Appendix G11

Report: *2012 Noise Monitoring Report*

MEADOWBANK GOLD PROJECT

2012 Noise Monitoring Report

In Accordance with NIRB Project Certificate No.004

Prepared by:
Agnico-Eagle Mines Limited – Meadowbank Division

March, 2013

EXECUTIVE SUMMARY

The 2012 noise monitoring program at Meadowbank was conducted in support of the Noise Abatement and Management Plan (AEM, 2009). The objective of the 2012 program was to measure noise levels at five previously determined monitoring locations around the Meadowbank site, over two 24 hr periods.

Due to equipment malfunction or difficulties with software, usable data was only obtained for three locations (R1, R2, R5).

Since noise levels vary constantly over time, the monitoring instrument used at Meadowbank measures acoustical energy near-continuously and reports a single number for each minute, representing the "equivalent sound level" (L_{eq}). This value represents the sound level that would produce the same amount of acoustical energy in the specified time period as the time-varying measured sound levels. L_{eq} values for various time periods recommended by Health Canada are provided for each monitoring location in Table 1.

Table 1: Summary of L_{eq} values for Health Canada-recommended time periods at three locations around the Meadowbank site (R1, R2, R5). Hourly data was filtered to remove set-up/take-down noises, and data collected outside of optimal weather conditions. Total hours used to calculate each L_{eq} after data filtering are provided.

Site	Dates (2012)	$L_{eq, day}$ 7am-11pm (dBA)	Total Hours	$L_{eq, night}$ 11pm-7am (dBA)	Total Hours	$L_{eq, 1hr}$ 10pm-11pm (dBA)	$L_{eq, 24hr}$ (dBA)	Total Hours
R1	July 2-3	51.1	13	45.8	8	44.21	49.7	21
	July 3-4	57.6	16	55.3	6	46.49	57.1	21
R2	July 25-26	48.7	5	38.0	1	33.43	48.0	6
R5	July 5-6	57.5	16	56.7	8	45.54	57.4	23
	July 6-7	64.5	9	58.1	6	49.79	62.9	15

Since three hours of data are considered representative of the acoustic environment for the daytime and nighttime L_{eq}, all values are considered valid except the nighttime L_{eq} for R2.

Noted sounds that contributed to noise levels at each location include wind, waves, insects, birds, vehicle traffic, air traffic (helicopter, airplane) and blasting.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

1.1 OBJECTIVE

Since 2008, Agnico-Eagle Mines Ltd. (AEM) has conducted outdoor noise monitoring at their Meadowbank site, near Baker Lake, Nunavut, in support of their Noise Abatement and Management Plan (AEM, 2009).

The objective of this monitoring program is to provide information on average daily noise levels and noise sources around the site. To fulfill this objective, AEM aims to conduct two 24 hr surveys of ambient noise each year in five locations around the mine site.

In 2012, data was only available for three sites (R1, R2, R5) due to instrument malfunction and problems with data extraction. Two 24 hr periods were recorded for R1 and R5, but only one 24 hr period was available for R2.

1.2 MONITORING LOCATIONS

Noise monitoring locations in 2012 were similar to previous years, and were located as recommended in the Noise Abatement and Management Plan. UTM coordinates are provided in Table 2, and are shown in relation to the mine site features in Figure 1. Photos of the monitoring locations are provided in Appendix A.

Table 2: UTM coordinates and dates of measurement for the Meadowbank noise monitoring locations. *Measurement data for two locations was not available due to equipment malfunction.

Monitoring Location	Dates	Easting	Northing
R1	July 2-3, 3-4	636896	7216829
R2	July 25-26	636795	7214435
R3*	Sept 8-9	641104	7214427
R4*	Sept 10-12	639990	7218810
R5	July 5-6, 6-7	633781	7214493

1.2.1 R1

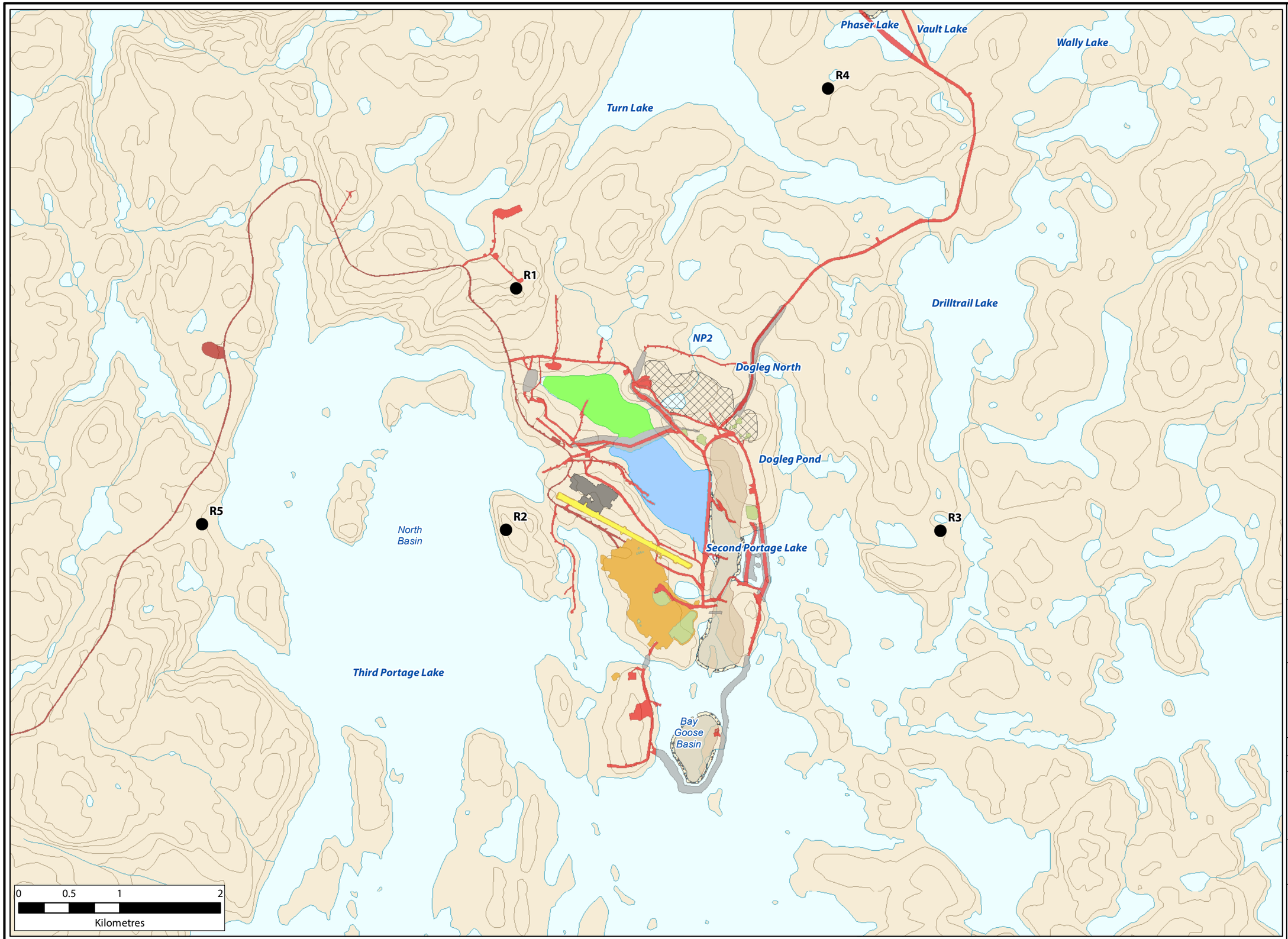
Location R1 is approximately 700 m south of the explosive storage area, and 400 m northeast of the all-weather access road. Third Portage Lake is nearby to the south, and surrounding terrain is rocky tundra with some vegetation.

1.2.2 R2

Location R2 is approximately 600 m west of the airstrip. Third Portage Lake is to the west and southwest and surrounding terrain is vegetated tundra with rocky outcrops.

1.2.3 R3

Location R3 is approximately 1,800 m east of the East Dike. Second Portage Lake is to the west and east, and surrounding terrain is vegetated tundra with rocky outcrops.



Legend

- Noise Monitoring Location
- Quarry
- AWAR Quarry
- Dikes
- Portage Attenuation Facility
- Tailings Storage Facility
- Roads
- AWAR
- Stockpiles
- Facility
- Airstrip
- Portage Rock Storage Facility
- Mine Pit Area
- Pit Cap

Noise Monitoring Locations

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PROJECT: DA11-062-03

CLIENT: Agnico-Eagle Mines Ltd., Meadowbank Div.

