Appendix G11

Report: 2014 Noise Monitoring Report

AGNICO EAGLE

MEADOWBANK GOLD PROJECT

2014 Noise Monitoring Report

In Accordance with NIRB Project Certificate No.004

Prepared by:
Agnico Eagle Mines Limited – Meadowbank Division

March, 2015

EXECUTIVE SUMMARY

The 2014 noise monitoring program at Meadowbank was conducted in support of the Noise Monitoring and Abatement Plan (AEM, 2013). The objective of the 2013 program was to measure noise levels at five previously determined monitoring locations around the Meadowbank site, over at least two 24 h periods.

While monitoring was conducted for a total of 15 days, the amount of available data was reduced due to filtering of the data recorded outside optimal weather conditions. Total usable hours of data for each station ranged from 17 – 40 hours.

Since noise levels vary constantly over time, Meadowbank's noise monitoring instruments measure acoustical energy near-continuously and report a single number for each minute, representing the "equivalent sound level" (L_{eq}). Daytime, nighttime, 10-11pm and 24 h L_{eq} values are shown for each monitoring location in Table 1.

No L_{eq} values exceeded the daytime target sound level of 55 dBA. Two values exceeded the nighttime target sound level of 45 dBA, at R1 and R5 (47.9 dBA each). These values were well within the range of those observed in previous years, and were likely a result of increased helicopter activity associated with exploration projects during the monitoring time period, since these two stations are closest to the helicopter route. An examination of the data for these time periods indicated that for both locations, L_{eq} values for only the 5 am and 6 am hours exceeded 45 dBA, with a total of 8-9 minutes exceeding 45 dBA during these hours.

AEM aims to increase noise monitoring in 2015 to include two monitoring rounds of 3-4 days per station.

Table 1. Daytime, nighttime, 10-11pm and 24 h L_{eq} values for monitoring locations R1 – R5 and total hours of valid data available to calculate each L_{eq}. Values exceeding target sound levels (55 dBA daytime; 45 dBA nighttime) are shaded grey.

Site	Dates (2014)	$L_{eq,\ day}$ 7am-11pm (dBA)	Total Hours	$L_{eq,\ night}$ 11pm-7am (dBA)	Total Hours	$L_{eq,\ 1\ h}$ 10pm-11pm (dBA)	$L_{eq,\ 24\ h}$ (dBA)	Total Hours
R1	02/08	-	-	-	-	-	-	-
	03/08	44.0	8	44.2	6	-	43.8	9
	04/08	43.2	8	47.9	8	34.1	43.4	15
	05/08	42.6	7	-	-	-	46.4	14
R2	05/08	48.1	3	-	-	-	48.1	3
	06/08	-	-	42.4	8	-	-	-
	07/08	-	-	38.2	4	-	42.3	9
	08/08	-	-	-	-	-	38.7	3
	09/08	-	-	-	-	-	-	-
R3	09/08	36.0	10	40.6	8	40.3	36.0	11
	10/08	35.7	13	35.4	4	-	38.4	21
	11/08	32.9	3	-	-	-	33.3	6
R4	11/08	-	-	-	-	-	-	-
	12/08	35.8	6	40.2	8	29.8	35.3	7
	13/08	41.2	6	-	-	-	41.0	13

Site	Dates (2014)	$L_{eq,\ day}$ 7am-11pm (dBA)	Total Hours	$L_{eq,\ night}$ 11pm-7am (dBA)	Total Hours	$L_{eq,\ 1\ h}$ 10pm-11pm (dBA)	$L_{eq,\ 24\ h}$ (dBA)	Total Hours
R5	13/08	-	-	-	-	-	-	-
	14/08	-	-	-	-	-	-	-
	15/08	54.4	7	47.9	8	28.3	53.9	8
	16/08	52.3	16	-	-	52.9	51.4	23
	17/08	-	-	-	-	-	-	-

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SECTION 1 • INTRODUCTION

Since 2008, Agnico Eagle Mines Ltd. (AEM) has conducted outdoor noise monitoring at the Meadowbank site, near Baker Lake, Nunavut, in support of the Noise Abatement and Management Plan (AEM, 2009; 2013). The objective of this monitoring program is to measure representative noise levels at the perimeter of the mine, and to inform the implementation of noise mitigation measures. Although no residential receptors are nearby, AEM aims to meet target sound levels identified in Environment Canada's "Environmental Code of Practice for Metal Mines (2009). These values are 55 dBA (daytime) and 45 dBA (nighttime).

To fulfill these objectives, AEM aims to conduct at least two 24 h surveys of ambient outdoor noise each year in five representative locations.

1.1 MONITORING LOCATIONS

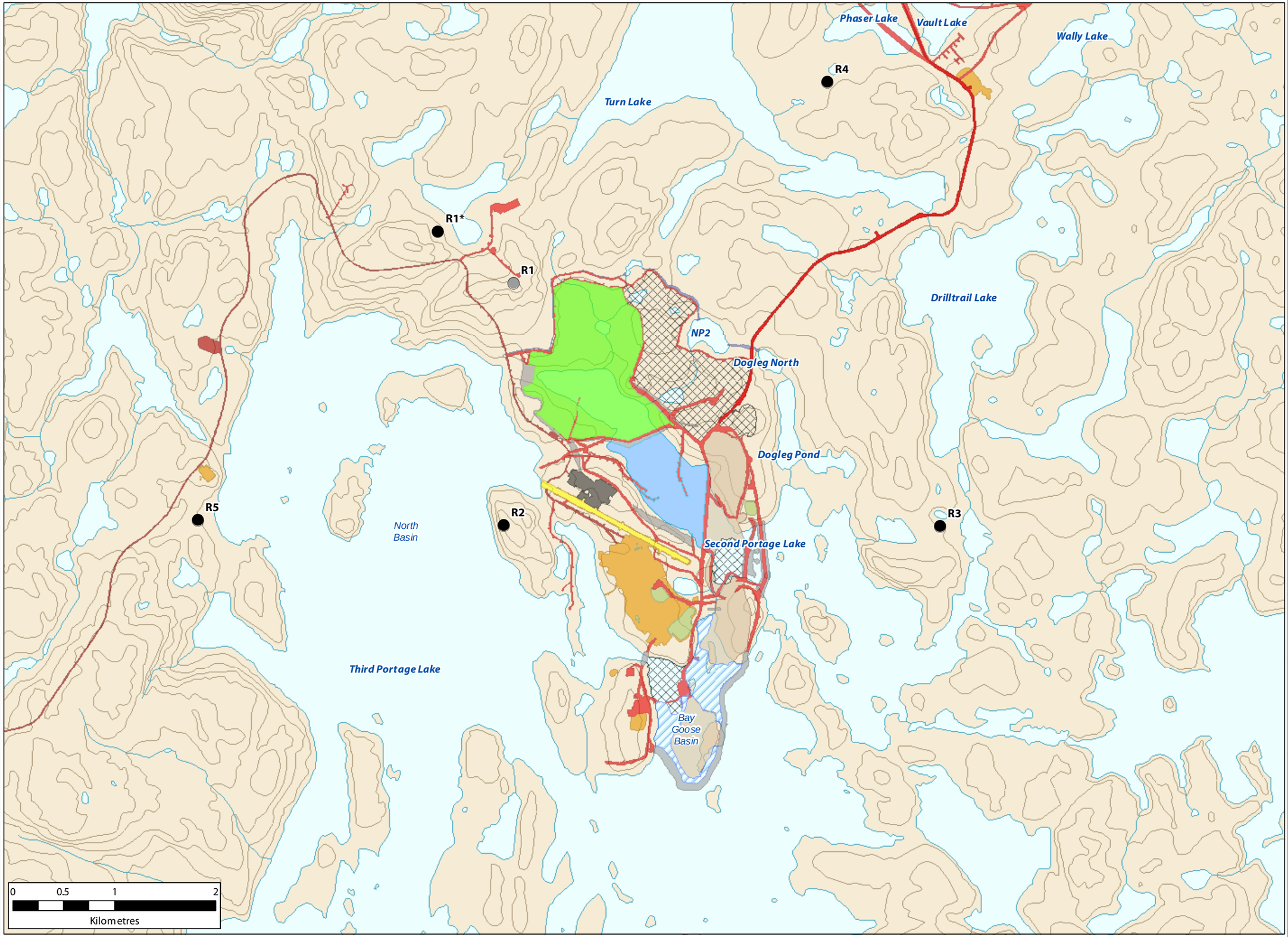
In 2014, a total of 15 days of monitoring occurred, and 2 – 4 days of data were collected for all sites.

Noise monitoring station R1 was moved approximately 1400 m north in 2014 due to construction of an access road adjacent to the original location. This change was proposed in the 2013 Noise Monitoring and Abatement Plan. Other locations in 2014 were the same as previous years, and were located as recommended in the original Noise Abatement and Management Plan (2009). UTM coordinates are provided in Table 2, and are shown in relation to 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.

Monitoring Location	Easting	Northing	Dates
R1	636896	7216829	-
R1*	636149	7217332	August 2 - 5
R2	636795	7214435	August 5 - 9
R3	641104	7214427	August 9 - 11
R4	639990	7218810	August 11 - 13
R5	633781	7214493	August 13 - 17

**New location in 2014*



Legend

- Noise Monitoring Location
  ** - new 2014 locations R1 - R5*
- Former (R1) Noise Monitoring Location

2014 Mine Plan

- Quarry
- AWPAR Quarry
- Dewatered Lake
- Portage Attenuation Facility
- Tailings Storage Facility
- Roads
- AWPAR
- Dikes
- Diversion Ditch
- Stockpiles
- Pits
- Facility
- Airstrip
- Waste Dump

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 2015

SCALE: 1:35,000

DRAWN BY: LW

CHECKED BY: MAY

FIGURE:

1

1.1.1 R1

Location R1 was formerly approximately 700 m south of the explosive storage area, and 400 m northeast of the all-weather access road. A spur road and a storage area were constructed within 100 m of this location in 2011. As a result, AEM proposed to move this station approximately 700 m northwest of the explosives storage area to better represent the originally intended orientation. The specific location was confirmed during 2014 field season, and is shown on Figure 1.

1.1.2 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.

1.1.3 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.

1.1.4 R4

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

1.1.5 R5

Location R5 is approximately 500 m south of the exploration camp and 300 m east of the all-weather access road. 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.

SECTION 2 • METHODS

In 2014, AEM field staff conducted noise surveys at each of the locations described in Section 1.1. These surveys provide data on average noise levels during a typical day, as well as variability of noise levels within the day. Since wind speeds in the area tend to exceed preferred levels for noise monitoring (see Section 2.4), surveys for each location were planned to last 3 – 4 days each to obtain data for a minimum of 2 monitoring periods per site.

2.1 SOUND LEVEL METER

For all stations 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 monitoring event 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.

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.

The Alberta Energy Resource Conservation Board (ERCB, 2007) has published preferred weather conditions for data to be used in noise complaint investigations because wind and precipitation can affect noise levels. High winds can obscure noises at a distance, but can also cause elevated readings due to interference with the microphone. Based on these guidelines, noise monitoring data was filtered to remove measurements collected outside of conditions where wind speed > 4.17 m/s or relative humidity > 90% (assuming precipitation occurred) prior to data analysis. In 2014, wind speeds commonly exceeded preferred levels, and wind-induced interference was frequently audible in recorded noise files, so the available data was significantly reduced as a result of this filtering.

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.

All datapoints associated with the first and last hour of measurement were 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, daytime (7am-11pm), nighttime (11pm-7am) and 24 h L_{eq} values, as previously. L_{eq} values for each time period were calculated as the geometric mean of filtered one-minute L_{eq} values.

SECTION 3 • RESULTS

3.1 R1

One-minute filtered and unfiltered L_{eq}, maximum (L_{max}) and minimum (L_{min}) values over the monitoring period are shown in Figure 2. 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, relative humidity > 90%). Filtered values were used in subsequent analyses, but unfiltered values are provided for reference. For station R1, despite 72 h of monitoring, a total of 40 h of data was available after filtering.

Hourly L_{eq} values were calculated for all data as described in Section 2.4, and are shown in Table 3, and the hours filtered out for subsequent analyses are identified.

Weather data for noise monitoring dates at R1 is shown in Table 4. Hourly average wind speeds exceeded 4.17 m/s for nearly half of the monitoring period, with gusts up to 12.68 m/s.

