4-D: Noise Baseline Report

It should be noted that this historical baseline report (Appendix 4-D) was reviewed and received conformity approval as part of the Approved Project FEIS submission (Agnico Eagle 2016c), and then final approval under Project Certificate No. 008. This baseline report remain unchanged.

December 2015

AGNICO EAGLE MINES: MEADOWBANK DIVISION - WHALE TAIL PIT PROJECT

Noise Baseline Report

Submitted to:
Agnico Eagle Mines Limited
Ryan Vanengen
Environment Superintendent

REPORT

Report Number: Doc 031-1524321.1500 Ver 0

Distribution:

1 copy: Agnico Eagle Mines Limited
1 copy: Golder Associates Ltd.

Golder Associates

Table of Contents

1.0 INTRODUCTION 1

1.1 Background 1

1.2 Objective 1

2.0 METHODS 3

2.1 Baseline Noise Monitoring Sites 3

2.2 Noise Monitoring Methodology 5

2.2.1 Data Analysis Methodology 6

3.0 RESULTS 7

3.1 Monitoring Site R6 7

3.2 Monitoring Site R7 8

3.3 Monitoring Site R8 10

3.4 Monitoring Site R9 12

4.0 SUMMARY 14

5.0 REFERENCES 17

TABLES

Table 2-1: Location of Noise Monitoring Sites 5

Table 3-1: Daytime and Nighttime Noise Levels at Monitoring Site R6 8

Table 3-2: Daytime and Nighttime Noise Levels at Monitoring Site R7 10

Table 3-3: Daytime and Nighttime Noise Levels at Monitoring Site R8 12

Table 3-4: Daytime and Nighttime Noise Levels at Monitoring Site R9 14

Table 4-1: Daytime and Nighttime Noise Levels at Project Monitoring Sites 15

FIGURES

Figure 1-1: Project Location 2

Figure 2-1: Location of Baseline Noise Monitoring Sites 4

Figure 3-1: One-minute Noise Data Recorded at Monitoring Site R6 8

Figure 3-2: One-minute Noise Data Recorded at Monitoring Site R7 10

Figure 3-3: One-minute Noise Data Recorded at Monitoring Site R8 12

Figure 3-4: One-minute Noise Data Recorded at Monitoring Site R9 14

APPENDICES

Appendix A
Calibration Results

Appendix B
Weather Data

Appendix C
Noise Data

1.0 INTRODUCTION

Agnico Eagle Mines Limited: Meadowbank Division (Agnico Eagle) is proposing to develop Whale Tail Pit, a satellite deposit on the Amaruq property, in continuation of mine operations and milling of the Meadowbank Mine. The Amaruq Exploration property is a 408 square kilometre (km^2) site located on Inuit Owned Land approximately 150 kilometres (km) north of the hamlet of Baker Lake and approximately 50 km northwest of the Meadowbank Mine in the Kivalliq region of Nunavut (Figure 1-1). The property was acquired by Agnico Eagle in April 2013 subject to a mineral exploration agreement with Nunavut Tunngavik Incorporated.

The Meadowbank Mine is an approved mining operation and Agnico Eagle is looking to extend the life of the mine by constructing and operating Whale Tail Pit (referred to in this document as the Project), which is located on the Amaruq Exploration property. As an amendment to the existing operations at the Meadowbank Mine, it is subject to an environmental review established by Article 12, Part 5 of the *Nunavut Land Claims Agreement* (NLCA). Baseline data have been collected in support of the Environmental Review to document existing conditions and to provide the foundation for a qualitative and quantitative assessment of project operations and the extension of the mine development, to be evaluated in the Environmental Impact Statement (EIS) for the Project.

This report presents the results of a baseline noise monitoring survey completed by Golder Associates Ltd. (Golder) for the area associated with the Project.