N / W / E / S
UTM Zone 14 NAD83

DATE: MARCH 2013

SCALE: 1:35,000

DRAWN BY: LC

CHECKED BY: TF

FIGURE:

1

1.2.4 R4

Location R4 is approximately 1,500 m southwest of the future location of Vault Pit. Turn Lake is to the west, and surrounding terrain is vegetated tundra with rocky outcrops.

1.2.5 R5

Location R5 is in the exploration camp, near the all-weather access road, and approximately 3,500 m west of the airstrip. Third Portage Lake is immediately to the east, and surrounding terrain away from the shoreline is vegetated tundra with rocky outcrops. This location is situated on a known caribou migration route.

2 METHODS

In 2012, AEM field staff conducted one or two 24 hr noise surveys at each of the locations described in Section 1.2. These surveys provide data on average noise levels during a typical day, as well as variability of noise levels within the day.

2.1 SOUND LEVEL METER

For locations R1, R2 and R5, a Bruel and Kjaer Model 2250 integrating sound level meter was used to conduct the noise survey. As in the past, the noise level logging rate was set at one-minute intervals, and sound was recorded in 10 minute intervals.

The parameters logged each minute were:

- Integrated average sound level, in dBA – L_{eq}
- Absolute maximum sound level, in dBA – L_{max}
- Absolute minimum sound level, in dBA – L_{min}
- Peak sound level, in dBZ - LZ_{peak}

Calibration of the instrument was performed before and after each 24 hr period using a Bruel and Kjaer Type 4231 Calibrator, to ensure variance was within 0.5 dB. See field notes, Appendix B. Estimated uncertainty of the calibrator is ± 0.12 dB at a 99% confidence level.

Before measurements could be conducted at locations R3 and R4, the Bruel and Kjaer instrument lost its firmware and could no longer be used. The replacement instrument (Larson Model 824) had battery problems, and usable data was not recovered for these locations.

2.2 WEATHER DATA

Weather data for the noise monitoring periods was collected using the mine site's permanent weather station. Hourly data for wind, temperature and relative humidity was available from this station.

2.3 FIELD NOTES

A pocket weather meter (Kestrel 3000) was used by field staff to record wind speed, direction and temperature at the beginning and end of each monitoring period. Other observations included precipitation, cloud cover and observed noises during instrument set-up and take-down.

2.4 DATA ANALYSIS

Since noise levels constantly vary over time, the monitoring instrument used at Meadowbank measures continuously and reports a single-number value for each minute, representing the "equivalent sound level" (L_{eq}). This value is the average sound level occurring over the specified time period (i.e.one minute). Alternatively, it is the sound level that would produce the same total amount of acoustical energy in the specified time period as the measured sound levels did.

As in 2011 (Golder, 2012), data downloaded from the instrument was filtered to remove measurements collected outside of acceptable weather conditions (wind speed > 4.17 m/s; relative humidity > 90%). All datapoints associated with the first and last hour of measurement were also filtered out to remove noise from technicians, and to ensure more than 30 min of data contributed to hourly averages.

One-minute L_{eq} values produced by the instrument were used to calculate hourly, day-time (7am-11pm), night-time (11pm-7am) and 24 hr L_{eq} values. These time periods are based on Health Canada recommendations, as described in Golder (2012). L_{eq} values for each time period were calculated as the geometric mean of filtered one-minute L_{eq} values.

3 RESULTS

3.1 R1

One-minute L_{eq} maximum (L_{max}) and minimum (L_{min}) values over the monitoring period are shown in Figure 1. Filtered one-minute L_{eq} values exclude data collected in the first and last hour to remove technician interference, and data collected under non-optimal weather conditions (wind speed > 4.17 m/s or relative humidity > 90%). Filtered values were used in subsequent L_{eq} calculations, but the unfiltered values are also shown for reference.

Hourly L_{eq} values were calculated as described in Section 2.4, and are shown in Table 3.

Weather data for noise monitoring dates at R1 is shown in Table 4. Six hours of data were filtered out due to weather conditions.

Audible noises noted in the field log at this location include trucks, airplanes, helicopters, blasting, insects and wind.

A review of the sound files identified construction traffic and wind as the most commonly heard noises.

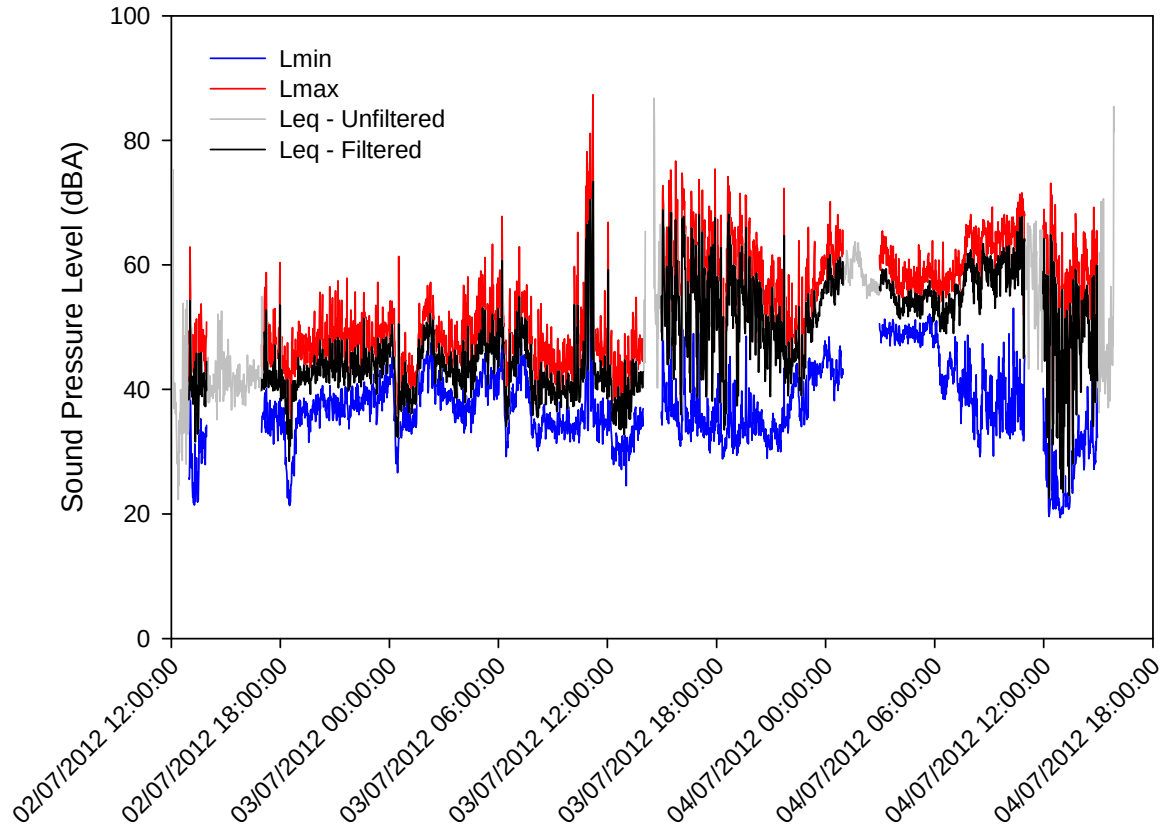


Figure 1: One-minute L_{eq}, L_{max} and L_{min} values recorded at monitoring station R1 at the Meadowbank site. Filtered data excludes those measurements taken outside of optimal conditions (set-up, take-down, wind speed > 4.17 m/s, RH > 90%).

Table 3: Hourly L_{eq} values for monitoring station R1 at the Meadowbank site. Hours for which measurements were taken outside of optimal conditions (set-up, take-down, wind speed > 4.17 m/s, RH > 90%) were not used in daily, nightly and 24 hr L_{eq} calculations, and are indicated as "not valid".