Audible noises noted in the field log at this location include traffic and birds. Activities ongoing during monitoring which may have contributed to noise at this station include increased helicopter traffic due to exploration activities, and maintenance work being done on the nearby communication tower.

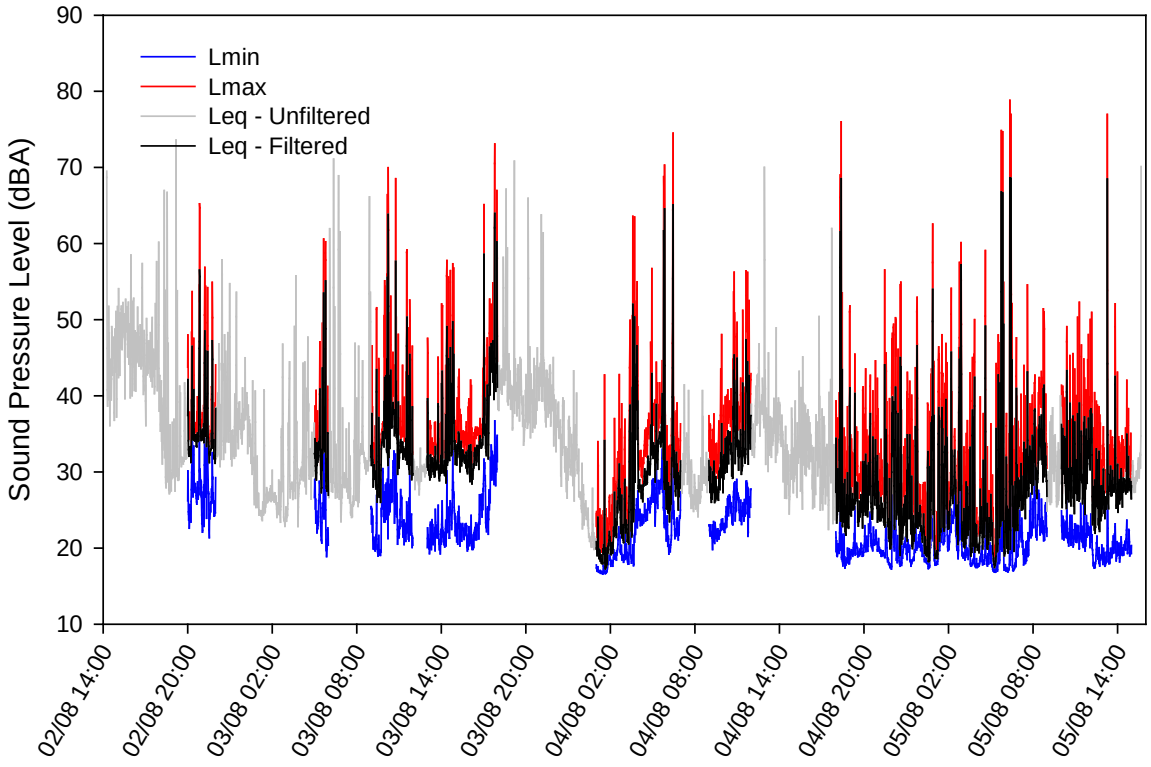


Figure 2. One-minute L_{eq}, L_{max} and L_{min} values recorded at monitoring station R1 at the Meadowbank site. Filtered data excludes those measurements taken outside of optimal conditions (set-up, take-down, wind > 4.17 m/s, RH > 90%). At R1, all data was filtered out due to non-optimal weather conditions.

Table 3. Hourly L_{eq} values for monitoring station R1 at the Meadowbank site and hours filtered out due to set-up, take-down or non-optimal weather conditions.

Date	Start time	L_{eq}-1h	Filtered
02/08/2014	2:00:00 PM	55.96	y
	3:00:00 PM	49.72	y
	4:00:00 PM	47.93	y
	5:00:00 PM	47.91	y
	6:00:00 PM	52.33	y
	7:00:00 PM	55.92	y
	8:00:00 PM	42.85	
	9:00:00 PM	38.80	
	10:00:00 PM	45.04	y
	11:00:00 PM	40.43	y
03/08/2014	12:00:00 AM	36.37	y
	1:00:00 AM	29.11	y
	2:00:00 AM	32.50	y
	3:00:00 AM	39.80	y
	4:00:00 AM	36.27	y
	5:00:00 AM	41.33	
	6:00:00 AM	56.22	y
	7:00:00 AM	33.18	y
	8:00:00 AM	49.05	y
	9:00:00 AM	33.89	
	10:00:00 AM	48.07	
	11:00:00 AM	37.36	
	12:00:00 PM	30.16	y
	1:00:00 PM	32.08	
	2:00:00 PM	39.47	
	3:00:00 PM	32.39	
	4:00:00 PM	32.54	
	5:00:00 PM	50.61	
	6:00:00 PM	51.33	y
	7:00:00 PM	53.30	y
	8:00:00 PM	49.23	y
	9:00:00 PM	49.14	y
	10:00:00 PM	35.72	y
	11:00:00 PM	33.18	y
04/08/2014	12:00:00 AM	23.84	y
	1:00:00 AM	21.36	
	2:00:00 AM	24.10	
	3:00:00 AM	40.11	
	4:00:00 AM	31.34	
	5:00:00 AM	49.26	
	6:00:00 AM	47.85	
	7:00:00 AM	31.70	y

Date	Start time	L_{eq}-1h	Filtered
	8:00:00 AM	30.07	y
	9:00:00 AM	29.31	
	10:00:00 AM	35.45	
	11:00:00 AM	37.66	
	12:00:00 PM	52.69	y
	1:00:00 PM	37.62	y
	2:00:00 PM	33.37	y
	3:00:00 PM	35.58	y
	4:00:00 PM	35.95	y
	5:00:00 PM	47.00	y
	6:00:00 PM	51.84	
	7:00:00 PM	29.01	
	8:00:00 PM	29.56	
	9:00:00 PM	29.78	
	10:00:00 PM	34.12	
	11:00:00 PM	32.18	
05/08/2014	12:00:00 AM	38.09	
	1:00:00 AM	31.20	
	2:00:00 AM	41.25	
	3:00:00 AM	29.74	
	4:00:00 AM	32.78	
	5:00:00 AM	52.13	
	6:00:00 AM	54.77	
	7:00:00 AM	31.14	
	8:00:00 AM	33.98	
	9:00:00 AM	32.02	y
	10:00:00 AM	33.08	
	11:00:00 AM	32.03	
	12:00:00 PM	30.29	
	1:00:00 PM	50.74	
	2:00:00 PM	28.59	
	3:00:00 PM	54.00	y

Table 4. Weather conditions for monitoring station R1 at the Meadowbank site. Hours for which average wind speed > 4.17 m/s or relative humidity > 90% are indicated in grey.

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
02/08/2014	2:00:00 PM	16.56	48.9	9.17	12.13
	3:00:00 PM	16.21	46.9	8.41	11.72
	4:00:00 PM	16.44	43.8	9.19	12.49
	5:00:00 PM	16.63	42.9	8.79	12.68
	6:00:00 PM	16.93	44.4	8.31	12.09
	7:00:00 PM	16.54	50.6	5.96	9.07
	8:00:00 PM	15.52	60.9	3.50	5.21
	9:00:00 PM	15.46	59.3	3.66	5.27
	10:00:00 PM	15.62	62.0	5.29	6.86
	11:00:00 PM	13.73	84.0	5.74	10.19
03/08/2014	12:00:00 AM	14.17	76.7	4.68	6.59
	1:00:00 AM	14.36	72.8	5.78	7.78
	2:00:00 AM	13.58	78.1	5.19	6.51
	3:00:00 AM	13.32	79.1	4.73	6.06
	4:00:00 AM	12.83	80.7	4.48	6.49
	5:00:00 AM	12.46	84.8	4.02	5.72
	6:00:00 AM	12.31	91.5	4.39	8.68
	7:00:00 AM	12.25	90.1	1.55	3.31
	8:00:00 AM	12.82	90.1	3.10	4.55
	9:00:00 AM	13.18	89.0	2.76	4.27
	10:00:00 AM	14.09	86.2	2.71	4.31
	11:00:00 AM	15.39	79.2	3.52	5.35
	12:00:00 PM	16.44	74.0	4.29	5.57
	1:00:00 PM	17.41	70.0	3.57	4.72
	2:00:00 PM	18.32	65.2	3.26	4.68
	3:00:00 PM	19.32	60.2	3.57	5.66
	4:00:00 PM	19.83	59.0	3.41	6.70
	5:00:00 PM	20.03	58.1	2.76	4.74
	6:00:00 PM	19.33	71.6	5.55	9.76
	7:00:00 PM	16.83	78.8	7.50	9.13
	8:00:00 PM	15.50	74.9	6.96	8.62
	9:00:00 PM	14.43	78.5	6.44	8.51
	10:00:00 PM	13.28	74.3	7.08	9.21
	11:00:00 PM	12.88	75.3	6.29	8.08
04/08/2014	12:00:00 AM	12.55	76.9	5.04	7.00
	1:00:00 AM	11.68	84.8	3.73	5.59
	2:00:00 AM	11.39	84.0	3.54	4.55

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
	3:00:00 AM	11.46	87.1	3.27	4.67
	4:00:00 AM	11.58	80.4	3.57	5.39
	5:00:00 AM	11.36	77.7	2.91	3.80
	6:00:00 AM	11.41	79.6	2.54	3.82
	7:00:00 AM	11.22	93.0	3.25	4.78
	8:00:00 AM	11.10	90.5	3.15	4.84
	9:00:00 AM	11.60	84.7	4.16	5.63
	10:00:00 AM	12.15	83.6	3.75	5.12
	11:00:00 AM	12.59	80.1	4.15	5.84
	12:00:00 PM	12.51	85.7	4.67	7.02
	1:00:00 PM	12.18	83.9	5.41	7.06
	2:00:00 PM	12.56	71.3	5.14	6.90
	3:00:00 PM	13.27	66.0	4.76	6.90
	4:00:00 PM	13.28	64.7	4.46	7.17
	5:00:00 PM	13.11	60.5	4.40	6.31
	6:00:00 PM	13.10	60.9	3.91	6.53
	7:00:00 PM	13.31	57.6	3.55	5.41
	8:00:00 PM	13.44	56.2	3.10	6.06
	9:00:00 PM	13.60	55.6	3.55	5.47
	10:00:00 PM	12.72	65.1	3.47	4.70
	11:00:00 PM	11.34	72.6	2.95	4.00
05/08/2014	12:00:00 AM	10.25	75.8	1.27	2.18
	1:00:00 AM	10.08	82.1	1.00	1.47
	2:00:00 AM	9.51	85.5	0.64	1.24
	3:00:00 AM	9.32	85.1	1.39	1.88
	4:00:00 AM	9.41	79.0	1.64	2.41
	5:00:00 AM	9.14	85.1	1.89	2.71
	6:00:00 AM	9.48	80.6	2.26	3.12
	7:00:00 AM	10.02	84.3	2.84	4.37
	8:00:00 AM	10.89	83.3	3.50	6.68
	9:00:00 AM	11.94	74.3	4.29	6.43
	10:00:00 AM	12.59	74.7	3.93	5.94
	11:00:00 AM	13.36	68.9	3.81	5.78
	12:00:00 PM	14.22	59.7	2.96	5.88
	1:00:00 PM	14.77	55.7	3.23	5.59
	2:00:00 PM	15.02	50.9	2.42	4.18
	3:00:00 PM	15.25	51.9	2.04	3.21

3.2 R2

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 5, and data points filtered out from subsequent calculations are indicated.

Weather data for noise monitoring dates at R2 is shown in Table 6. Wind exceeded 4.17 m/s for the majority of the monitoring period, with gusts up to 12.90 m/s. Although monitoring was continued for 90 h, only 16 h of data were usable after filtering.

Audible noises noted in the field log at this location include airplanes, ground traffic, insects and birds. Activities contributing to noise at this location included regular camp activities and increased helicopter traffic due to exploration activities (landing nearby).