1.1 Background

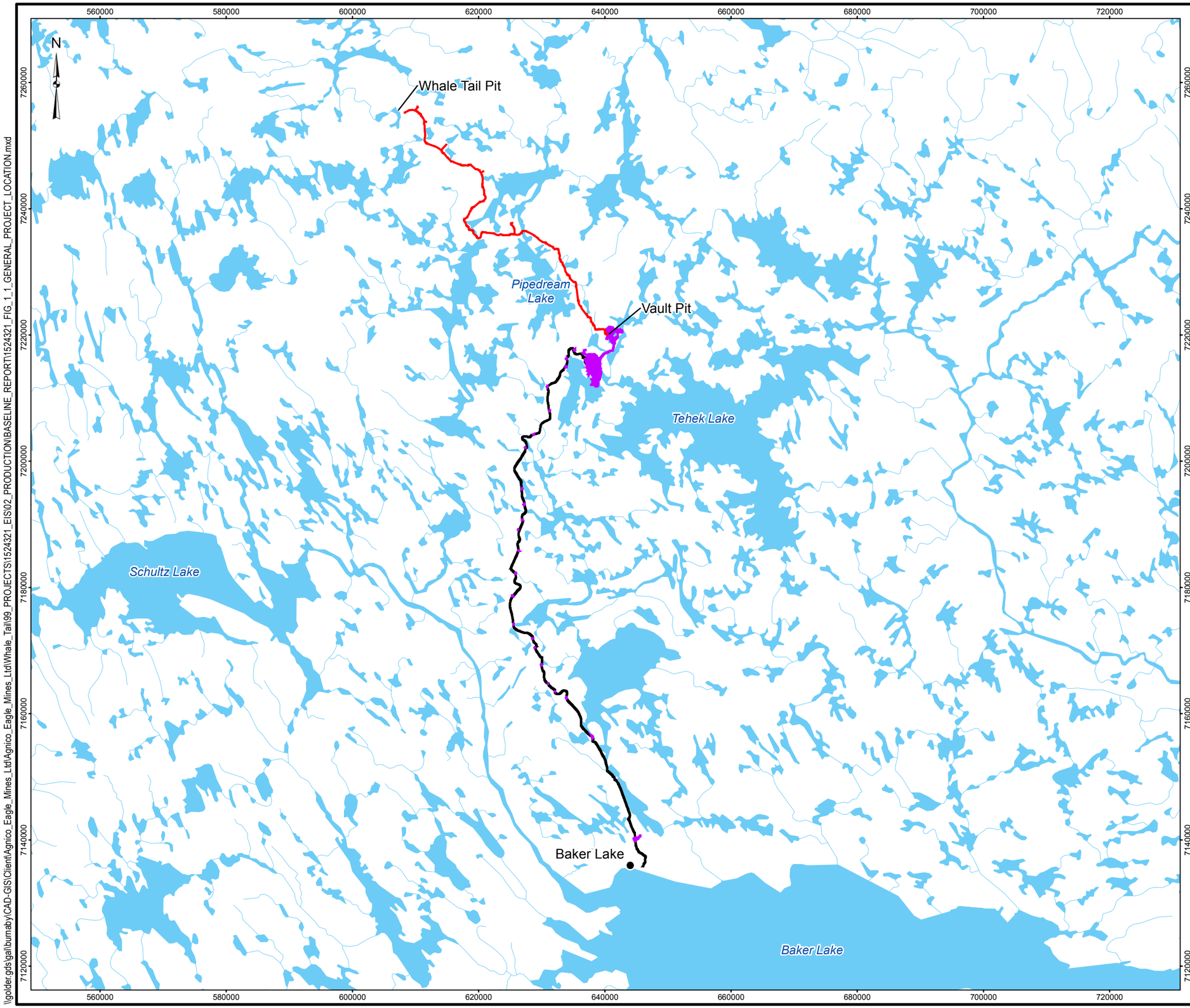
Since 2009, Agnico Eagle has conducted annual noise surveys at five representative locations surrounding the Meadowbank Mine site in support of their Noise Monitoring and Abatement Plan (Agnico Eagle 2009, 2013). The most recent noise monitoring report for Meadowbank Mine completed in 2014 (Agnico Eagle 2014) summarized the noise monitoring survey data from these locations. The locations for the 2009 through 2014 surveys were chosen to characterize the baseline noise levels are within several kilometres of the Meadowbank Mine. Therefore, the monitoring results for these locations are not considered applicable as background noise levels for the current noise survey for the Project (i.e., the future Whale Tail Pit and Haul Road). As a result, an additional baseline noise monitoring survey was completed in 2015.