Date	Start Time	L_{eq} – 1hr	Notes
July 2, 2012	12:00 PM	59.20	Not valid
	1:00 PM	42.90	
	2:00 PM	44.23	Not valid
	3:00 PM	41.86	Not valid
	4:00 PM	43.11	Not valid
	5:00 PM	43.33	
	6:00 PM	40.98	
	7:00 PM	42.44	
	8:00 PM	44.25	
	9:00 PM	44.12	

Date	Start Time	L_{eq} – 1hr	Notes
	10:00 PM	44.21	
	11:00 PM	44.93	
July 3, 2012	12:00 AM	43.84	
	1:00 AM	43.59	
	2:00 AM	47.70	
	3:00 AM	42.97	
	4:00 AM	44.56	
	5:00 AM	47.54	
	6:00 AM	47.77	
	7:00 AM	47.60	
	8:00 AM	40.43	
	9:00 AM	40.07	
	10:00 AM	53.99	
	11:00 AM	60.66	
	12:00 PM	43.67	
	1:00 PM	40.84	
	2:00 PM	58.10	Not valid
	2:00 PM	73.77	Not valid
	3:00 PM	60.37	
	4:00 PM	60.43	
	5:00 PM	58.61	
	6:00 PM	58.03	
	7:00 PM	57.11	
	8:00 PM	52.79	
	9:00 PM	51.00	
	10:00 PM	46.49	
	11:00 PM	53.14	
July 4, 2012	12:00 AM	58.01	
	1:00 AM	60.67	Not valid
	2:00 AM	56.79	Not valid
	3:00 AM	56.80	
	4:00 AM	53.72	
	5:00 AM	54.59	
	6:00 AM	52.78	
	7:00 AM	57.45	
	8:00 AM	59.06	
	9:00 AM	59.72	
	10:00 AM	61.11	
	11:00 AM	61.40	Not valid
	12:00 PM	55.55	
	1:00 PM	50.92	
	2:00 PM	51.63	
	3:00 PM	69.89	Not valid

Table 4: Weather conditions for monitoring station R1 at the Meadowbank site. Data for which wind speed > 4.17 m/s or relative humidity > 90% were filtered out for L_{eq} calculations.

Date	Start Time	Air Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction (deg)	Filtered Out?
July 2, 2012	12:00 PM	14.35	51.17	2.73	33.87	
	1:00 PM	15.08	50.12	3.173	62	
	2:00 PM	15.7	45.34	4.254	59.8	y
	3:00 PM	16.27	43.75	4.169	48.69	y
	4:00 PM	16.68	43.04	4.416	68.64	y
	5:00 PM	16.79	42.22	3.409	120.1	
	6:00 PM	17.25	40.53	3.378	123	
	7:00 PM	17.54	42.33	3.671	116.5	
	8:00 PM	17.65	43.2	4.163	110.1	
	9:00 PM	17.62	43.14	3.153	117.7	
	10:00 PM	16.73	47.13	2.176	128.6	
	11:00 PM	16.09	51.94	1.483	110.6	
July 3, 2012	12:00 AM	15.56	54.11	1.206	79.85	
	1:00 AM	14.67	61.48	2.045	88.5	
	2:00 AM	12.67	68.1	0.646	279.4	
	3:00 AM	12.64	64.78	1.318	57.5	
	4:00 AM	12.7	64.88	1.568	71.88	
	5:00 AM	12.95	66.04	1.728	82.9	
	6:00 AM	12.62	65.53	0.852	91.9	
	7:00 AM	13.14	65.87	1.608	70.65	
	8:00 AM	14.37	55.94	1.553	96.1	
	9:00 AM	15.73	51.54	1.548	110.6	
	10:00 AM	16.58	46.86	2.259	129.8	
	11:00 AM	16.78	45.94	2.283	94.8	
	12:00 PM	17.24	45.03	3.301	67.09	
	1:00 PM	17.85	43.07	3.326	37.23	
	2:00 PM	18.41	36.2	3.349	53.53	
	3:00 PM	18.94	37.69	3.017	50.19	
	4:00 PM	19.24	36.26	3.063	30.62	
	5:00 PM	19.49	34.67	3.287	28.14	
	6:00 PM	19.65	31.43	2.488	18.25	
	7:00 PM	20.1	28.53	1.972	15.46	
	8:00 PM	20.09	29.91	2.829	0.574	
	9:00 PM	19.98	31.64	2.664	346.5	
	10:00 PM	19.33	39.82	2.507	343.9	

Date	Start Time	Air Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction (deg)	Filtered Out?
	11:00 PM	17.59	43.64	2.517	3.156	
July 4, 2012	12:00 AM	16.05	52.62	3.707	19.6	
	1:00 AM	14.81	61.72	4.362	40.08	y
	2:00 AM	13.6	66.34	4.411	38.84	y
	3:00 AM	12.85	68.27	3.602	40.12	
	4:00 AM	11.55	69.7	1.132	315.4	
	5:00 AM	11.94	70.23	1.52	10.4	
	6:00 AM	12.59	66.81	1.862	14.47	
	7:00 AM	13.75	60.08	1.627	20.06	
	8:00 AM	15	58.3	2.411	33.33	
	9:00 AM	16.08	50.52	3.357	40.72	
	10:00 AM	17.34	45.1	3.821	42.05	
	11:00 AM	18.35	39.82	4.302	40.74	y
	12:00 PM	18.9	36.41	3.986	38.26	
	1:00 PM	19.58	33.46	2.262	14.01	
	2:00 PM	20.14	32.92	2.185	36.12	
	3:00 PM	20.92	30.21	1.661	113.1	

3.2 R2

One-minute L_{eq}, maximum (L_{max}) and minimum (L_{min}) values over the monitoring period are shown in Figure 2.

Hourly L_{eq} values were calculated as described in Section 2.4, and are shown in Table 5.

Weather data for noise monitoring dates at R2 is shown in Table 6. Nineteen hours of data were filtered out due to weather conditions.

Audible noises noted in the field log at this location include airplanes, helicopters, waves and wind.

The sound files were dominated by sounds of birds, waves and wind. A high-pitched squeaking noise which may have been caused by movement of the tripod set-up was heard throughout the monitoring period.

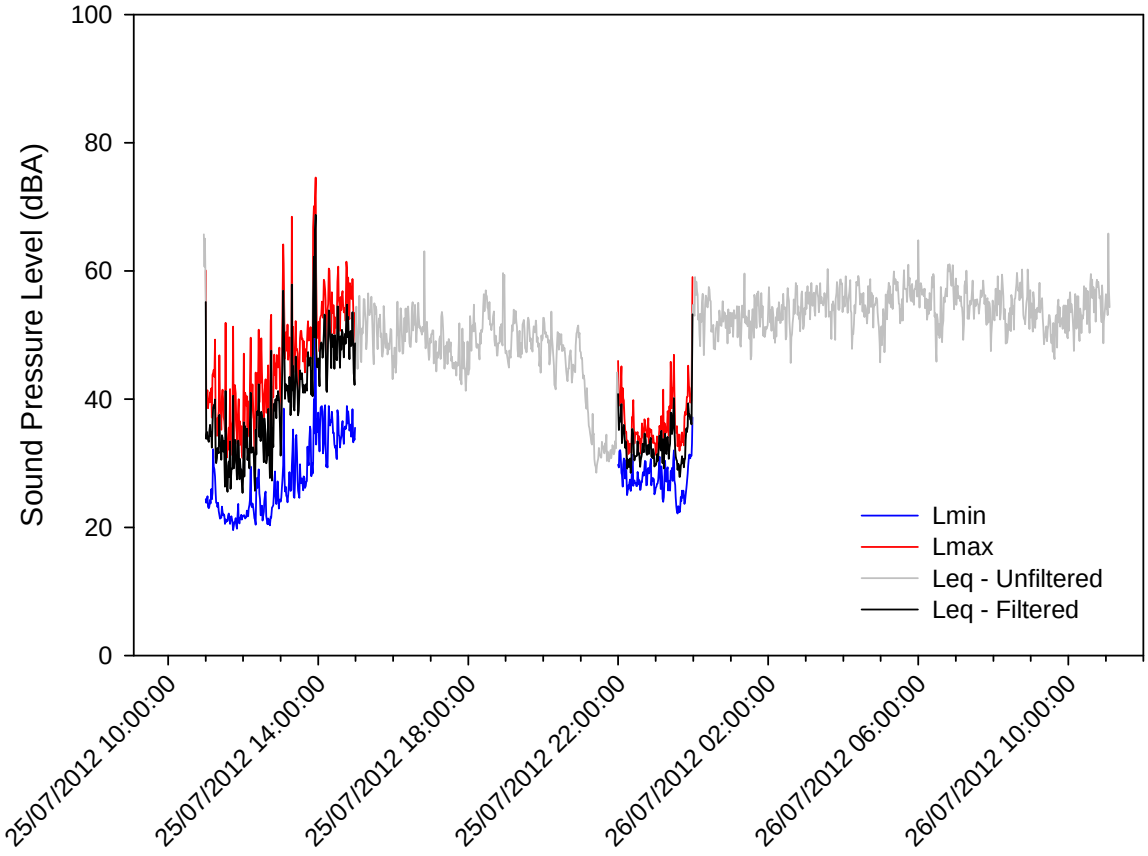


Figure 2: One-minute L_{eq}, L_{max} and L_{min} values recorded at monitoring station R2 at the Meadowbank site. Filtered data excludes those measurements taken outside of optimal conditions (set-up, take-down, wind speed > 4.17 m/s, RH > 90%).