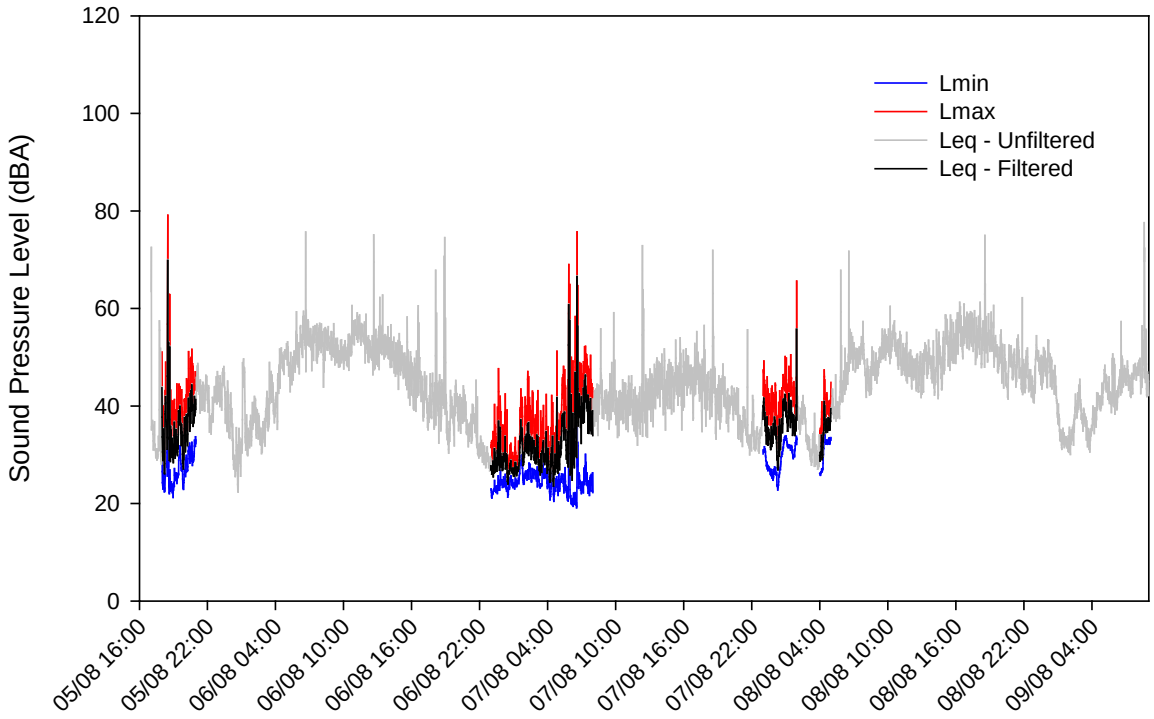


Figure 3. One-minute L_{eq}, L_{max} and L_{min} values recorded at monitoring station R2 at the Meadowbank site. Filtered data excludes those measurements taken outside of optimal conditions (set-up, take-down, wind > 4.17 m/s, RH > 90%).

Table 5. Hourly L_{eq} values for monitoring station R2 at the Meadowbank site and hours filtered out due to set-up, take-down or non-optimal weather conditions.

Date	Start time	L_{eq}-1h	Filtered
05/08/2014	5:00:00 PM	55.69	
	6:00:00 PM	52.66	
	7:00:00 PM	34.79	
	8:00:00 PM	39.06	
	9:00:00 PM	43.84	y
	10:00:00 PM	41.72	y
	11:00:00 PM	43.04	y
06/08/2014	12:00:00 AM	34.00	y
	1:00:00 AM	41.39	y
	2:00:00 AM	37.04	y
	3:00:00 AM	41.45	y
	4:00:00 AM	48.62	y
	5:00:00 AM	50.24	y
	6:00:00 AM	59.63	y
	7:00:00 AM	54.16	y
	8:00:00 AM	53.34	y
	9:00:00 AM	51.59	y
	10:00:00 AM	53.35	y
	11:00:00 AM	55.60	y
	12:00:00 PM	59.29	y
	1:00:00 PM	54.20	y
	2:00:00 PM	51.21	y
	3:00:00 PM	49.21	y
	4:00:00 PM	48.92	y
	5:00:00 PM	42.17	y
	6:00:00 PM	59.19	y
	7:00:00 PM	40.13	y
	8:00:00 PM	39.35	y
	9:00:00 PM	36.45	y
	10:00:00 PM	30.04	y
	11:00:00 PM	29.40	
07/08/2014	12:00:00 AM	28.16	
	1:00:00 AM	30.57	
	2:00:00 AM	32.38	
	3:00:00 AM	30.19	
	4:00:00 AM	30.11	
	5:00:00 AM	45.93	
	6:00:00 AM	49.68	
	7:00:00 AM	40.39	
	8:00:00 AM	43.35	y
	9:00:00 AM	44.98	y
	10:00:00 AM	41.06	y

Date	Start time	L_{eq}-1h	Filtered
	11:00:00 AM	40.69	y
	12:00:00 PM	56.17	y
	1:00:00 PM	45.83	y
	2:00:00 PM	45.26	y
	3:00:00 PM	46.80	y
	4:00:00 PM	47.19	y
	5:00:00 PM	47.61	y
	6:00:00 PM	55.35	y
	7:00:00 PM	42.73	y
	8:00:00 PM	40.63	y
	9:00:00 PM	40.13	y
	10:00:00 PM	35.79	y
	11:00:00 PM	36.15	
08/08/2014	12:00:00 AM	37.00	
	1:00:00 AM	41.26	
	2:00:00 AM	37.96	y
	3:00:00 AM	31.42	y
	4:00:00 AM	35.85	
	5:00:00 AM	51.27	y
	6:00:00 AM	55.50	y
	7:00:00 AM	51.22	y
	8:00:00 AM	47.52	y
	9:00:00 AM	51.84	y
	10:00:00 AM	53.60	y
	11:00:00 AM	50.49	y
	12:00:00 PM	48.12	y
	1:00:00 PM	49.47	y
	2:00:00 PM	50.09	y
	3:00:00 PM	54.24	y
	4:00:00 PM	56.55	y
	5:00:00 PM	55.63	y
	6:00:00 PM	59.82	y
	7:00:00 PM	53.30	y
	8:00:00 PM	49.23	y
	9:00:00 PM	50.22	y
	10:00:00 PM	46.48	y
	11:00:00 PM	49.67	y
09/08/2014	12:00:00 AM	47.83	y
	1:00:00 AM	34.56	y
	2:00:00 AM	39.21	y
	3:00:00 AM	36.77	y
	4:00:00 AM	40.38	y
	5:00:00 AM	45.29	y
	6:00:00 AM	46.32	y

Date	Start time	L_{eq}-1h	Filtered
	7:00:00 AM	46.38	y
	8:00:00 AM	61.89	y
	9:00:00 AM	44.86	y
	10:00:00 AM	65.23	y

Table 6. Weather conditions for monitoring station R2 at the Meadowbank site. Hours for which average wind speed > 4.17 m/s or relative humidity > 90% are indicated in grey.

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
05/08/2014	5:00:00 PM	14.84	60.4	1.36	3.06
	6:00:00 PM	13.47	68.8	2.70	3.88
	7:00:00 PM	12.60	78.0	2.94	4.98
	8:00:00 PM	12.07	83.4	3.24	4.96
	9:00:00 PM	11.62	90.9	4.23	7.12
	10:00:00 PM	11.81	95.7	5.56	7.53
	11:00:00 PM	12.29	96.6	5.28	7.08
06/08/2014	12:00:00 AM	12.46	98.1	3.82	5.78
	1:00:00 AM	12.95	96.8	2.18	4.68
	2:00:00 AM	12.54	99.1	3.50	5.39
	3:00:00 AM	12.21	99.6	3.51	5.63
	4:00:00 AM	11.95	99.7	4.65	7.76
	5:00:00 AM	11.20	99.4	6.90	9.25
	6:00:00 AM	10.69	96.2	7.17	10.05
	7:00:00 AM	10.42	94.3	8.89	11.62
	8:00:00 AM	10.45	88.8	9.40	12.90
	9:00:00 AM	10.41	86.1	8.93	11.96
	10:00:00 AM	10.27	90.2	8.50	11.76
	11:00:00 AM	9.58	84.6	9.18	12.88
	12:00:00 PM	9.36	81.3	9.73	12.82
	1:00:00 PM	9.68	65.2	8.56	11.86
	2:00:00 PM	10.40	61.1	8.74	12.43
	3:00:00 PM	10.77	56.3	8.27	11.98
	4:00:00 PM	11.30	49.2	7.25	12.90
	5:00:00 PM	11.60	50.2	6.69	9.64
	6:00:00 PM	11.82	49.8	5.69	8.66
	7:00:00 PM	11.60	47.4	5.71	8.21
	8:00:00 PM	11.15	54.1	5.21	7.45
	9:00:00 PM	10.33	54.3	5.03	6.92

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
	10:00:00 PM	9.48	58.9	4.47	6.37
	11:00:00 PM	8.57	63.1	3.27	4.74
07/08/2014	12:00:00 AM	8.21	64.5	2.18	3.90
	1:00:00 AM	7.67	69.4	1.81	2.57
	2:00:00 AM	7.49	72.3	1.93	2.92
	3:00:00 AM	7.60	66.6	1.93	2.80
	4:00:00 AM	7.43	72.1	1.69	2.41
	5:00:00 AM	7.37	77.2	2.27	4.10
	6:00:00 AM	7.19	74.7	3.27	4.74
	7:00:00 AM	7.30	74.7	3.33	5.94
	8:00:00 AM	7.32	72.5	4.47	6.21
	9:00:00 AM	7.15	73.9	4.48	6.76
	10:00:00 AM	6.98	68.7	4.23	6.06
	11:00:00 AM	7.21	61.8	4.45	6.23
	12:00:00 PM	7.25	62.2	4.34	7.45
	1:00:00 PM	7.48	58.7	4.47	7.98
	2:00:00 PM	8.14	54.9	5.28	8.19
	3:00:00 PM	9.18	47.5	5.39	8.21
	4:00:00 PM	9.98	46.8	5.55	8.21
	5:00:00 PM	10.46	41.4	5.80	8.92
	6:00:00 PM	10.83	42.5	5.11	9.23
	7:00:00 PM	10.70	41.7	5.65	8.39
	8:00:00 PM	10.42	43.9	5.44	7.88
	9:00:00 PM	9.87	47.1	5.22	7.25
	10:00:00 PM	9.13	57.9	4.63	7.13
	11:00:00 PM	7.96	65.0	4.11	6.61
08/08/2014	12:00:00 AM	7.03	67.5	3.98	6.47
	1:00:00 AM	6.18	71.4	4.06	6.45
	2:00:00 AM	5.83	66.2	4.37	6.47
	3:00:00 AM	6.20	71.0	4.44	6.47
	4:00:00 AM	5.79	73.3	3.39	4.59
	5:00:00 AM	6.03	76.4	4.53	6.78
	6:00:00 AM	5.82	77.8	5.34	7.84
	7:00:00 AM	5.81	76.8	7.94	11.35
	8:00:00 AM	5.63	69.1	8.41	11.66
	9:00:00 AM	6.11	74.6	7.83	10.98
	10:00:00 AM	6.41	74.6	8.58	12.29
	11:00:00 AM	6.73	73.1	8.86	12.47
	12:00:00 PM	7.29	69.3	8.35	12.00

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
	1:00:00 PM	8.14	63.8	8.12	10.51
	2:00:00 PM	8.84	63.5	8.51	10.82
	3:00:00 PM	9.16	59.4	8.38	12.23
	4:00:00 PM	9.24	60.2	9.31	12.09
	5:00:00 PM	9.60	58.9	9.33	12.29
	6:00:00 PM	9.66	62.1	9.35	12.74
	7:00:00 PM	9.38	66.0	9.57	12.49
	8:00:00 PM	8.37	62.6	8.99	12.29
	9:00:00 PM	8.43	63.2	8.10	11.33
	10:00:00 PM	8.73	66.0	7.74	11.03
	11:00:00 PM	8.79	65.8	7.55	11.54
09/08/2014	12:00:00 AM	8.75	72.6	8.60	11.13
	1:00:00 AM	7.92	75.6	6.84	10.27
	2:00:00 AM	7.42	76.0	4.40	5.86
	3:00:00 AM	7.71	73.8	5.10	7.51
	4:00:00 AM	7.89	79.3	4.83	7.00
	5:00:00 AM	7.72	81.9	4.92	6.47
	6:00:00 AM	7.81	79.3	5.27	6.82
	7:00:00 AM	8.05	78.8	5.09	6.90
	8:00:00 AM	8.37	71.1	5.44	7.08
	9:00:00 AM	8.74	65.2	5.76	7.59
	10:00:00 AM	9.80	60.2	5.64	7.68

3.3 R3

One-minute L_{eq}, maximum (L_{max}) and minimum (L_{min}) values over the monitoring period are shown in Figure 4.