1.2 Objective

The 2015 noise monitoring survey was completed to obtain information regarding baseline noise levels in the area surrounding the proposed Project. The objectives of the baseline noise survey were:

- to establish the baseline noise levels in the area adjacent to the Project; and
- to collect data that will be used in the noise related section of the EIS for the Project.

The following sections present the results of the baseline noise monitoring conducted at four monitoring sites from August 7 to August 10, 2015.



\\golder.gds\gal\burnaby\CAD-GIS\Client\Agnico_Eagle_Mines_Ltd\Agnico_Eagle_Mines_Ltd\Whale_Tail\99_PROJECTS\1524321_EIS\02_PRODUCTION\BASELINE_REPORT\1524321_FIG_1_1_GENERAL_PROJECT_LOCATION.mxd

LEGEND

- COMMUNITY
- PROPOSED HAUL ROAD
- ALL WEATHER ROAD
- MEADOWBANK INFRASTRUCTURE
- WATERCOURSE
- WATERBODY

REFERENCE

1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200_R0.dwg
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
3. INSET MAP DATA OBTAINED FROM ESRI

DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

12 0 12
KILOMETRES

PROJECT
AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION
WHALE TAIL PIT PROJECT

TITLE

PROJECT LOCATION

Golder Associates

PROJECT		1524321	FILE No.	
DESIGN	JR	24 Sept. 2015	SCALE AS SHOWN	REV. A
GIS	CD	13 Nov. 2015		
CHECK	JR	16 Dec. 2015		
REVIEW	DRW	16 Dec. 2015		