Table 5: Hourly L_{eq} values for monitoring station R2 at the Meadowbank site. Hours for which measurements were taken outside of optimal conditions (set-up, take-down, wind speed > 4.17 m/s, RH > 90%) were not used in daily, nightly and 24 hr L_{eq} calculations, and are indicated as "not valid".

Date	Start Time	L_{eq} – 1hr	Notes
July 25, 2012	10:00 AM	64.31	Not valid
	11:00 AM	38.97	
	12:00 PM	37.19	
	1:00 PM	54.20	
	2:00 PM	49.83	
	3:00 PM	51.76	Not valid
	4:00 PM	52.10	Not valid
	5:00 PM	48.04	Not valid

Date	Start Time	L_{eq} – 1hr	Notes
	6:00 PM	52.47	Not valid
	7:00 PM	49.87	Not valid
	8:00 PM	48.53	Not valid
	9:00 PM	38.46	Not valid
	10:00 PM	33.43	
	11:00 PM	38.01	
July 26, 2012	12:00 AM	53.68	Not valid
	1:00 AM	53.14	Not valid
	2:00 AM	53.86	Not valid
	3:00 AM	55.87	Not valid
	4:00 AM	55.40	Not valid
	5:00 AM	56.51	Not valid
	6:00 AM	57.04	Not valid
	7:00 AM	55.55	Not valid
	8:00 AM	55.64	Not valid
	9:00 AM	52.84	Not valid
	10:00 AM	55.27	Not valid
	11:00 AM	59.14	Not valid

Table 6: Weather conditions for monitoring station R2 at the Meadowbank site. Data for which wind speed > 4.17 m/s or relative humidity > 90% were filtered out for L_{eq} calculations.

Date	Start Time	Air Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction (deg)	Filtered Out?
July 25, 2012	10:00 AM	10.08	62.72	1.593	263.7	
	11:00 AM	11.21	55.58	2.843	291.9	
	12:00 PM	12.57	51.24	2.956	268.7	
	1:00 PM	14.19	48.33	2.869	274.6	
	2:00 PM	15.3	49.93	3.663	257.3	
	3:00 PM	16.36	48.68	4.719	265.2	y
	4:00 PM	15.99	51.25	5.153	262.5	y
	5:00 PM	16.02	54.3	5.239	260.5	y
	6:00 PM	16.55	49.12	4.697	257.6	y
	7:00 PM	16.24	58.08	5.495	258.8	y
	8:00 PM	15.85	59.42	5.06	253.3	y
	9:00 PM	15.26	67.74	5.236	266.1	y
	10:00 PM	13.9	78.8	3.533	291.4	
	11:00 PM	13.33	85.5	1.951	288.9	
July 26, 2012	12:00 AM	12.79	93.4	2.216	299.8	y
	1:00 AM	9.59	95.1	7.699	1.679	y

Date	Start Time	Air Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction (deg)	Filtered Out?
	2:00 AM	7.886	92.2	7.341	7.355	y
	3:00 AM	6.814	91.4	7.663	7.773	y
	4:00 AM	5.319	93.3	8.11	4.151	y
	5:00 AM	4.383	94.8	7.561	5.594	y
	6:00 AM	3.722	91	7.373	12.3	y
	7:00 AM	3.935	83	8.45	16.23	y
	8:00 AM	4.381	80.5	8.3	12.05	y
	9:00 AM	4.517	80.4	7.822	14.41	y
	10:00 AM	4.681	79.79	7.874	21.36	y
	11:00 AM	6.151	74.94	8.29	17.84	y

3.3 R5

One-minute L_{eq}, maximum (L_{max}) and minimum (L_{min}) values over the monitoring period are shown in Figure 3.

Hourly L_{eq} values were calculated as described in Section 2.4, and are shown in Table 7.

Weather data for noise monitoring dates at R5 is shown in Table 8. Seven hours of data were filtered out due to weather conditions.

Audible noises noted in the field log at this location include birds, helicopters, planes, trucks and wind.

Distant construction noises were dominant in the sound files throughout the daytime hours, and were much more noticeable during the nighttime hours of the second monitoring period (6-7/07/2012) compared to the first (5-6/07/2012). A squeaking noise which may have been caused by movement of the tripod set-up was heard consistently.

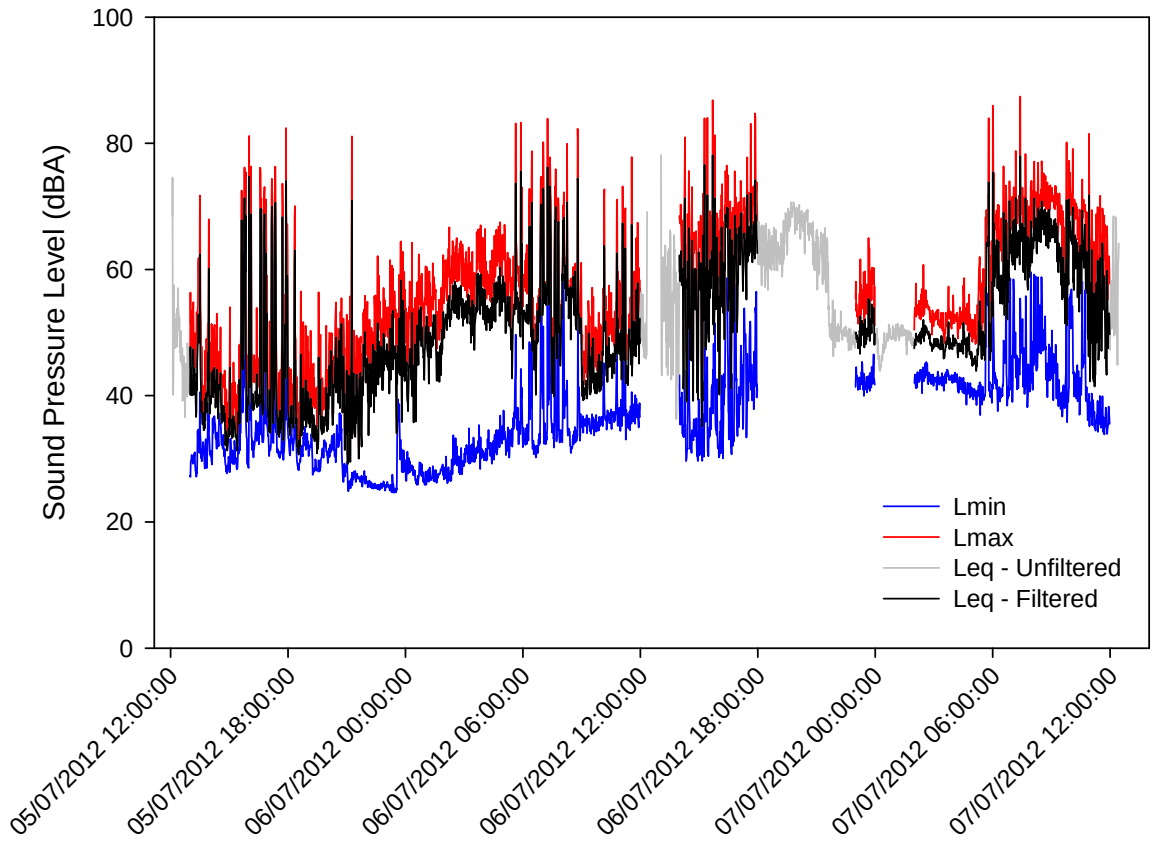


Figure 3: One-minute L_{eq}, L_{max} and L_{min} values recorded at monitoring station R5 at the Meadowbank site. Filtered data excludes those measurements taken outside of optimal conditions (set-up, take-down, wind speed > 4.17 m/s, RH > 90%).

Table 7: Hourly L_{eq} values for monitoring station R5 at the Meadowbank site. Hours for which measurements were taken outside of optimal conditions (set-up, take-down, wind speed > 4.17 m/s, RH > 90%) were not used in daily, nightly and 24 hr L_{eq} calculations, and are indicated as "not valid".