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 R3 is shown in Table 8. Wind speeds exceeded 4.17 m/s for a relatively small proportion of the dataset, and 38 out of 52 h of data collected were usable.

Audible noises noted in the field log at this location include birds, insects, traffic and pit noise. Activities contributing to the acoustic environment at this location include Vault road traffic and increased helicopter activity due to exploration works.

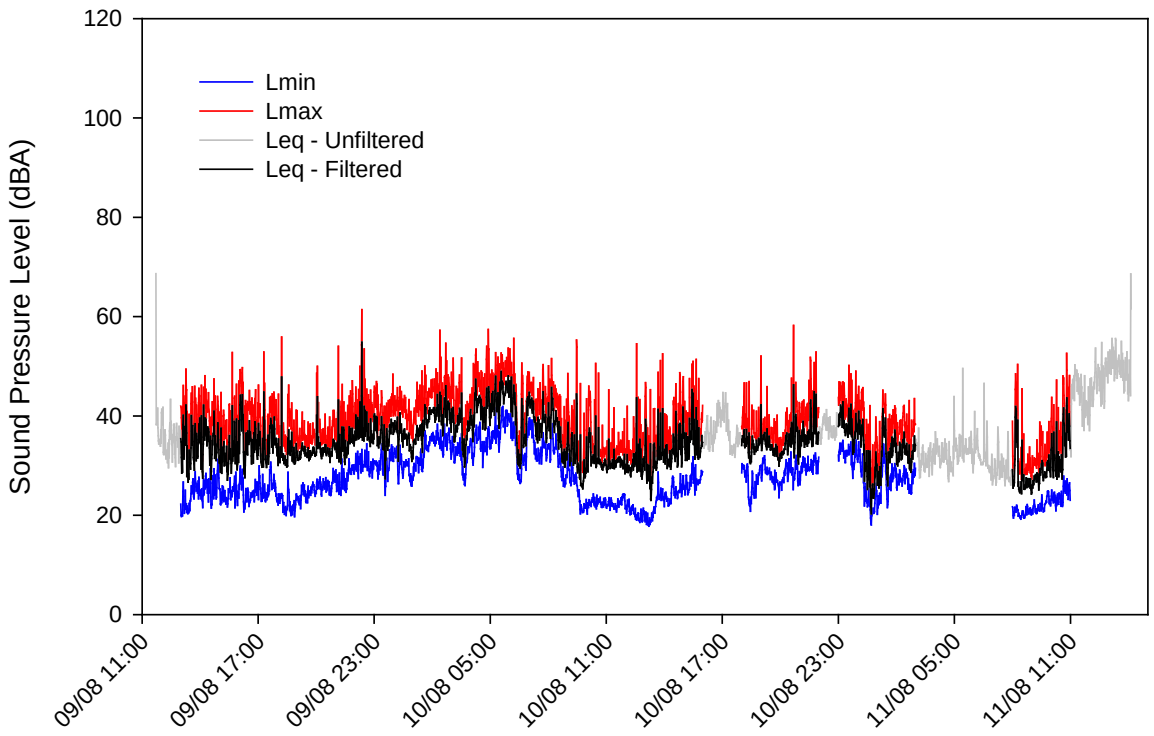


Figure 4. One-minute L_{eq}, L_{max} and L_{min} values recorded at monitoring station R4 at the Meadowbank site. Filtered data excludes those measurements taken outside of optimal conditions (set-up, take-down, wind > 4.17 m/s, RH > 90%).

Table 7. Hourly L_{eq} values for monitoring station R3 at the Meadowbank site and hours filtered out due to set-up, take-down or non-optimal weather conditions.

Date	Start time	L_{eq}-1 hr	Filtered
09/08/2014	11:00 AM	56.36	y
	12:00 PM	36.36	y
	1:00 PM	35.40	
	2:00 PM	35.74	
	3:00 PM	33.50	
	4:00 PM	37.16	
	5:00 PM	35.64	
	6:00 PM	34.44	
	7:00 PM	32.56	
	8:00 PM	34.18	
	9:00 PM	35.04	
	10:00 PM	40.29	
	11:00 PM	36.79	
10/08/2014	12:00 AM	36.29	
	1:00 AM	38.31	
	2:00 AM	41.15	
	3:00 AM	38.37	
	4:00 AM	42.02	
	5:00 AM	44.41	
	6:00 AM	41.27	
	7:00 AM	40.17	
	8:00 AM	38.39	
	9:00 AM	33.76	
	10:00 AM	32.37	
	11:00 AM	30.60	
	12:00 PM	31.59	
	1:00 PM	33.15	
	2:00 PM	34.36	
	3:00 PM	36.61	
	4:00 PM	38.04	y
	5:00 PM	38.11	y
	6:00 PM	34.39	
	7:00 PM	34.32	
	8:00 PM	36.08	
	9:00 PM	37.76	
	10:00 PM	37.88	y
	11:00 PM	38.54	
11/08/2014	12:00 AM	33.68	
	1:00 AM	34.16	
	2:00 AM	32.77	
	3:00 AM	32.07	y
	4:00 AM	33.06	y

Date	Start time	L_{eq}-1 hr	Filtered
	5:00 AM	35.79	y
	6:00 AM	34.18	y
	7:00 AM	30.40	y
	8:00 AM	32.02	
	9:00 AM	28.41	
	10:00 AM	35.58	
	11:00 AM	45.16	y
	12:00 PM	48.40	y
	1:00 PM	50.99	y
	2:00 PM	59.99	y

Table 8. Weather conditions for monitoring station R3 at the Meadowbank site. Data for which wind speed > 4.17 m/s or relative humidity > 90% are indicated in grey.

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
09/08/2014	11:00:00 AM	10.66	54.4	5.11	7.57
	12:00:00 PM	11.24	50.5	4.95	8.02
	1:00:00 PM	11.97	44.0	4.12	6.31
	2:00:00 PM	12.80	41.6	4.11	6.96
	3:00:00 PM	13.17	41.4	3.73	6.68
	4:00:00 PM	13.83	38.6	3.47	5.74
	5:00:00 PM	14.19	39.4	3.96	7.37
	6:00:00 PM	13.78	41.3	3.70	6.45
	7:00:00 PM	13.88	40.2	3.29	5.43
	8:00:00 PM	13.99	41.1	3.24	4.55
	9:00:00 PM	13.34	48.0	3.33	4.61
	10:00:00 PM	11.94	72.2	2.54	3.47
	11:00:00 PM	11.16	73.9	2.23	3.20
10/08/2014	12:00:00 AM	10.88	70.8	2.37	4.43
	1:00:00 AM	10.72	74.8	3.68	5.72
	2:00:00 AM	10.04	76.3	2.73	3.69
	3:00:00 AM	9.37	83.5	2.51	4.37
	4:00:00 AM	8.70	85.9	1.01	3.53
	5:00:00 AM	8.36	88.8	1.76	3.61
	6:00:00 AM	8.33	88.3	1.34	2.65
	7:00:00 AM	8.64	84.5	1.99	3.37
	8:00:00 AM	9.07	80.0	2.50	3.74
	9:00:00 AM	10.58	67.6	1.27	2.27
	10:00:00 AM	12.42	54.7	1.21	2.41

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
	11:00:00 AM	13.62	52.4	1.57	2.71
	12:00:00 PM	14.36	43.4	1.79	3.96
	1:00:00 PM	15.46	39.2	2.72	4.61
	2:00:00 PM	15.89	37.3	3.42	6.23
	3:00:00 PM	16.62	36.4	3.89	6.94
	4:00:00 PM	16.36	42.8	4.22	7.12
	5:00:00 PM	15.32	43.4	5.27	8.02
	6:00:00 PM	15.19	42.6	3.73	7.92
	7:00:00 PM	15.06	47.4	3.39	5.63
	8:00:00 PM	14.66	52.5	1.67	2.51
	9:00:00 PM	13.70	66.7	3.34	7.72
	10:00:00 PM	12.30	77.9	4.46	6.39
	11:00:00 PM	11.50	81.0	3.57	4.90
11/08/2014	12:00:00 AM	10.98	78.5	1.69	3.57
	1:00:00 AM	10.79	85.9	1.87	3.25
	2:00:00 AM	10.50	88.0	1.65	3.06
	3:00:00 AM	10.17	93.1	1.84	3.49
	4:00:00 AM	10.04	93.8	1.66	2.45
	5:00:00 AM	9.76	95.6	1.62	2.35
	6:00:00 AM	9.28	93.7	1.91	3.23
	7:00:00 AM	9.07	95.6	2.03	3.14
	8:00:00 AM	9.59	80.3	2.69	3.70
	9:00:00 AM	10.68	75.1	3.11	4.47
	10:00:00 AM	11.20	70.9	3.18	6.17
	11:00:00 AM	11.46	76.5	5.41	8.39
	12:00:00 PM	11.11	70.7	6.92	9.23
	1:00:00 PM	10.35	75.4	7.10	9.88
	2:00:00 PM	9.54	73.7	7.01	9.76

3.4 R4

One-minute L_{eq}, maximum (L_{max}) and minimum (L_{min}) values over the monitoring period are shown in Figure 5.

Hourly L_{eq} values were calculated as described in Section 2.4, and are shown in Table 9, along with data filtered out for subsequent calculations.

Weather data for noise monitoring dates at R4 is shown in Table 10. Average hourly wind speeds exceeded 4.17 m/s for approximately half of the time points, with gusts up to 13.84 m/s.

Noises noted in the field log include Vault pit traffic, birds and insects. Wind, waves and traffic are dominant in recorded sound files.

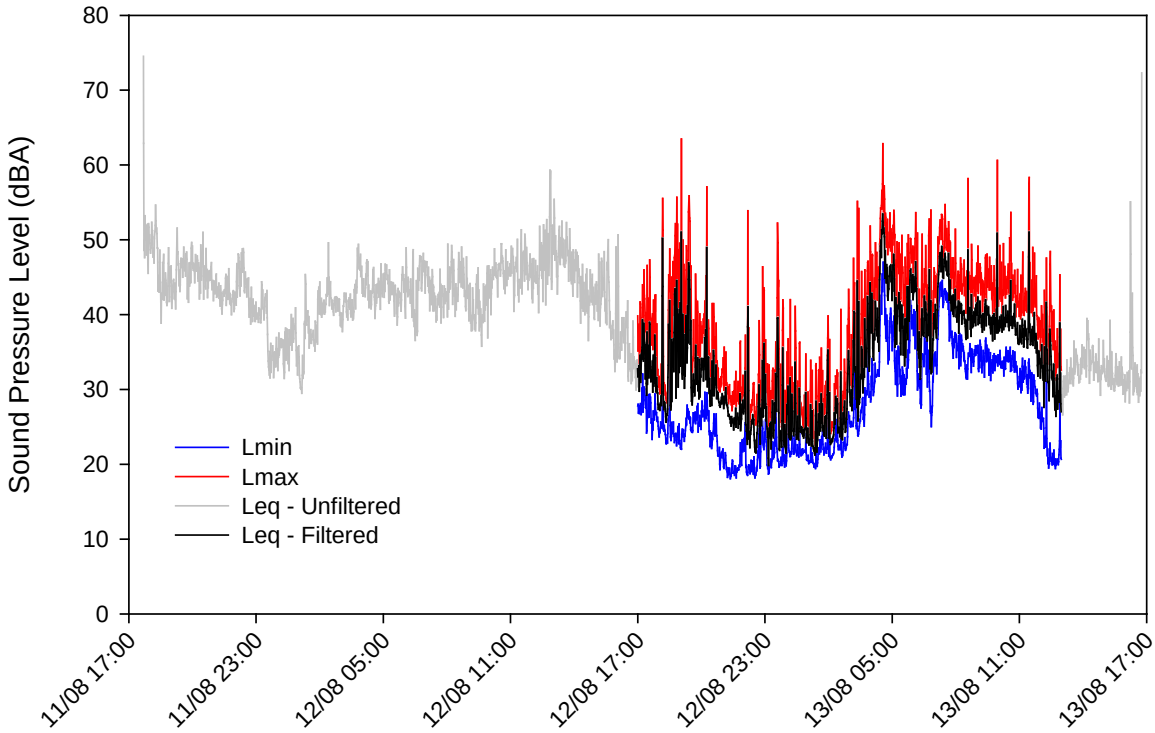


Figure 5. One-minute L_{eq}, L_{max} and L_{min} values recorded at monitoring station R4 at the Meadowbank site. Filtered data excludes those measurements taken outside of optimal conditions (set-up, take-down, wind > 4.17 m/s, RH > 90%).