FIGURE 1-1

2.0 METHODS

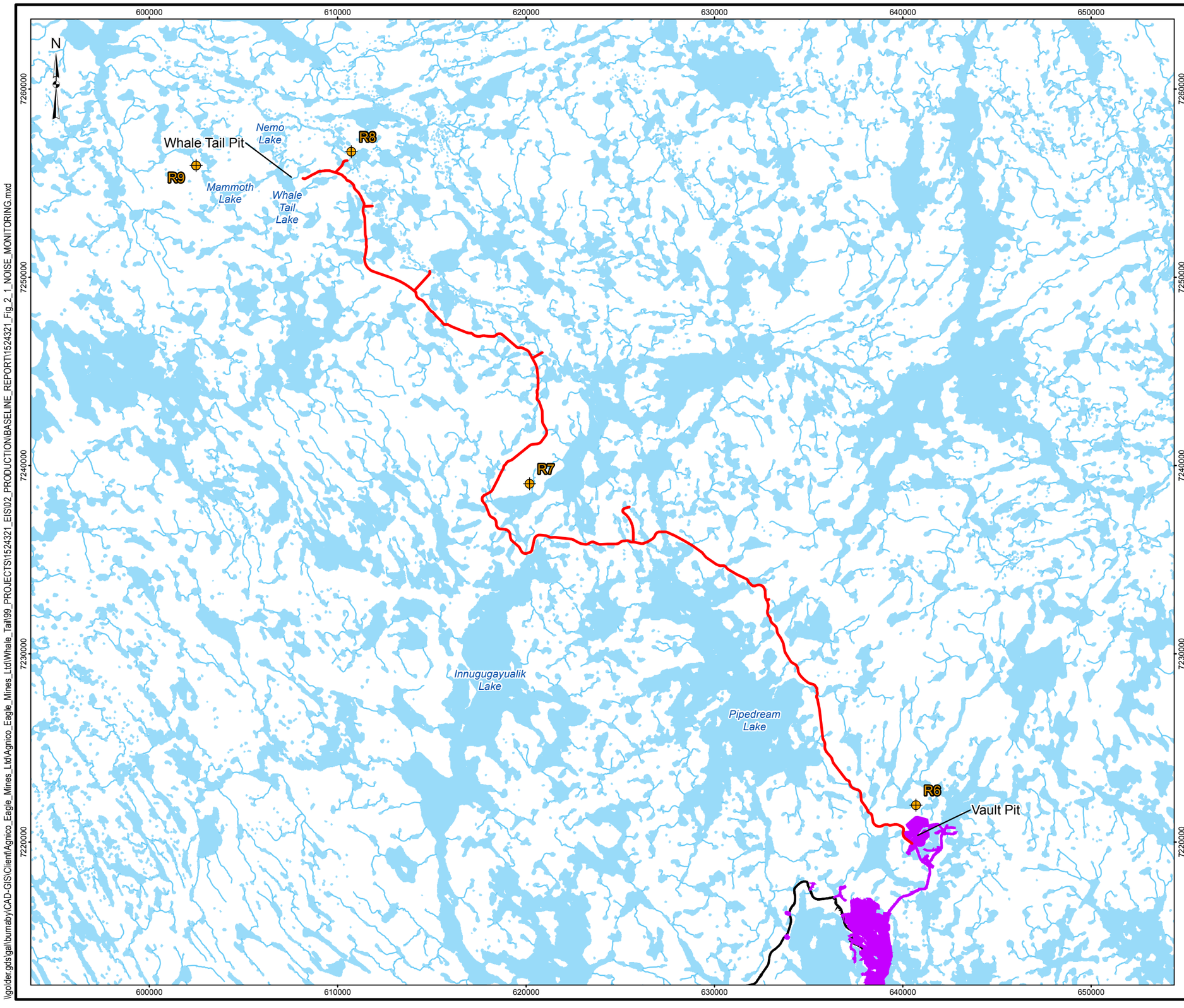
The territory of Nunavut does not have noise specific regulations or guidance that could be applicable to noise baseline measurements. Environment Canada recommends management tools for noise associated with metal mines activities in the document "Environmental Code of Practice for Metal Mines" (Environment Canada 2009), however, there is no specific guidance for baseline noise monitoring in Nunavut in this document. To characterize baseline noise levels existing in the area of the Project, Alberta Energy Regulator (AER) Directive 038 *Noise Control* (EUB 2007) was adopted and followed during the baseline noise program and data analysis. Directive 038 is frequently used to aid assessment of noise effects from mining developments located in the Canadian North (e.g., De Beers 2010 and Dominion Diamond 2014). In addition, the Environmental Impact Review Board (EIRB) (EIRB 2011) explicitly references the AER Directive 038 as the guidance for noise impact assessments in the Inuvialuit Settlement Region of Canada's western Arctic.

2.1 Baseline Noise Monitoring Sites

Directive 038 specifies that noise impact should be assessed at the most impacted residences (including seasonally or permanently occupied dwellings) located within 1.5 km from the project boundary. The proposed Whale Tail Pit will be located at the same location as the existing exploration site on the Amaruq property, and the proposed Haul Road will be built by expanding the exploration access road from the Meadowbank Mine to the Amaruq exploration site. The Project is located in a highly remote area; there are no residences or cabins near Whale Tail Pit as the site is approximately 150 km north of the nearest community of Baker Lake. Therefore, the noise monitoring locations were chosen based on the locations of the existing exploration site and exploration access road. In the absence of residences located within 1.5 km from the exploration site and access road, the following four unoccupied locations were chosen at the distance of about 1.5 km from the proposed Project to be representative of the baseline noise conditions in the area. The baseline noise monitoring program for the Project is the continuation of the annual noise surveys for Meadowbank Mine site (Agnico Eagle 2009, 2013, 2014), which were conducted at five representative locations (R1 – R5) surrounding the Meadowbank Mine site in support of their Noise Monitoring and Abatement Plan. So the four monitoring locations chosen for the baseline noise monitoring for the Project were numbered as R6, R7, R8, and R9:

- R6 is located along the southern portion of the proposed Haul Road and north of Vault Pit, at about 1.5 km from the proposed Haul Road and approximately 1.5 km from the centre of Vault Pit;
- R7 is located between the proposed Whale Tail Pit and Vault Pit, at approximately 1.5 km from the proposed Haul Road; and
- R8 and R9 are located about 1.5 km northwest and northeast of the existing exploration site, respectively.

The locations of monitoring sites are presented in Table 2-1. Figure 2-1 shows the noise monitoring locations, as well as the proposed Haul Road, Whale Tail Pit, and Vault Pit. In the future, the monitoring locations (R6 – R9) identified and evaluated for baseline purposes for the Project may be relocated depending on operational requirements.



\\golder.gds\gal\burnaby\CAD-GIS\Client\Agnico_Eagle_Mines_Ltd\Agnico_Eagle_Mines_Ltd\Whale_Tail\99_PROJECTS\1524321_EIS\02_PRODUCTION\BASELINE_REPORT\1524321_Fig_2_1_NOISE_MONITORING.mxd

LEGEND

- NOISE MONITORING SITE
- PROPOSED HAUL ROAD
- ALL WEATHER ROAD
- WATERCOURSE
- WATERBODY
- MEADOWBANK INFRASTRUCTURE

REFERENCE

1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200_R0.dwg
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

4 0 4
KILOMETRES

PROJECT
AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION
WHALE TAIL PIT PROJECT

TITLE

LOCATION OF BASELINE NOISE MONITORING SITES

Golder Associates

PROJECT		1524321	FILE No.	
DESIGN	AF	1 OCT. 2015	SCALE AS SHOWN	REV. A
GIS	CD	1 OCT. 2015		
CHECK	JR	16 DEC. 2015		
REVIEW	AF	16 DEC. 2015		

FIGURE 2-1

Table 2-1: Location of Noise Monitoring Sites

Noise Monitoring Site	Monitoring Site Description	Universal Transverse Mercator Location (Zone 14, NAD 83)	
		Easting [m]	Northing [m]
R6	Unoccupied site located 1.5 km from proposed Haul Road and approximately 1.5 km from the centre of the Vault Pit	640708	7221964
R7	Unoccupied site located 1.5 km from the proposed Haul Road	620194	7239038
R8	Unoccupied site located 1.5 km northeast from the proposed Whale Tail Pit	610725	7256677
R9	Unoccupied site located 1.5 km northwest from the proposed Whale Tail Pit	602488	7255946

m = metres; km = kilometres; NAD = North American Datum.

2.2 Noise Monitoring Methodology

The methodology of the baseline noise monitoring program was in accordance with Directive 038 (EUB 2007). The noise monitoring was conducted for approximately 72 hours, which allows for the collection of noise data sufficient to characterize the local daytime and nighttime variability of noise levels.

At each monitoring location, a Model 2250 Brüel and Kjær Type I integrating sound level meter (SLM) was used to collect noise measurements and to record audible sound for the entire duration of the monitoring program.

Data parameters recorded during the baseline monitoring survey included:

- equivalent energy noise level over a one-minute time period ($L_{eq,1min}$) in A-weighted decibels (dBA); and
- 1/3 octave band L_{eq} values over a one-minute time period in unweighted decibels (dB).