Date	Start Time	L_{eq} - 1hr	Notes
July 5,2012	12:00 PM	58.63	Not valid
	1:00 PM	48.68	
	2:00 PM	39.74	
	3:00 PM	58.16	
	4:00 PM	61.63	
	5:00 PM	61.54	
	6:00 PM	47.83	
	7:00 PM	37.33	
	8:00 PM	43.72	

Date	Start Time	L_{eq} - 1hr	Notes
	9:00 PM	53.59	
	10:00 PM	45.54	
	11:00 PM	48.59	
July 6, 2012	12:00 AM	47.39	
	1:00 AM	48.85	
	2:00 AM	54.44	
	3:00 AM	55.02	
	4:00 AM	55.20	
	5:00 AM	61.20	
	6:00 AM	61.07	
	7:00 AM	64.13	
	8:00 AM	62.41	
	9:00 AM	43.57	
	10:00 AM	52.48	
	11:00 AM	55.52	
	12:00 PM	57.37	Not valid
	1:00 PM	62.56	Not valid
	2:00 PM	60.21	
	3:00 PM	65.06	
	4:00 PM	63.19	
	5:00 PM	66.17	
	6:00 PM	63.97	Not valid
	7:00 PM	67.09	Not valid
	8:00 PM	67.03	Not valid
	9:00 PM	61.37	Not valid
	10:00 PM	49.79	Not valid
	11:00 PM	50.75	
July 7, 2012	12:00 AM	48.54	Not valid
	1:00 AM	49.67	Not valid
	2:00 AM	49.35	
	3:00 AM	48.26	
	4:00 AM	47.90	
	5:00 AM	58.99	
	6:00 AM	64.41	
	7:00 AM	66.28	
	8:00 AM	67.31	
	9:00 AM	64.44	
	10:00 AM	63.56	
	11:00 AM	55.74	
	12:00 PM	61.00	Not valid

Table 8: Weather conditions for monitoring station R2 at the Meadowbank site. Data for which wind speed > 4.17 m/s or relative humidity > 90% were filtered out for L_{eq} calculations.

Date	Start Time	Air Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction (deg)	Filtered Out?
July 5, 2012	12:00 PM	14.87	58.69	3.126	130.9	
	1:00 PM	15.57	59.16	2.78	150.1	
	2:00 PM	16.32	54.09	2.905	131.8	
	3:00 PM	16.44	52.23	2.036	159.6	
	4:00 PM	17.17	50.3	2.683	126.4	
	5:00 PM	17.47	44.86	1.55	170.3	
	6:00 PM	18.04	41.58	1.423	239.3	
	7:00 PM	18.75	40.96	1.014	236.5	
	8:00 PM	19.08	43.53	1.051	244.8	
	9:00 PM	18.84	44.42	1.021	240.4	
	10:00 PM	18.49	55.24	2	212.4	
	11:00 PM	15.43	65.6	3.313	235.8	
July 6, 2012	12:00 AM	14.19	63.71	3.241	272.2	
	1:00 AM	14.19	68.45	3.774	279.9	
	2:00 AM	12.83	66.17	2.182	263	
	3:00 AM	11.98	72.33	3.24	263.4	
	4:00 AM	11.34	72.94	2.889	282.3	
	5:00 AM	11.57	72.33	1.872	263.5	
	6:00 AM	11.88	72.02	1.26	262.4	
	7:00 AM	13.1	73	1.591	245.1	
	8:00 AM	14.26	62.63	1.576	275	
	9:00 AM	15.13	66.79	2.018	299	
	10:00 AM	16.29	59.11	2.665	309.6	
	11:00 AM	17.59	53.01	3.185	330.6	
	12:00 PM	18.81	42.83	3.367	344.8	
	1:00 PM	19.78	37.31	3.237	337.9	
	2:00 PM	20.25	34.23	3.521	313.9	
	3:00 PM	20.71	38.76	3.86	318.6	
	4:00 PM	20.79	40.11	3.544	304.9	
	5:00 PM	21.04	35.28	3.512	312.6	
	6:00 PM	21.53	37.85	4.25	324.2	y
	7:00 PM	21	38.26	4.614	333	y
	8:00 PM	20.4	43.43	5.203	347.9	y
	9:00 PM	18.99	43.47	5.315	351.8	y

Date	Start Time	Air Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction (deg)	Filtered Out?
	10:00 PM	17.75	50.74	4.909	5.874	y
	11:00 PM	16.26	54.64	3.628	15.18	
July 7, 2012	12:00 AM	14.99	58.3	4.964	26.57	y
	1:00 AM	13.84	60.82	4.866	27.81	y
	2:00 AM	12.53	66.31	4.066	22.57	
	3:00 AM	11.54	68.13	3.689	18.75	
	4:00 AM	9.81	79.55	2.455	336.2	
	5:00 AM	8.42	75.7	2.458	315.7	
	6:00 AM	8.89	73.03	2.672	314.1	
	7:00 AM	10.8	63.17	3.489	331.6	
	8:00 AM	12.08	61.3	4.103	348.5	
	9:00 AM	13.64	57.98	4.089	3.843	
	10:00 AM	15.05	49.41	3.482	2.368	
	11:00 AM	16.14	46.01	3.402	18.57	
	12:00 PM	16.94	40.84	2.64	44.5	

4 SUMMARY

4.1 DAYTIME, NIGHTTIME AND 24 HR L_{EQ}

L_{eq} values were calculated for daytime (7am-11pm), nighttime (11pm-7am), 1 hr (10pm-11pm) and 24 hr time periods based on Health Canada recommendations (as in Golder, 2012). These L_{eq} values and the total hours of valid data available for the calculations are shown in Table 9. According to Alberta's ERCB Directive 038 (in Golder, 2012), a minimum of three hours of valid data are considered representative of the noise environment for daytime and nighttime calculations. Although wind speeds at Meadowbank are commonly near the limit of acceptability, a sufficient number of valid datapoints were available for all sites and time periods except nighttime at R2.

Table 9: Summary of L_{eq} values for Health Canada-recommended time periods at three locations around the Meadowbank site (R1, R2, R5). Since certain data was not valid for all time points (due to set-up/take-down noises or weather conditions) the total hours used to calculate each L_{eq} are provided.

Site	Dates (2012)	$L_{eq, day}$ 7am-11pm (dBA)	Total Hours	$L_{eq, night}$ 11pm-7am (dBA)	Total Hours	$L_{eq, 1hr}$ 10pm-11pm (dBA)	$L_{eq, 24hr}$ (dBA)	Total Hours
R1	July 2-3	51.1	13	45.8	8	44.21	49.7	21
	July 3-4	57.6	15	55.3	6	46.49	57.1	21
R2	July 25-26	48.7	5	38.0	1	33.43	48.0	6
R5	July 5-6	57.5	16	56.7	8	45.54	57.4	23
	July 6-7	64.5	9	58.1	6	49.79	62.9	15

4.2 HISTORICAL COMPARISON

4.2.1 Differences in Data Analysis

Methods of data analysis were not identical in each year, and the differences are noted here.

Firstly, hourly, daytime (7am-11pm), nighttime (11pm-7am) and 24 hr L_{eq} values in the 2011 report (Golder, 2012) appear to have been calculated using the arithmetic mean of one-minute L_{eq} values, rather than the geometric mean, which would result in calculated L_{eq} values that are lower than actual, because the decibel scale is logarithmic. Values for 2011 were re-calculated as in this report (see Section 2.4) to provide comparable data. Values in 2009 and 2010 (Golder, 2010; 2011) appear to have been calculated using the geometric mean, as in the current analysis.

Secondly, it should be noted that data points measured outside of acceptable wind conditions (> 4.17 m/s) were not filtered from the analysis in 2009 and 2010 because it was determined that these were typical for the area, and no wind-induced noise in the microphone was noted. These data points were

filtered out in 2011 and 2012, as per Health Canada and Alberta Energy Resources Conservation Board guidance (described in Golder, 2012). Wind was regularly noted in sound files in 2012.

Lastly, the model of Bruel and Kjaer sound level meter used in 2012 was the same as previous years, but the specific instrument was new.

L_{eq} measurements for all time periods from 2009 - 2012 are shown in Figure 4. Daytime and nighttime sound levels are discussed in more detail below. It should be recalled that because of the logarithmic scale, an increase of 3 dB represents an approximate doubling of sound pressure.

4.2.2 R1

Calculated daytime L_{eq} values at R1 (mean = 55 dB) were similar to 2009 (57 dB), but higher than 2010 (42 dB) and 2011 (47 dB). Nighttime values at this location (mean = 53 dB) were higher than previously recorded (41 dB in 2009, 2010 and 2011), which may have been due to construction of the nearby north cell diversion ditch, which occurred during the monitoring event. Sound files were reviewed, and construction sounds were audible overnight.

4.2.3 R2

Calculated noise levels for all time periods were similar to, or lower than previous years.