Table 9. Hourly L_{eq} values for monitoring station R4 at the Meadowbank site and hours filtered out due to set-up, take-down or non-optimal weather conditions.

Date	Start time	L_{eq}-1 h	Filtered
11/08/2014	5:00:00 PM	62.44	y
11/08/2014	6:00:00 PM	48.10	y
11/08/2014	7:00:00 PM	46.35	y
11/08/2014	8:00:00 PM	46.25	y
11/08/2014	9:00:00 PM	43.20	y
11/08/2014	10:00:00 PM	44.62	y
11/08/2014	11:00:00 PM	39.37	y
12/08/2014	12:00:00 AM	36.60	y
12/08/2014	1:00:00 AM	38.43	y
12/08/2014	2:00:00 AM	42.39	y
12/08/2014	3:00:00 AM	43.76	y
12/08/2014	4:00:00 AM	43.90	y
12/08/2014	5:00:00 AM	44.04	y
12/08/2014	6:00:00 AM	44.76	y
12/08/2014	7:00:00 AM	43.62	y
12/08/2014	8:00:00 AM	45.32	y
12/08/2014	9:00:00 AM	42.05	y
12/08/2014	10:00:00 AM	46.10	y
12/08/2014	11:00:00 AM	46.94	y
12/08/2014	12:00:00 PM	50.09	y
12/08/2014	1:00:00 PM	49.22	y
12/08/2014	2:00:00 PM	44.35	y
12/08/2014	3:00:00 PM	43.71	y
12/08/2014	4:00:00 PM	38.17	y
12/08/2014	5:00:00 PM	34.31	
12/08/2014	6:00:00 PM	38.43	
12/08/2014	7:00:00 PM	39.34	
12/08/2014	8:00:00 PM	34.93	
12/08/2014	9:00:00 PM	27.45	
12/08/2014	10:00:00 PM	29.77	
12/08/2014	11:00:00 PM	29.69	
13/08/2014	12:00:00 AM	26.71	
13/08/2014	1:00:00 AM	26.54	
13/08/2014	2:00:00 AM	27.94	
13/08/2014	3:00:00 AM	36.40	
13/08/2014	4:00:00 AM	46.76	
13/08/2014	5:00:00 AM	42.48	
13/08/2014	6:00:00 AM	40.86	
13/08/2014	7:00:00 AM	45.37	
13/08/2014	8:00:00 AM	40.79	
13/08/2014	9:00:00 AM	40.86	
13/08/2014	10:00:00 AM	39.69	

Date	Start time	L_{eq}-1 h	Filtered
13/08/2014	11:00:00 AM	39.38	
13/08/2014	12:00:00 PM	33.48	
13/08/2014	1:00:00 PM	32.66	y
13/08/2014	2:00:00 PM	34.63	y
13/08/2014	3:00:00 PM	32.77	y
13/08/2014	4:00:00 PM	55.95	y

Table 10. Weather conditions for monitoring station R4 at the Meadowbank site. Hours for which average wind speed > 4.17 m/s or relative humidity > 90% are indicated in grey.

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
11/08/2014	5:00:00 PM	9.52	61.7	7.76	11.17
	6:00:00 PM	9.06	70.1	8.50	12.17
	7:00:00 PM	8.57	65.1	6.99	10.94
	8:00:00 PM	9.93	59.7	6.87	9.72
	9:00:00 PM	10.34	62.1	6.96	9.23
	10:00:00 PM	10.07	67.6	5.93	8.94
	11:00:00 PM	9.74	71.5	5.16	7.57
12/08/2014	12:00:00 AM	9.01	76.8	4.44	6.49
	1:00:00 AM	8.60	75.9	5.18	6.92
	2:00:00 AM	8.64	77.4	4.90	6.94
	3:00:00 AM	8.99	81.8	5.96	8.94
	4:00:00 AM	8.72	86.4	5.18	8.27
	5:00:00 AM	8.48	87.9	6.38	8.96
	6:00:00 AM	8.26	87.6	6.19	8.80
	7:00:00 AM	8.01	78.1	6.96	9.43
	8:00:00 AM	7.68	74.2	6.57	9.60
	9:00:00 AM	7.89	71.4	6.38	8.60
	10:00:00 AM	7.42	78.9	5.16	7.84
	11:00:00 AM	8.80	66.3	6.16	8.76
	12:00:00 PM	9.74	59.8	7.06	10.39
	1:00:00 PM	10.66	53.0	7.31	10.70
	2:00:00 PM	10.88	59.4	7.60	10.56
	3:00:00 PM	11.03	60.6	5.87	8.98
	4:00:00 PM	12.12	58.3	6.43	9.82
	5:00:00 PM	11.92	59.5	3.35	6.55
	6:00:00 PM	12.06	59.3	2.99	4.70
	7:00:00 PM	12.09	58.6	1.80	3.10

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
	8:00:00 PM	13.02	55.4	1.70	3.16
	9:00:00 PM	12.92	57.2	0.56	1.55
	10:00:00 PM	11.59	80.0	0.92	2.67
	11:00:00 PM	10.02	80.4	2.24	3.33
13/08/2014	12:00:00 AM	9.52	80.3	2.37	4.18
	1:00:00 AM	9.37	84.0	2.80	3.84
	2:00:00 AM	9.15	84.3	3.23	4.86
	3:00:00 AM	8.70	82.1	1.82	4.02
	4:00:00 AM	8.85	76.5	2.68	5.92
	5:00:00 AM	8.77	74.8	1.57	3.37
	6:00:00 AM	9.35	77.4	2.12	3.67
	7:00:00 AM	9.07	78.9	1.97	3.16
	8:00:00 AM	9.60	75.5	1.53	3.18
	9:00:00 AM	9.37	83.0	2.60	4.33
	10:00:00 AM	9.80	78.5	2.99	4.21
	11:00:00 AM	10.82	69.8	3.48	5.19
	12:00:00 PM	11.60	67.0	4.11	6.00
	1:00:00 PM	12.17	63.8	4.39	6.08
	2:00:00 PM	12.96	60.1	4.47	6.23
	3:00:00 PM	13.39	60.6	4.64	7.02
	4:00:00 PM	13.86	57.5	4.40	6.29

3.5 R5

One-minute L_{eq}, maximum (L_{max}) and minimum (L_{min}) values over the monitoring period are shown in Figure 6.

Hourly L_{eq} values were calculated as described in Section 2.4, and are shown in Table 11, along with data filtered out for subsequent calculations.

Weather data for noise monitoring dates at R5 is shown in Table 12. Average wind speeds exceeded 4.17 m/s for 54 out of 86 monitoring hours, with gusts up to 20.66 m/s.

Audible noises noted in the field log at this location include birds, insects and exploration camp activities.

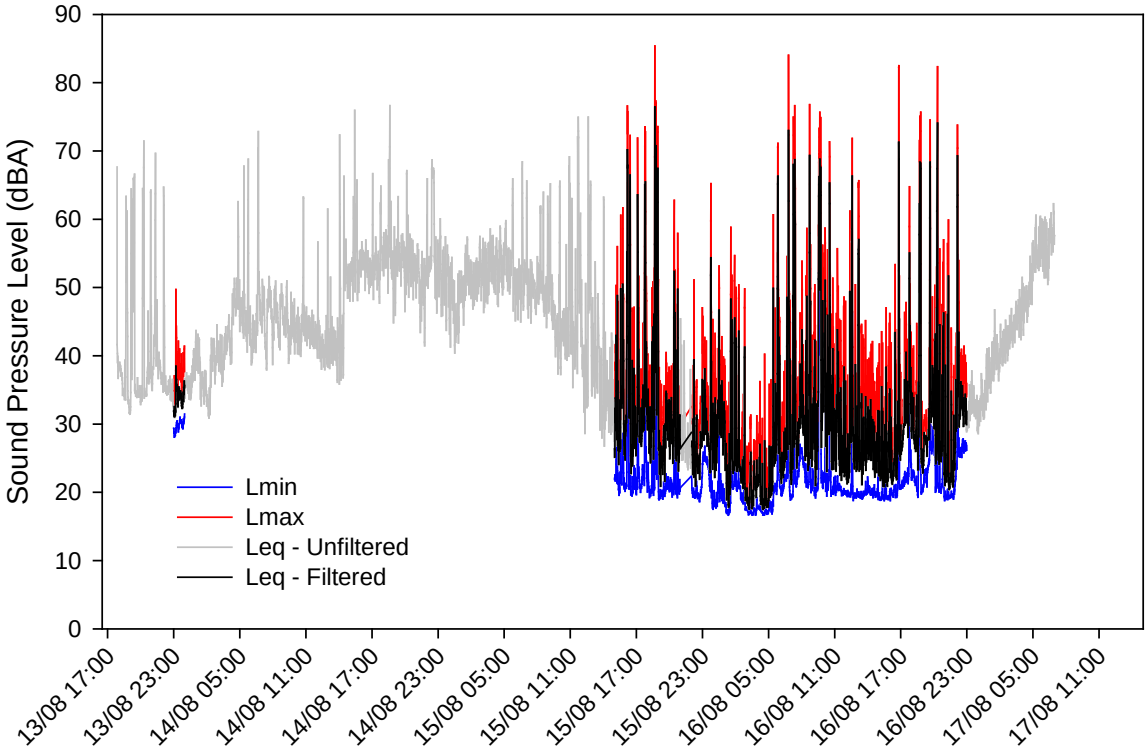


Figure 6. One-minute L_{eq}, L_{max} and L_{min} values recorded at monitoring station R5 at the Meadowbank site. Filtered data excludes those measurements taken outside of optimal conditions (set-up, take-down, wind > 4.17 m/s, RH > 90%).

Table 11. Hourly L_{eq} values for monitoring station R5 at the Meadowbank site and hours filtered out due to set-up, take-down or non-optimal weather conditions.

Date	Start time	L_{eq}-1 h	Filtered
13/08/2014	5:00:00 PM	58.07	y
	6:00:00 PM	48.90	y
	7:00:00 PM	56.67	y
	8:00:00 PM	57.21	y
	9:00:00 PM	53.36	y
	10:00:00 PM	50.60	y
	11:00:00 PM	33.94	
14/08/2014	12:00:00 AM	37.02	y
	1:00:00 AM	38.25	y
	2:00:00 AM	38.89	y
	3:00:00 AM	40.74	y
	4:00:00 AM	49.47	y

Date	Start time	L_{eq}-1 h	Filtered
	5:00:00 AM	54.90	y
	6:00:00 AM	57.32	y
	7:00:00 AM	47.20	y
	8:00:00 AM	46.64	y
	9:00:00 AM	45.24	y
	10:00:00 AM	49.78	y
	11:00:00 AM	43.68	y
	12:00:00 PM	46.60	y
	1:00:00 PM	42.27	y
	2:00:00 PM	56.90	y
	3:00:00 PM	60.19	y
	4:00:00 PM	53.38	y
	5:00:00 PM	56.02	y
	6:00:00 PM	61.79	y
	7:00:00 PM	55.08	y
	8:00:00 PM	56.27	y
	9:00:00 PM	52.08	y
	10:00:00 PM	61.02	y
	11:00:00 PM	53.06	y
15/08/2014	12:00:00 AM	48.07	y
	1:00:00 AM	51.92	y
	2:00:00 AM	51.88	y
	3:00:00 AM	53.87	y
	4:00:00 AM	53.61	y
	5:00:00 AM	56.05	y
	6:00:00 AM	55.70	y
	7:00:00 AM	53.37	y
	8:00:00 AM	54.65	y
	9:00:00 AM	51.31	y
	10:00:00 AM	57.37	y
	11:00:00 AM	62.40	y
	12:00:00 PM	58.79	y
	1:00:00 PM	41.92	y
	2:00:00 PM	49.70	y
	3:00:00 PM	38.97	
	4:00:00 PM	56.95	
	5:00:00 PM	53.21	
	6:00:00 PM	60.86	
	7:00:00 PM	28.96	
	8:00:00 PM	38.31	
	9:00:00 PM	33.23	y
	10:00:00 PM	28.28	
	11:00:00 PM	38.98	
16/08/2014	12:00:00 AM	33.61	

Date	Start time	L_{eq}-1 h	Filtered
	1:00:00 AM	34.65	
	2:00:00 AM	31.89	
	3:00:00 AM	20.78	
	4:00:00 AM	20.41	
	5:00:00 AM	51.15	
	6:00:00 AM	55.43	
	7:00:00 AM	54.41	
	8:00:00 AM	51.91	
	9:00:00 AM	57.36	
	10:00:00 AM	49.49	
	11:00:00 AM	32.23	
	12:00:00 PM	49.50	
	1:00:00 PM	43.72	
	2:00:00 PM	27.15	
	3:00:00 PM	27.66	
	4:00:00 PM	55.20	
	5:00:00 PM	39.67	
	6:00:00 PM	55.33	
	7:00:00 PM	51.38	
	8:00:00 PM	57.09	
	9:00:00 PM	35.85	
	10:00:00 PM	52.89	
	11:00:00 PM	32.71	y
17/08/2014	12:00:00 AM	34.59	y
	1:00:00 AM	39.60	y
	2:00:00 AM	41.96	y
	3:00:00 AM	45.31	y
	4:00:00 AM	49.43	y
	5:00:00 AM	56.40	y
	6:00:00 AM	57.05	y

Table 12. Weather conditions for monitoring station R5 at the Meadowbank site. Hours for which average wind speed > 4.17 m/s or relative humidity > 90% are indicated in grey.