Due to site-specific weather conditions characterized by strong winds, extra windscreens were determined to be warranted for the microphones to minimize the unwanted effects of wind-induced noise on the monitoring data. In addition to standard environmental microphone screens (i.e., UA 1404 and UA 1679), each monitoring kit was equipped with a secondary windscreen, Brüel and Kjær model NH-2512, designed and developed specifically for noise measurements at high wind speeds in order to minimize wind-induced microphone noise.

Each SLM used during the survey was calibrated with a Brüel and Kjær Type 4231 calibrator immediately before and after each monitoring period to ensure the sound meter's variance was within 1 dB. The calibration data were logged by the meter, and calibration results were recorded in the field notes. The recordings of calibration signals are documented in Appendix A.

Directive 038 requires noise data be collected under appropriate weather conditions including the absence of steady precipitation, snow, water, or ice ground cover, as well as under meteorological conditions acceptable for noise measurement, which includes restrictions on maximum wind speed (EUB 2007). The survey was conducted during the summer and therefore the ground surface was not covered by either snow or ice. During the survey, weather data were collected using Nielsen-Kellerman Kestrel 4500 pocket weather meters deployed near the noise monitoring sites. The weather meters were set to record wind speed, wind direction, temperature, and relative humidity data every five minutes. The weather data (wind speed, wind direction, temperature, and

humidity) are presented in Appendix B. Data from the weather meters were used to screen the collected noise data based on the weather condition requirements outlined in Directive 038. In addition, direct observations in the field and field notes taken by the survey team, including information regarding precipitation, cloud cover, wind direction, and audible noise sources, were used in the data analysis.

2.2.1 Data Analysis Methodology

Data recorded at each of the four monitoring sites were downloaded to a computer for analysis with the Brüel and Kjær 7820 Evaluator software program.

Following the guidance of Directive 038, a maximum wind speed of 15 kilometres per hour (km/h) (4.17 metres per second [m/s]) was used as the acceptable limit for the data analysis. Data collected when wind speed was less than 15 km/h was considered valid, while data collected when wind speed was greater than 15 km/h was not. The 15 km/h limit allowed for the removal of periods of high wind resulting in potential increased noise levels due to wind effects. The 15 km/h wind speed limit is set by Directive 038 and is not affected by the presence or absence of the wind screens.

Subsequently, based on Directive 038, any noise data containing recordings of anomalous or abnormal noise sources not representative of the existing noise levels were also removed as invalid. Since the Project is located in a remote area surrounded by the tundra and not exposed to heavy human development (i.e., industry), there were no specific anthropogenic noise sources identified except the activities in the existing Vault Pit and the existing exploration site, which were continuously operating during the noise survey and were considered to be normal noise sources for the Project area. During the analysis of the data, specific abnormal noise events were identified mainly by listening to the sound recordings. Other indicators used to identify sources of noise were field observations. Abnormal noise sources identified and subsequently removed included the following:

- technician activities;
- wildlife in the proximity of microphone;
- helicopter flyovers in the proximity of the microphone; and
- wind-induced microphone noise.

While all one-minute data samples recorded when wind speeds exceeded the Directive 038 wind speed limit (i.e., 15 km/h) were automatically removed during the first step of data analysis, one-minute data samples recorded at wind speeds below the Directive 038 limit were also manually removed when wind-generated noise was clearly audible (e.g., as the result of a short but intense gust).

Hourly noise levels ($L_{eq,1hr}$) were calculated for each hour of monitoring based on the valid one-minute data. The valid one-minute data were used to calculate daytime equivalent energy noise levels ($L_{eq,day}$) and nighttime equivalent energy noise levels ($L_{eq,night}$) for each location. Daytime is defined as the time period between 7:00 a.m. to 10:00 p.m., and nighttime as the time period between 10:00 p.m. to 7:00 a.m., in accordance with Directive 038 (EUB 2007). A noise monitoring survey is considered to be acceptable under Directive 038 if there are a minimum of 180 valid minutes during the daytime period and 180 valid minutes during the nighttime period.