4.2.4 R5

Calculated daytime L_{eq} values at R5 (mean = 62 dB) were higher than 2009 (57 dB), 2010 (58 dB), and 2011 (mean = 45 dB). Similarly, nighttime values for both sampling periods in 2012 (mean = 57 dB) were higher than previously recorded in 2009 (45 dB), 2010 (42 dB), and 2011 (42 dB). Sound files were reviewed, and distant construction noise was prominent throughout the daytime hours, and particularly during the night of the second monitoring period.

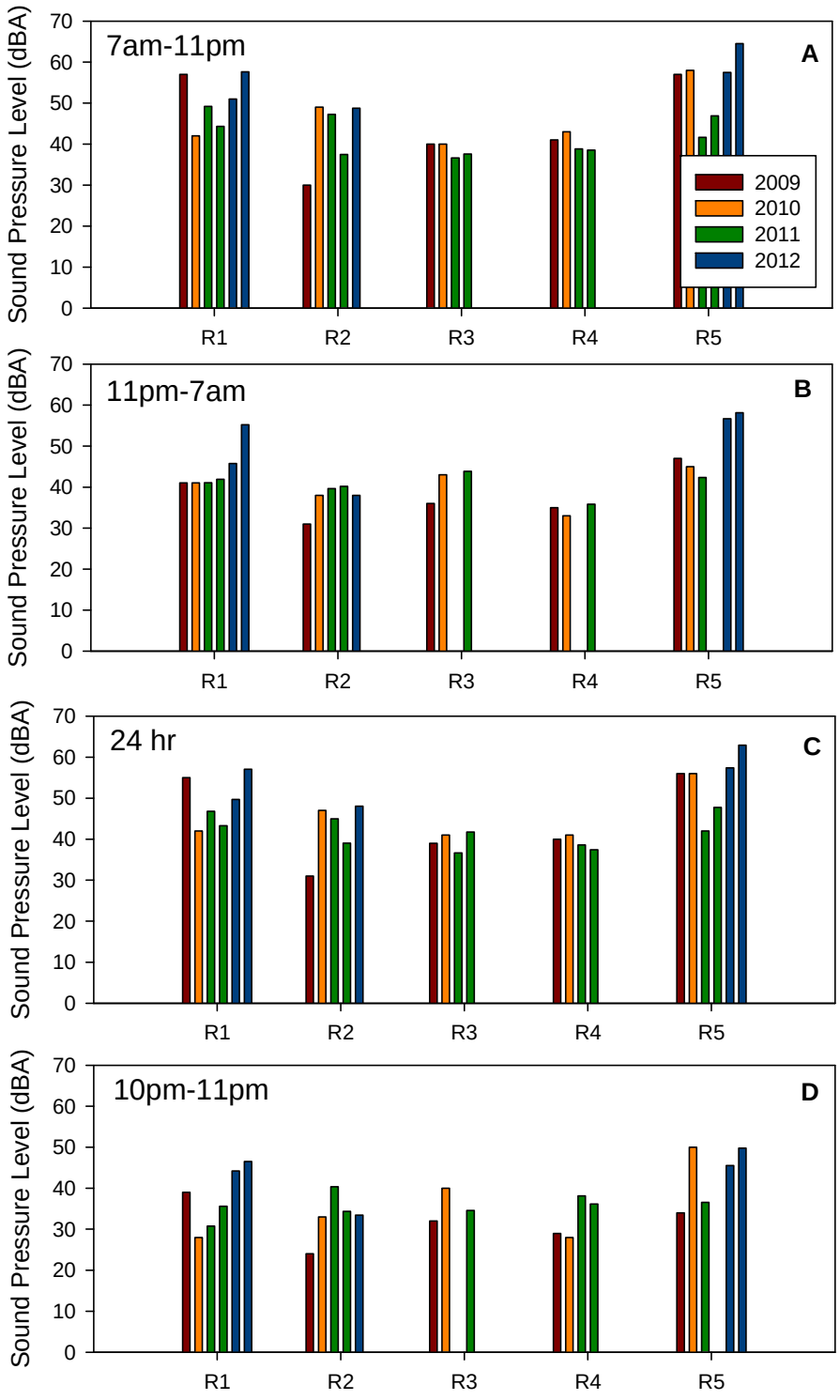


Figure 4: L_{eq} values for various Health Canada-recommended time periods, calculated from 1 min L_{eq} values collected at Meadowbank locations R1 – R5 in 24-hr surveys in 2010 - 2012. One column is shown for each 24-hr survey.

5 RECOMMENDATIONS

- Noise level monitoring should continue in 2013 at all five locations after professional calibration of the instrument.
- Specific activities occurring in the vicinity during monitoring events should be noted to help identify possible noise sources.
- Trends in noise levels in should be re-examined in 2013 (particularly nighttime) to determine whether values continue to increase. If values are sustained above the PSL (55 dB) as a result of mine-related activities for an unreasonable period of time, additional steps should be taken to mitigate noise levels (per the Noise Management and Abatement Plan, 2009).
- Any audible noises from the instrument itself (possibly caused by movement of the tripod) should be noted upon set-up, and mitigated if possible.

6 REFERENCES

Golder Associates (Golder), 2012. 2011 Noise Monitoring, Meadowbank Division, Nunavut. Prepared for Agnico-Eagle Mines Ltd. February, 2012.

Golder Associates (Golder), 2011. 2010 Noise Monitoring, Meadowbank Division, Nunavut. Prepared for Agnico-Eagle Mines Ltd. March 8, 2011.

Golder Associates (Golder), 2010. 2010 Noise Monitoring, Meadowbank Division, Nunavut. Prepared for Agnico-Eagle Mines Ltd. February 4, 2010.

AEM, 2009. Noise Management and Abatement Plan. Meadowbank Gold Project. Version 1. September, 2009.