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
13/08/2014	5:00:00 PM	14.23	59.5	4.69	6.41
	6:00:00 PM	14.38	58.4	5.05	6.78
	7:00:00 PM	14.89	57.6	4.43	5.84
	8:00:00 PM	14.81	59.3	4.33	5.90
	9:00:00 PM	14.43	62.8	4.53	6.63
	10:00:00 PM	13.80	71.1	4.51	6.12

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
	11:00:00 PM	13.11	79.4	4.07	5.66
14/08/2014	12:00:00 AM	12.57	91.9	4.35	6.59
	1:00:00 AM	12.53	94.0	4.79	6.92
	2:00:00 AM	12.27	95.8	4.35	6.72
	3:00:00 AM	12.02	95.3	4.95	7.62
	4:00:00 AM	11.81	96.0	4.65	6.55
	5:00:00 AM	11.57	96.6	5.94	8.70
	6:00:00 AM	11.33	96.3	5.10	8.06
	7:00:00 AM	11.22	95.2	5.06	8.27
	8:00:00 AM	10.83	96.7	5.31	7.70
	9:00:00 AM	10.62	96.4	4.56	8.31
	10:00:00 AM	10.62	95.4	4.70	7.04
	11:00:00 AM	11.08	91.4	5.04	7.13
	12:00:00 PM	11.64	86.0	5.07	7.62
	1:00:00 PM	12.14	79.6	5.16	7.53
	2:00:00 PM	12.75	76.5	5.16	7.78
	3:00:00 PM	12.21	88.3	6.83	12.07
	4:00:00 PM	10.19	85.6	8.91	12.19
	5:00:00 PM	10.09	72.0	8.90	12.84
	6:00:00 PM	11.34	60.8	8.50	12.15
	7:00:00 PM	10.67	65.4	9.45	12.33
	8:00:00 PM	9.31	70.5	9.78	13.35
	9:00:00 PM	7.52	72.7	9.44	13.35
	10:00:00 PM	6.53	75.2	9.16	13.19
	11:00:00 PM	5.56	78.5	9.27	13.39
15/08/2014	12:00:00 AM	4.70	81.3	9.32	13.37
	1:00:00 AM	4.79	81.1	8.21	12.15
	2:00:00 AM	5.11	89.8	9.11	12.09
	3:00:00 AM	5.32	87.7	9.14	13.11
	4:00:00 AM	5.30	91.3	10.00	13.15
	5:00:00 AM	5.28	92.3	9.76	13.72
	6:00:00 AM	5.40	90.0	8.92	12.15
	7:00:00 AM	5.49	84.5	7.11	10.54
	8:00:00 AM	5.61	81.9	7.56	10.47
	9:00:00 AM	5.97	73.1	7.58	10.45
	10:00:00 AM	6.32	72.8	6.35	9.60
	11:00:00 AM	6.78	69.5	5.77	8.76
	12:00:00 PM	7.25	73.9	5.81	8.76
	1:00:00 PM	7.33	73.4	5.08	8.31

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
	2:00:00 PM	7.16	72.7	5.33	7.37
	3:00:00 PM	7.50	69.0	4.02	5.90
	4:00:00 PM	7.63	68.4	3.74	6.23
	5:00:00 PM	7.57	68.0	4.14	6.35
	6:00:00 PM	7.43	69.2	3.87	5.39
	7:00:00 PM	7.34	67.2	3.95	5.78
	8:00:00 PM	7.20	74.4	3.55	5.59
	9:00:00 PM	6.41	80.3	4.35	6.74
	10:00:00 PM	6.27	85.4	3.45	4.90
	11:00:00 PM	5.61	86.8	2.83	5.16
16/08/2014	12:00:00 AM	5.36	82.0	2.79	4.63
	1:00:00 AM	5.20	69.9	3.92	5.55
	2:00:00 AM	4.84	72.9	3.11	5.45
	3:00:00 AM	5.01	71.0	1.86	2.94
	4:00:00 AM	5.16	73.9	2.20	4.65
	5:00:00 AM	5.05	74.2	1.81	3.21
	6:00:00 AM	5.07	71.3	1.85	3.69
	7:00:00 AM	5.11	73.0	2.70	4.41
	8:00:00 AM	5.51	72.4	2.21	3.37
	9:00:00 AM	5.75	68.9	1.89	3.33
	10:00:00 AM	6.29	66.7	1.41	3.47
	11:00:00 AM	6.40	63.5	1.42	3.47
	12:00:00 PM	7.36	58.4	0.86	2.67
	1:00:00 PM	8.21	53.1	1.32	2.98
	2:00:00 PM	8.94	51.4	0.93	2.74
	3:00:00 PM	9.54	45.1	1.66	2.86
	4:00:00 PM	10.09	46.8	1.22	3.06
	5:00:00 PM	10.61	46.7	1.64	3.51
	6:00:00 PM	10.69	47.0	1.98	3.55
	7:00:00 PM	10.47	51.2	3.22	5.41
	8:00:00 PM	10.25	50.3	3.91	5.39
	9:00:00 PM	9.99	54.1	3.67	5.41
	10:00:00 PM	9.89	63.5	3.32	6.59
	11:00:00 PM	9.42	66.5	5.24	6.68
17/08/2014	12:00:00 AM	9.16	70.5	5.86	8.04
	1:00:00 AM	8.58	66.6	5.80	8.31
	2:00:00 AM	8.43	62.5	6.52	8.49
	3:00:00 AM	8.71	64.1	6.73	9.47
	4:00:00 AM	8.78	70.1	7.15	10.23

Date	Start Time	Air Temp. (°C)	Relative Humidity (%)	Avg. Wind Speed (m/s)	Max Wind Speed (m/s)
	5:00:00 AM	8.28	78.5	7.17	10.66
	6:00:00 AM	7.62	86.7	7.96	11.76
	7:00:00 AM	7.28	90.1	9.02	13.56
	8:00:00 AM	7.18	90.5	11.18	16.60
	9:00:00 AM	7.03	88.8	12.98	19.89
	10:00:00 AM	6.30	98.7	13.23	19.85
	11:00:00 AM	6.04	100.0	14.02	19.48
	12:00:00 PM	6.16	100.0	15.27	20.29
	1:00:00 PM	6.38	100.0	14.92	20.66
	2:00:00 PM	6.98	97.3	12.13	18.76
	3:00:00 PM	7.33	98.0	10.46	16.33
	4:00:00 PM	7.69	97.2	10.58	15.99
	5:00:00 PM	7.90	97.6	9.91	15.58
	6:00:00 PM	8.12	99.0	10.07	14.56

SECTION 4 • SUMMARY

4.1 DAYTIME, NIGHTTIME AND 24 H L_{EQ}

L_{eq} values were calculated for daytime (7am-11pm), nighttime (11pm-7am), 1 h (10pm-11pm) and 24 h time periods as in previous years, based on Health Canada recommendations (as described in Golder, 2012). These L_{eq} values and the total hours of filtered data available for the calculations are shown in Table 13. Alberta ERCB guidance (ERCB 2007) indicates that 3 hours of valid data are required to contribute to daytime and nighttime averages, so time periods with fewer valid hours are excluded. Time periods for which insufficient data was collected due to start/stop of monitoring, or due to weather conditions are indicated with a dash ("-").

No values exceeded the daytime target sound level (55 dBA), and one value each at R1 and R5 exceeded the nighttime target sound level (45 dBA), with recorded L_{eq}-night values of 47.9 dBA. These values are well within the range of those observed in previous years, and are likely a result of increased helicopter activity associated with exploration projects during the monitoring time period, since these two stations are closest to the helicopter route. An examination of the data for these time periods indicated that for both locations, L_{eq} values for only the 5 am and 6 am hours exceeded 45 dBA, and a total of 8 -9 minutes during these two hours exceeded 45 dBA.

Table 13. Daytime, nighttime, 10-11 pm and 24-h L_{eq} values for each monitoring location and total hours used to calculate each L_{eq}. Time periods with fewer than 3 hours of valid data are excluded, and those exceeding corresponding target sound levels are shaded grey.

Site	Dates (2014)	$L_{eq,\ day}$ 7am-11pm (dBA)	Total Hours	$L_{eq,\ night}$ 11pm-7am (dBA)	Total Hours	$L_{eq,\ 1\ h}$ 10pm-11pm (dBA)	$L_{eq,\ 24\ h}$ (dBA)	Total Hours
R1	02/08	-	-	-	-	-	-	-
	03/08	44.0	8	44.2	6	-	43.8	9
	04/08	43.2	8	47.9	8	34.1	43.4	15
	05/08	42.6	7	-	-	-	46.4	14
R2	05/08	48.1	3	-	-	-	48.1	3
	06/08	-	-	42.4	8	-	-	-
	07/08	-	-	38.2	4	-	42.3	9
	08/08	-	-	-	-	-	38.7	3
	09/08	-	-	-	-	-	-	-
R3	09/08	36.0	10	40.6	8	40.3	36.0	11
	10/08	35.7	13	35.4	4	-	38.4	21
	11/08	32.9	3	-	-	-	33.3	6
R4	11/08	-	-	-	-	-	-	-
	12/08	35.8	6	40.2	8	29.8	35.3	7
	13/08	41.2	6	-	-	-	41.0	13
R5	13/08	-	-	-	-	-	-	-
	14/08	-	-	-	-	-	-	-
	15/08	54.4	7	47.9	8	28.3	53.9	8

Site	Dates (2014)	$L_{eq, day}$ 7am-11pm (dBA)	Total Hours	$L_{eq, night}$ 11pm-7am (dBA)	Total Hours	$L_{eq, 1 h}$ 10pm-11pm (dBA)	$L_{eq, 24 h}$ (dBA)	Total Hours
	16/08	52.3	16	-	-	52.9	51.4	23
	17/08	-	-	-	-	-	-	-

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 h 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, 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 subsequent years.

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

4.2.2 Interannual Comparison

L_{eq} measurements for all valid time periods from 2009 - 2014 are shown in Figure 7. With the exception of one 10-11pm period at R4 and one nighttime period at R5, all L_{eq} values in 2014 were lower than or very similar to those recorded previously.

