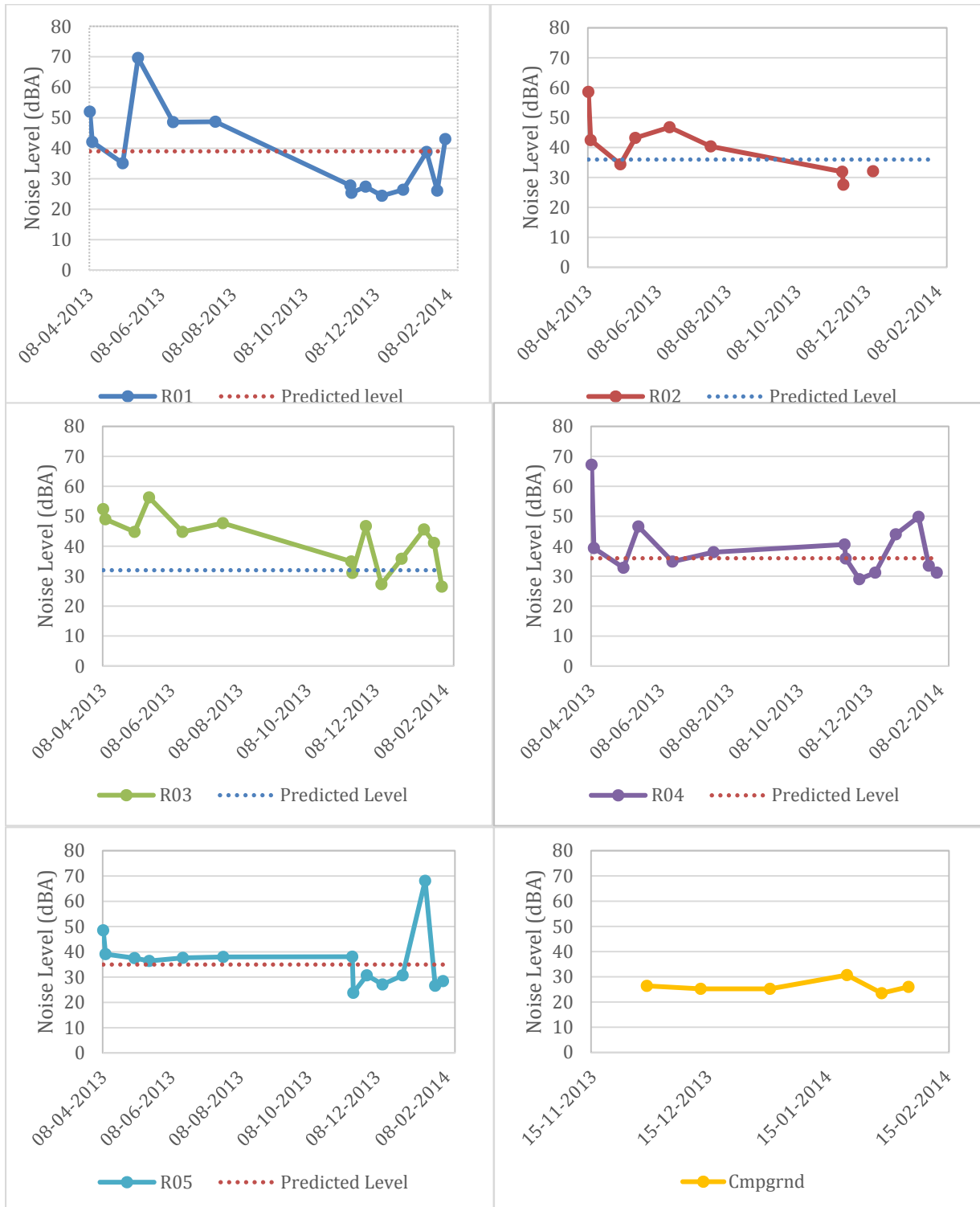


Figure 2 Keno Noise Monitoring Data

APPENDIX A

KENO NOISE MONITORING DATA

Keno Noise Monitoring Data

Date	Location	Time	Temp (°C)	Wind	Precipitation	dB	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 + human voice + dog barking. All at about 200 m 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 distance, water truck drove by and backed up (alarm) nearby
29-11-2013	R04	14:20	-23	Calm	None	29.0	Squirrels and little birds in distance, ravens flying by, person coughing, doors closing, 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 singing 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 singing
13-12-2013	R05	11:13	-20	N-W Calm	None	27.1	Quiet, squirrel
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

*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.)