APPENDIX A

Site Photos

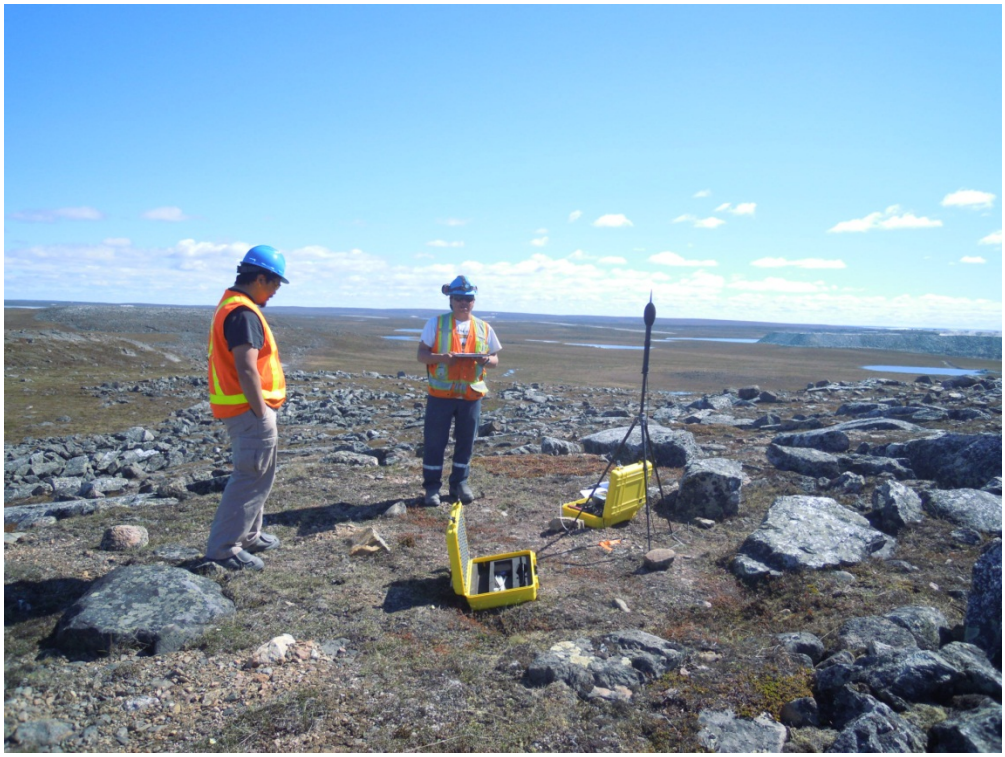


Figure -Apx 1: Monitoring location R1

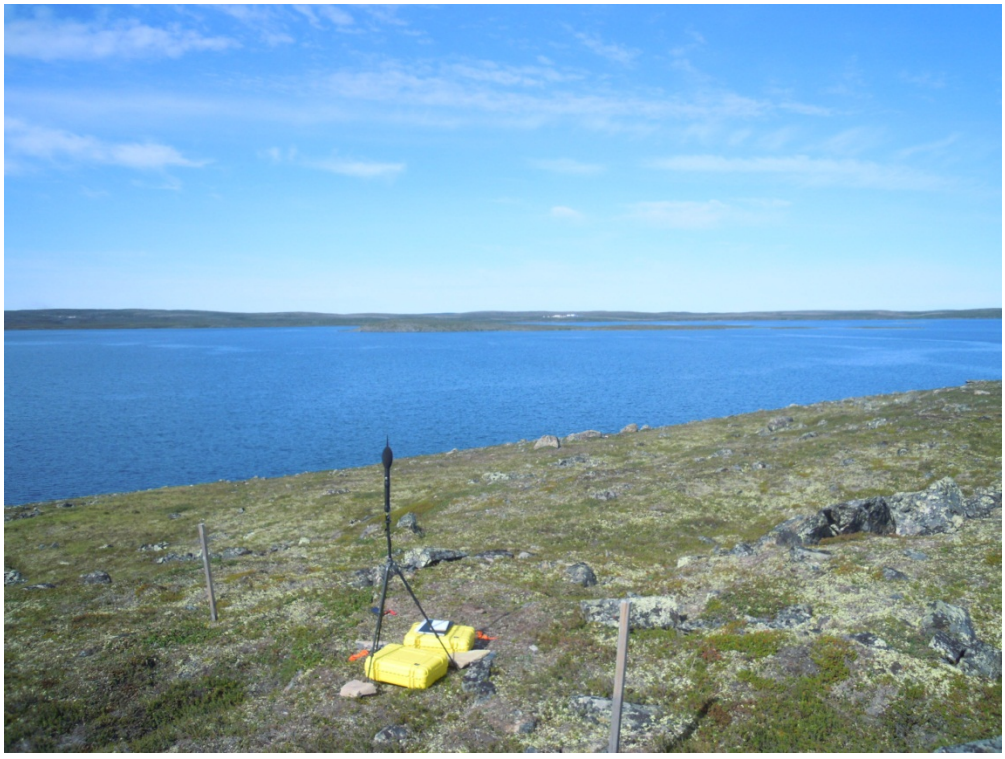


Figure -Apx 2: Monitoring location R2

Figure -Apx 3: Monitoring location R5.

APPENDIX B

Field Logs

CARD #2

MONITORING STARTS

Operator:	Martin Theriault
Location:	R1 Emulsion
Noise Meter Start Time:	11h54
Date:	2012-07-02
Calibration complete ?:	Y
Sensitivity	Y 48.88
Derviation	0.07
Time of Calibration:	11h52
Battery Power Check:	Good / Poor
Photographs of Setup (Y/N)	Y
Photographs of Surrounding (Y/N)	Y
Check available disk memory (Y/N)	Y 3.82
Cloud cover:	cloudy / partly cloudy / sunny
Height of cloud (feet):	0-10,000 / 10,000-25,000 / 25,000 +
Air Temperature (C):	16.0
Wind Speed (km/hr):	AV 2.4 x 3.6 (8.64 km/h) max 3.8 x 3.6 = 13.68
Wind Direction:	N NE
North wind (wind blows from North)	
Barometric Pressure (kPa):	
Relative Humidity (%)	44.4 %
Precipitation:	none / drizzle / rain

GENERAL SITE DESCRIPTION

GPS Location	Latitude	Longitude	Altitude
	14W 0636876	7216829	179
Type of Ground Surface:			
Acoustic Environment:	tundra, lake		
Traffic	pick up truck plane	helicopter	
Human activities			
Animal	caribou, fox, ptarmigan		
Other noise sources	Bugs, tech, helicopter, blast ...		

MONITORING ENDS

Operator:	Martin Theriault
Record Data File Name:	
Total Monitoring Period	26h17
Noise Meter End Time:	14h07
Date:	2012-07-03
Calibration complete ?:	Y
Sensitivity	49.11
Derviation	0.04
Time of Calibration:	14h09
Check file size (GB)	
Battery Power Check:	Good / Poor
Cloud cover:	cloudy / partly cloudy / sunny
Height of cloud (feet):	0-10,000 / 10,000-25,000 / 25,000 +
Air Temperature (C):	12.8
Wind Speed (km/hr):	7.6 x 3.6
Wind Direction:	N-NE
North wind (wind blows from North)	
Barometric Pressure (kPa):	
Relative Humidity (%)	39.2 %
Precipitation:	none / drizzle / rain
Depature Time:	14h25

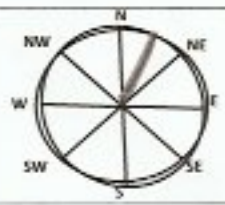
CARD #3

MONITORING STARTS

Operator:	Martin Theriault
Location:	RI Envision
Noise Meter Start Time:	
Date:	2012-07-03
Calibration complete ?:	Y
Sensitivity	48.92
Derviation	-0.03
Time of Calibration:	14h30
Battery Power Check:	Good / Poor
Photographs of Setup (Y/N)	Y
Photographs of Surrounding (Y/N)	Y
Check available disk memory (Y/N)	3.42/3.72

Cloud cover:	cloudy	partly cloudy	sunny
Height of cloud (feet):	0-10,000	10,000-25,000	25,000 +

Air Temperature (C):	22.8
Wind Speed (km/hr):	2.6 x 3.6
Wind Direction:	N-NE
North wind (wind blows from North)	



Barometric Pressure (kPa):			
Relative Humidity (%)	37.8%		
Precipitation:	none	drizzle	rain

GENERAL SITE DESCRIPTION

GPS Location	Latitude	Longitude	Altitude
	19U 0636896	7216879	179

Type of Ground Surface:	tundra, rock, lake
Acoustic Environment:	
Traffic	pick up truck, helicopter, plane
Human activities	
Animal	caribou, fox, ptarmigan
Other noise sources	

MONITORING ENDS

Operator:	Martin Theriault
Record Data File Name:	RI 20120703
Total Monitoring Period	
Noise Meter End Time:	15h55
Date:	2012-07-04
Calibration complete ?:	Y
Sensitivity	48.81
Derviation	-0.02
Time of Calibration:	15h57
Check file size (GB)	
Battery Power Check:	Good / Poor

Cloud cover:	cloudy	partly cloudy	sunny
Height of cloud (feet):	0-10,000	10,000-25,000	25,000 +

Air Temperature (C):	19.5
Wind Speed (km/hr):	1.0 x 3.6 = 3.6
Wind Direction:	
North wind (wind blows from North)	Nowind

Barometric Pressure (kPa):			
Relative Humidity (%)	33.3		
Precipitation:	none	drizzle	rain
Depature Time:	16h00		

MONITORING STARTS

Operator	M. Theriault
Location	R-2
Noise Meter Start Time	10h50
Date	2012-07-25
Calibration complete ?	Y
Sensitivity	48.88
Deviation	0.07
Time of Calibration	10h47
Battery Power Check	Good / Poor
Photographs of Setup (Y/N)	
Photographs of Surrounding (Y/N)	
Check available disk memory (Y/N)	
Cloud cover	cloudy / partly cloudy / sunny
Height of cloud (feet)	0-10,000 / 10,000-25,000 / 25,000+
Air Temperature (C)	15.5
Wind Speed (km/hr)	1.44
Wind Direction	
North wind (wind blows from North)	North west
Barometric Pressure (kPa)	
Relative Humidity (%)	51.0
Precipitation	none / drizzle / rain

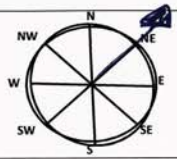
GENERAL SITE DESCRIPTION

GPS Location	Latitude	Longitude	Altitude
	0636795	7214435	
Type of Ground Surface	tundra		
Acoustic Environment			
Traffic	lake		
Human activities	plane, helicopter		
Animal	hare, fox		
Other noise sources			

MONITORING ENDS

Operator	M Theriault
Record Data File Name	R2 20120725
Total Monitoring Period	24:16
Noise Meter End Time	11h06
Date	2012-07-26
Calibration complete ?	Y
Sensitivity	50.23
Deviation	0.22
Time of Calibration	11h08
Check file size (GB)	
Battery Power Check	Good / Poor
Cloud cover	cloudy / partly cloudy / sunny
Height of cloud (feet)	0-10,000 / 10,000-25,000 / 25,000+
Air Temperature (C)	
Wind Speed (km/hr)	Av. 8.7 24.48 Km/hr
Wind Direction	
North wind (wind blows from North)	North
Barometric Pressure (kPa)	
Relative Humidity (%)	60.1
Precipitation	none / drizzle / rain
Departure Time	11h10

MONITORING STARTS

Operator:	CBR \ RA R3		
Location:			
Noise Meter Start Time:	10h10		
Date:	2012/09/08		
Calibration complete ?:	YES.		
Sensitivity			
Derviation	113.7		
Time of Calibration:	10h05		
Battery Power Check:	Good		Poor
Photographs of Setup (Y/N)	Y		
Photographs of Surrounding (Y/N)	Y		
Check available disk memory (Y/N)	OK.		
Cloud cover:	cloudy	partly cloudy	sunny
Height of cloud (feet):	0-10,000	10,000-25,000	25,000 +
Air Temperature (C):	13°C		
Wind Speed (km/hr):	4 m/sec.		
Wind Direction: North wind (wind blows from North)			
Barometric Pressure (kPa):			
Relative Humidity (%)			
Precipitation:	none	drizzle	rain

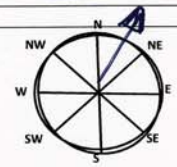
GENERAL SITE DESCRIPTION

GPS Location	Latitude	Longitude	Altitude
	14W0641104	72 14427	
Type of Ground Surface:	TUNDRA		
Acoustic Environment:			
Traffic	HELICOPTER		
Human activities	RADIO, SETUP		
Animal	BIRDS, ETC.		