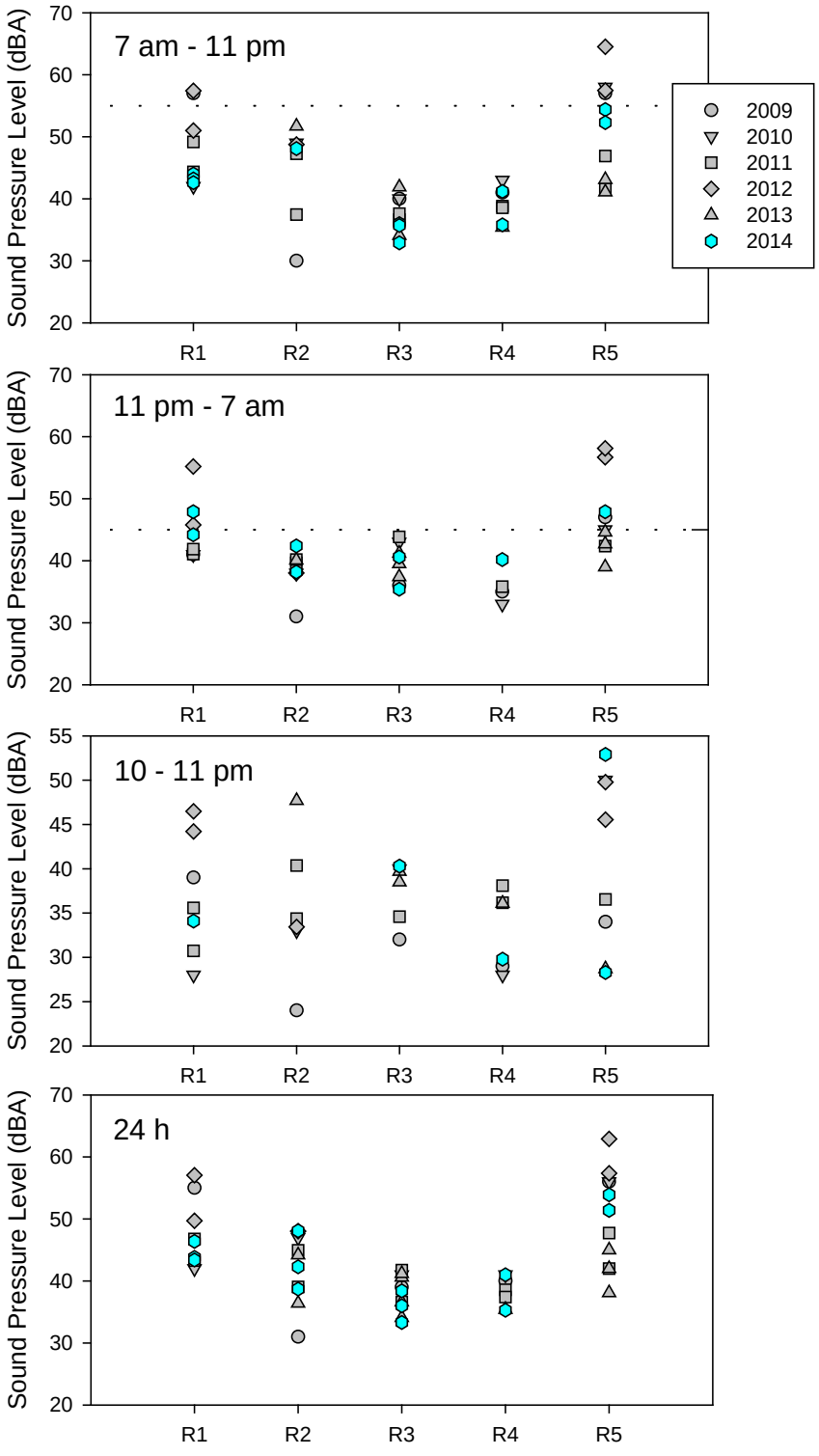


Figure 7. L_{eq} values calculated from filtered data for various time periods at locations R1 – R5 on the Meadowbank site in 24-h surveys from 2009 - 2014. Dashed lines indicate target sound levels.

SECTION 5 • ACTIONS

The following actions were identified in 2013, and AEM's responses in 2014 are indicated below each item.

- Techniques to further mitigate wind-induced noise in the microphone will be investigated to help obtain a larger proportion of valid data. This may include new or different wind screens, particular attention to monitoring during calm weather, or further extending the monitoring periods.
    - Monitoring times were extended to up to 90 h, and increased familiarity with the instrument resulted in no instrument-related monitoring errors in 2014.

The following actions are planned for 2015:

- AEM will aim to train additional Environment Department technicians on use of the noise meter, so that two separate rounds of noise monitoring per year can be conducted in order to increase the amount of available data.

SECTION 6 • REFERENCES

AEM, 2013. Noise Monitoring and Abatement Plan, Meadowbank Gold Project. Version 2. Prepared by Agnico Eagle Mines Ltd. January, 2014.

AEM, 2009. Noise Management and Abatement Plan. Meadowbank Gold Project. Version 1. Prepared by Agnico Eagle Mines Ltd. September, 2009.

ERCB, 2007. Noise Control Directive 038. Alberta Energy Resources Conservation Board. Calgary, Alberta.

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.

APPENDIX A

Site Photos

Figure -Apx 1: Monitoring location R1

Figure -Apx 2: Monitoring location R2

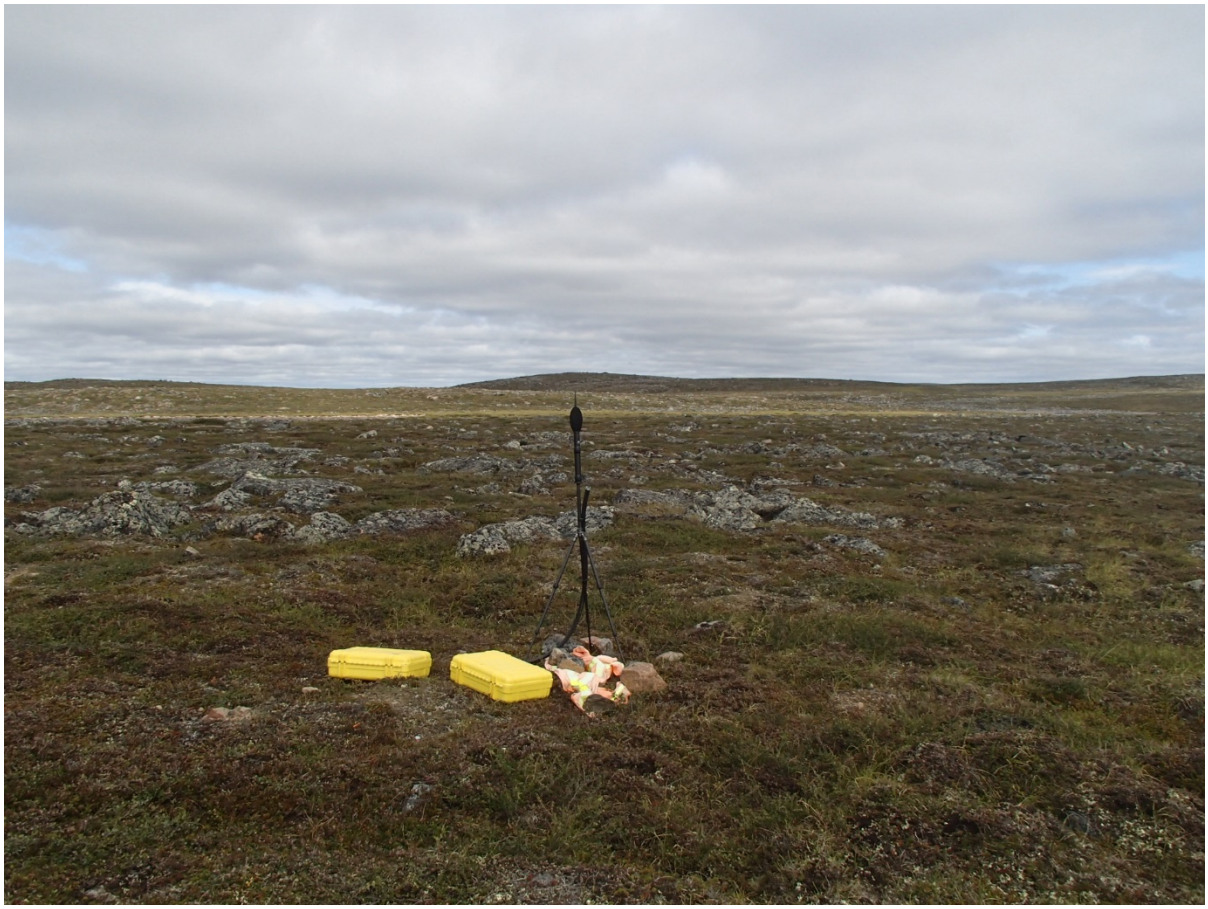


Figure -Apx 3: Monitoring location R3.

Figure -Apx 4: Monitoring location R4.

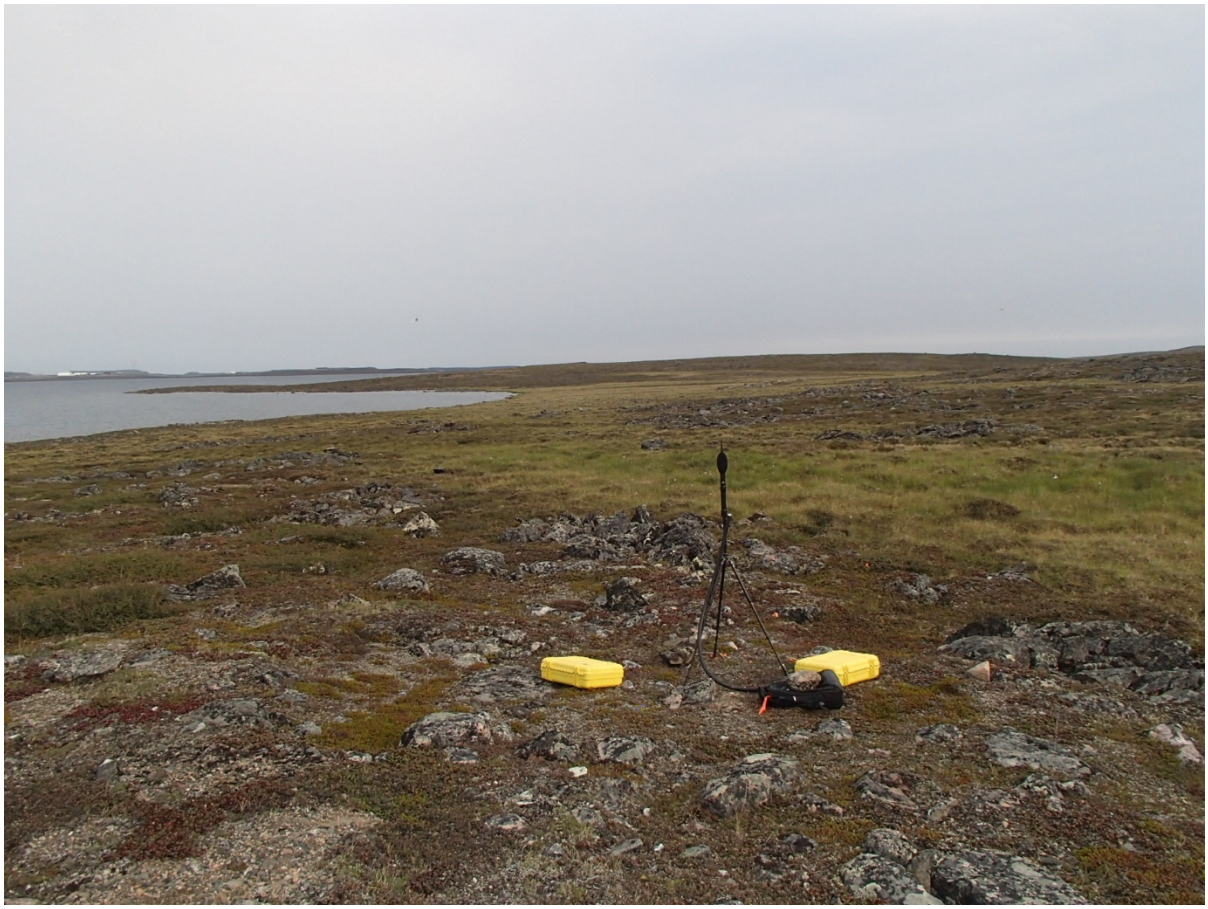


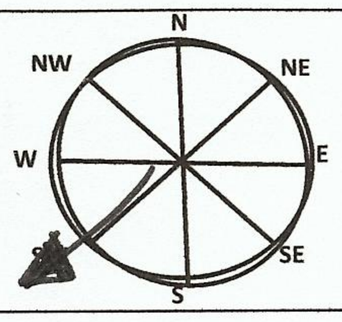
Figure -Apx 5: Monitoring location R5.