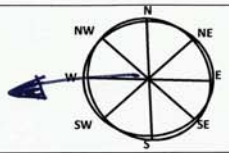
Other noise sources

WIND.

MONITORING ENDS

Operator:	CBR \ RA		
Record Data File Name:			
Total Monitoring Period			
Noise Meter End Time:	11h00		
Date:	2012/09/09		
Calibration complete ?:	Y		
Sensitivity			
Derviation	113.9		
Time of Calibration:	11h05		
Check file size (GB)			
Battery Power Check:	Good		Poor
Cloud cover:	cloudy	partly cloudy	sunny
Height of cloud (feet):	0-10,000	10,000-25,000	25,000 +
Air Temperature (C):			
Wind Speed (km/hr):	5.7 m/sec.		
Wind Direction: North wind (wind blows from North)			
Barometric Pressure (kPa):			
Relative Humidity (%)			
Precipitation:	none	drizzle	rain
Depature Time:	2012/09/09 11h05		

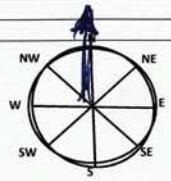
MONITORING STARTS

Operator:	CBR / RA RH		
Location:			
Noise Meter Start Time:			
Date:	2012/09/10		
Calibration complete ?:			
Sensitivity	/		
Derviation	113.9		
Time of Calibration:	10h13		
Battery Power Check:	(Good)		Poor
Photographs of Setup (Y/N)	Y		
Photographs of Surrounding (Y/N)	Y		
Check available disk memory (Y/N)	Q		
Cloud cover:	cloudy	(partly cloudy)	sunny
Height of cloud (feet):	0-10,000	(10,000-25,000)	25,000 +
Air Temperature (C):	8.5°C		
Wind Speed (km/hr):	2.8 m/sec		
Wind Direction: North wind (wind blows from North)			
Barometric Pressure (kPa):			
Relative Humidity (%)			
Precipitation:	(none)	drizzle	rain

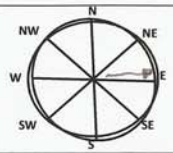
GENERAL SITE DESCRIPTION

GPS Location	Latitude	Longitude	Altitude
	4W0639990	7218810	
Type of Ground Surface:	TUNDRA		
Acoustic Environment:			
Traffic	HELICOPTER		
Human activities	RADIO - SETUP		
Animal	BIRD, ETC.		
Other noise sources			
WIND			

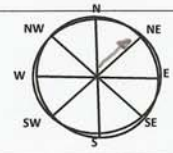
MONITORING ENDS

Operator:	CBR/RA/TT		
Record Data File Name:			
Total Monitoring Period			
Noise Meter End Time:	00h00		
Date:	2012/09/12		
Calibration complete ?:			
Sensitivity			
Derviation	113.7		
Time of Calibration:			
Check file size (GB)	Q		
Battery Power Check:	(Good)		(Poor)
Cloud cover:	(cloudy)	partly cloudy	sunny
Height of cloud (feet):	(0-10,000)	10,000-25,000	25,000 +
Air Temperature (C):	4°C		
Wind Speed (km/hr):	3.0 m/sec		
Wind Direction: North wind (wind blows from North)			
Barometric Pressure (kPa):			
Relative Humidity (%)			
Precipitation:	(none)	drizzle	rain
Depature Time:	2012/09/12 10h35		

Card #4

MONITORING STARTS			
Operator: Jamie Kataluk			
Location: RS Exploration camp			
Noise Meter Start Time: 10:16			
Date: 2012-07-05			
Calibration complete ?: Yes			
Sensitivity 49.08			
Derviation 0.05			
Time of Calibration: 10:32			
Battery Power Check:	Good		Poor
Photographs of Setup (Y/N)			
Photographs of Surrounding (Y/N)			
Check available disk memory (Y/N) 3.72GB/3.72GB			
Cloud cover:	cloudy	partly cloudy	sunny
Height of cloud (feet):	0-10,000	10,000-25,000	25,000 +
Air Temperature (C): 14			
Wind Speed (km/hr): ~~0.3 x 3.6 average~~ average 2.5x3.6=9			
Wind Direction: East North wind (wind blows from North)			
Barometric Pressure (kPa):			
Relative Humidity (%) 63.2			
Precipitation: none	none	drizzle	rain

GENERAL SITE DESCRIPTION			
GPS Location 14W 0633781 7214493	Latitude	Longitude	Altitude
	14W 0633781	7214493	136m
Type of Ground Surface: tundra			
Acoustic Environment:			
Traffic			
Human activities			
Animal			
Other noise sources birds helicopter plane			

MONITORING ENDS			
Operator: Jamie Kataluk			
Record Data File Name:			
Total Monitoring Period			
Noise Meter End Time: 12:25			
Date: 2012-07-06			
Calibration complete ?: Yes			
Sensitivity 49.98			
Derviation 0.10			
Time of Calibration: 12:26			
Check file size (GB)			
Battery Power Check:	Good		Poor
Cloud cover:	cloudy	partly cloudy	sunny
Height of cloud (feet):	0-10,000	10,000-25,000	25,000 +
Air Temperature (C): 20.0			
Wind Speed (km/hr): 2.5x3.6=			
Wind Direction: North wind (wind blows from North) NE Wind			
Barometric Pressure (kPa):			
Relative Humidity (%) 48.0			
Precipitation:	none	drizzle	rain
Depature Time:			

Card #5

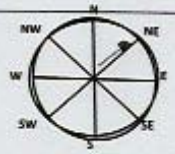
MONITORING STARTS

Operator: Jamie Kataluk	
Location: RS Exploration Camp	
Noise Meter Start Time:	
Date: 2012-07-06	
Calibration complete ?: Yes	
Sensitivity 48.73 mv/PA	
Derviation -0.04 dB	
Time of Calibration:	
Battery Power Check:	Good / Poor
Photographs of Setup (Y/N)	
Photographs of Surrounding (Y/N)	
Check available disk memory (Y/N) 3.72/3.72 Gb	
Cloud cover:	cloudy / partly cloudy / sunny
Height of cloud (feet):	0-10,000 / 10,000-25,000 / 25,000 +
Air Temperature (C): 20.9	
Wind Speed (km/hr): 12.1	
Wind Direction: North wind (wind blows from North)	
Barometric Pressure (kPa):	
Relative Humidity (%) 34.5	
Precipitation: none	none / drizzle / rain

GENERAL SITE DESCRIPTION

GPS Location	Latitude	Longitude	Altitude
	14W 0683781	7214493	136m
Type of Ground Surface: tundra			
Acoustic Environment:			
Traffic helicopter, light/heavy vehicles			
Human activities			
Animal birds			
Other noise sources			

MONITORING ENDS

Operator: Jamie Kataluk	
Record Data File Name: RS 20120706	
Total Monitoring Period	
Noise Meter End Time: 12:30	
Date: 2012-07-07	
Calibration complete ?:	
Sensitivity 48.93	
Derviation 0.04 dB	
Time of Calibration: 12:32	
Check file size (GB)	
Battery Power Check:	Good / Poor
Cloud cover:	cloudy / partly cloudy / sunny
Height of cloud (feet):	0-10,000 / 10,000-25,000 / 25,000 +
Air Temperature (C): 18.4	
Wind Speed (km/hr): 2.9 x 3.6 = 10.44 km	
Wind Direction: North wind (wind blows from North)	
Barometric Pressure (kPa):	
Relative Humidity (%) 44.8	
Precipitation:	none / drizzle / rain
Departure Time: 12:40	