APPENDIX B

Field Logs

R1 - New location

MONITORING STARTS

Operator:	RA / JK		
Location:	R1 - NEW		
Noise Meter Start Time:	14h15		
Date:	2014/08/02		
Calibration complete ?:			
Sensitivity	51.23 @ 14h12		
Derviation			
Time of Calibration:			
Battery Power Check:	Good		Poor
Photographs of Setup (Y/N)	Y		
Photographs of Surrounding (Y/N)	Y		
Check available disk memory (Y/N)	Y		
Cloud cover:	~~cloudy~~	partly cloudy	sunny
Height of cloud (feet):	~~0-10,000~~	10,000-25,000	25,000 +
Air Temperature (C):	16.5°C		
Wind Speed (km/hr):			
Wind Direction: North wind (wind blows from North)	MAX: 5.5 m/s AVG: 0.4 m/s		
Barometric Pressure (kPa):			
Relative Humidity (%)	45%		
Precipitation:	none	drizzle	rain

GENERAL SITE DESCRIPTION

	Latitude	Longitude	Altitude
GPS Location	N 65 05.168	W 096 10645	/

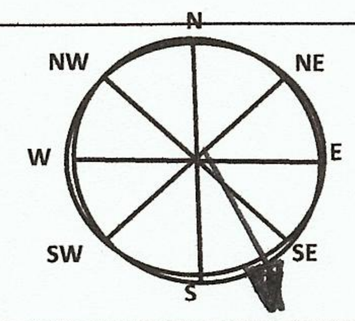
Type of Ground Surface:	TUNDRA
Acoustic Environment:	
Traffic	AWPR / EMULSION ROAD.
Human activities	EMULSION
Animal	BIRDS / INSECTS

Other noise sources

INCREASED HELICOPTER TRAFFIC FOR OUR PROJECT.

MAINTENANCE WORK BEING DONE AT TOWER.

MONITORING ENDS

Operator:	RA / MPM		
Record Data File Name:	R1		
Total Monitoring Period	3 d.		
Noise Meter End Time:	15h40		
Date:	2014/08/05		
Calibration complete ?:	YES		
Sensitivity	51.16		
Derviation	-0.01 @ 15h45		
Time of Calibration:			
Check file size (GB)	7.26 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):	15.9°		
Wind Speed (km/hr):			
Wind Direction: North wind (wind blows from North)	MAX: 1.6 m/s AVG: 0.9 m/s		
Barometric Pressure (kPa):			
Relative Humidity (%)	52.3%		
Precipitation:	none	drizzle	rain
Depature Time:	15h55.		

R2

MONITORING STARTS

Operator:	RA / MPM
Location:	R2
Noise Meter Start Time:	17h00
Date:	2014/08/05
Calibration complete ?:	
Sensitivity	51.4
Derviation	0.00
Time of Calibration:	17h00.
Battery Power Check:	Good / Poor
Photographs of Setup (Y/N)	Y
Photographs of Surrounding (Y/N)	Y
Check available disk memory (Y/N)	Y
Cloud cover:	cloudy / partly cloudy / sunny
Height of cloud (feet):	0-10,000 / 10,000-25,000 / 25,000 +
Air Temperature (C):	16.1°
Wind Speed (km/hr):	
Wind Direction: North wind (wind blows from North)	MAX: 1.3 AVG: 0.8.
Barometric Pressure (kPa):	66.89.
Relative Humidity (%)	
Precipitation:	none / drizzle / rain

GENERAL SITE DESCRIPTION

GPS Location	Latitude	Longitude	Altitude
	14W 0636 76	7214435	
Type of Ground Surface:	TUNDRA		
Acoustic Environment:			
Traffic	FRESH WATER BARGE ROAD		
Human activities	CAMP		
Animal	INSECTS / BIRDS		

Other noise sources

INCREASED HELICOPTER NOISE FOR FUR PROJECT.
→ LANDING AT GEOLOGY CORE SHACK.

MONITORING ENDS

Operator:	RA / MPM.
Record Data File Name:	
Total Monitoring Period	
Noise Meter End Time:	2014/08/09 10h02
Date:	
Calibration complete ?:	
Sensitivity	51.4
Derviation	0.04
Time of Calibration:	10h06
Check file size (GB)	02
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):	9.9°.
Wind Speed (km/hr):	
Wind Direction: North wind (wind blows from North)	MAX: 6.4 AVG: 5.1
Barometric Pressure (kPa):	56.48
Relative Humidity (%)	
Precipitation:	none / ~~drizzle~~ / rain
Depature Time:	10h15.

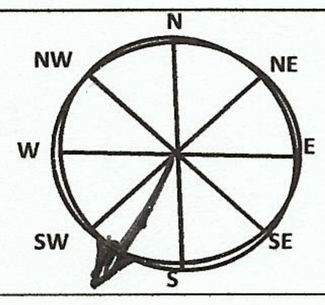
R3

MONITORING STARTS

Operator:	RA/MPM R3
Location:	
Noise Meter Start Time:	
Date:	2014/08/09
Calibration complete ?:	
Sensitivity	51.22
Derviation	-0.03
Time of Calibration:	11h38
Battery Power Check:	Good / Poor
Photographs of Setup (Y/N)	Y
Photographs of Surrounding (Y/N)	Y
Check available disk memory (Y/N)	Y

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

Air Temperature (C):	12.2°C
Wind Speed (km/hr):	
Wind Direction: North wind (wind blows from North)	MAX: 5.2 AVG: 3.1
Barometric Pressure (kPa):	
Relative Humidity (%)	55.0%



Precipitation:	none	drizzle	rain

GENERAL SITE DESCRIPTION

GPS Location	Latitude	Longitude	Altitude
	6502351	9600411	

Type of Ground Surface:	
Acoustic Environment:	
Traffic	TUNDRA VAULT ROAD
Human activities	PIT ACTIVITIES
Animal	INSECTS / BIRDS / MUSKOX.

Other noise sources

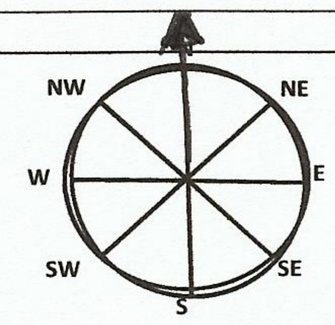
INCREASED HELICOPTER NOISE/TRAFFIC FOR IUR.

MONITORING ENDS

Operator:	RA/MPM
Record Data File Name:	R3
Total Monitoring Period	
Noise Meter End Time:	14h05
Date:	2014/08/11
Calibration complete ?:	
Sensitivity	51.36
Derviation	0.02
Time of Calibration:	14h05
Check file size (GB)	8
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):	9.5
Wind Speed (km/hr):	
Wind Direction: North wind (wind blows from North)	MAX: 6.3 AVG: 5.0
Barometric Pressure (kPa):	
Relative Humidity (%)	62.5%



Precipitation:	none	drizzle	rain
Depature Time:		14h15.	

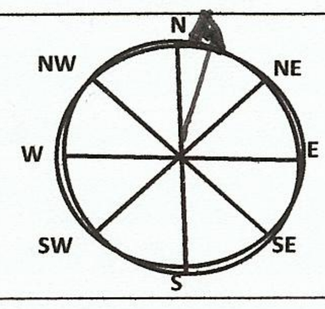
R4

MONITORING STARTS

Operator:	RA/ MPM
Location:	R4
Noise Meter Start Time:	17h40
Date:	2014/08/11
Calibration complete ?:	
Sensitivity	51.46
Derviation	-0.02
Time of Calibration:	17h35
Battery Power Check:	Good / Poor
Photographs of Setup (Y/N)	Y
Photographs of Surrounding (Y/N)	Y
Check available disk memory (Y/N)	Y

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

Air Temperature (C):	9.9°
Wind Speed (km/hr):	
Wind Direction: North wind (wind blows from North)	MAX: 6.2 AVG: 4.1
Barometric Pressure (kPa):	
Relative Humidity (%)	63.8%



Precipitation:	none	drizzle	rain

GENERAL SITE DESCRIPTION

GPS Location	Latitude	Longitude	Altitude
	N65 06 352	W 960 324	

Type of Ground Surface:	
Acoustic Environment:	TUNDRA
Traffic	JAWYPIT - ROAD
Human activities	VAULT PIT
Animal	BIRDS / INSECTS

Other noise sources

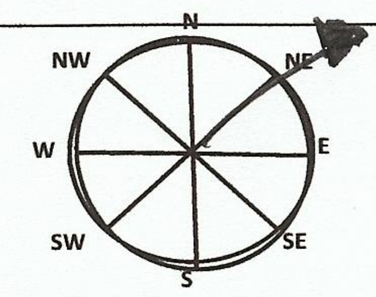
VAULT PIT ACTIVITIES
HELICOPTER TRAFFIC INCREASED.

MONITORING ENDS

Operator:	RA/ MPM / TT
Record Data File Name:	
Total Monitoring Period	
Noise Meter End Time:	2014/08/13 16h45
Date:	
Calibration complete ?:	
Sensitivity	51.41
Derviation	-0.01
Time of Calibration:	16h50
Check file size (GB)	0.52
Battery Power Check:	Good / Poor

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

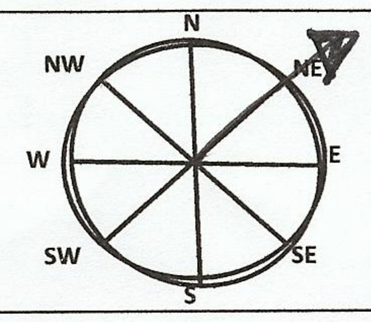
Air Temperature (C):	16.1
Wind Speed (km/hr):	
Wind Direction: North wind (wind blows from North)	MAX: 3.1 AVG: 2.4
Barometric Pressure (kPa):	
Relative Humidity (%)	50.7%.



Precipitation:	none	drizzle	rain

Depature Time: 17h00.

MONITORING STARTS

Operator:	RA / TT / MPM
Location:	PS
Noise Meter Start Time:	17h45
Date:	2014/08/13
Calibration complete ?:	
Sensitivity	51.41
Derviation	0.00
Time of Calibration:	19h45
Battery Power Check:	Good / Poor
Photographs of Setup (Y/N)	Y
Photographs of Surrounding (Y/N)	Y
Check available disk memory (Y/N)	Y
Cloud cover:	cloudy / partly cloudy / sunny
Height of cloud (feet):	0-10,000 / 10,000-25,000 / 25,000 +
Air Temperature (C):	13.9 °C
Wind Speed (km/hr):	
Wind Direction: North wind (wind blows from North)	MAX: 2.2 AVG: 1.7.
	
Barometric Pressure (kPa):	60.7
Relative Humidity (%)	
Precipitation:	none / drizzle / rain

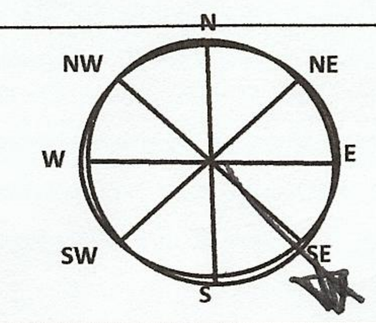
GENERAL SITE DESCRIPTION

	Latitude	Longitude	Altitude
GPS Location	14W063717	7214493	
Type of Ground Surface:	TUNDRA		
Acoustic Environment:	AVPIR		
Traffic	EXPLO / CAMP		
Human activities	BIRD / INSECTS		
Animal			

Other noise sources

EXPLORATION CAMP USED FOR FUR
+ HELICOPTER TRAFFIC

MONITORING ENDS

Operator:	TT / MT
Record Data File Name:	
Total Monitoring Period	
Noise Meter End Time:	17h00,
Date:	2014/08/17
Calibration complete ?:	
Sensitivity	51.33
Derviation	-0.01
Time of Calibration:	18h22
Check file size (GB)	ok
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):	3.9°
Wind Speed (km/hr):	
Wind Direction: North wind (wind blows from North)	MAX: 9.1 AVG: 5.8
	
Barometric Pressure (kPa):	87.4
Relative Humidity (%)	
Precipitation:	none / drizzle / rain
Depature Time:	17h30

STAND ON GROUND ON ARRIVAL, LOW BATTERY ON METER
- PROBABLY MOVED CABLE WHEN TRIPOD FELL.