3.0 RESULTS

This section presents the results obtained during baseline noise monitoring at receptor sites associated with the Project, as well as a description of baseline noise conditions within the Project area.

3.1 Monitoring Site R6

Monitoring site R6 was located approximately 1.5 km east from the proposed Haul Road and approximately 1.5 km from the centre of the Vault Pit. At the time of the survey, the terrain was relatively flat and covered by vegetation typical of tundra (i.e., low vegetation). In addition, the ground surface near the receptor was covered by scattered rocks. The waste rock storage area of the Vault Pit is located approximately 750 m south from the monitoring site.

The noise levels at monitoring site R6 were influenced by operations at Vault Pit, as well as noise generated by wind. Invalid noise events removed from the monitored data included technician activities, periods of high speed wind, and helicopter flyovers in the proximity of the microphone. The sound monitoring equipment deployed at R6 is shown in Photo 3-1.

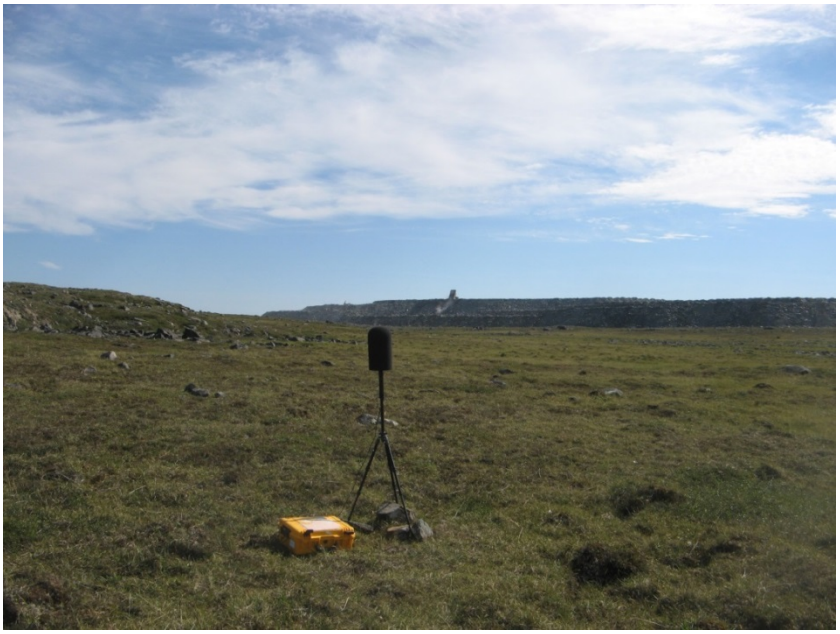


Photo 3-1: Sound Level Meter Deployed at Monitoring Site R6 (Vault Pit waste rock storage area can be seen in the background)

The individual $L_{eq,1min}$ recorded at monitoring site R6 are shown graphically in Figure 3-1. The invalid samples removed from the calculation of $L_{eq,day}$ and $L_{eq,night}$ are indicated. The weather data collected during the survey (wind speed, wind direction, temperature, and humidity) are presented in Appendix B.

Filtered hourly noise levels ($L_{eq,1hr}$) and daytime and nighttime noise levels ($L_{eq,day}$ and $L_{eq,night}$) at R6 are presented in Appendix C, Table C-1. As discussed in Section 2.2.1, the $L_{eq,1hr}$ values were obtained by energy averaging the valid $L_{eq,1min}$ data. Daytime and nighttime noise levels ($L_{eq,day}$ and $L_{eq,night}$) are summarized in

Table 3-1. There are more than 180 valid minutes during both the daytime and nighttime periods; therefore, the monitoring at R6 is considered acceptable according to Directive 038 criteria.

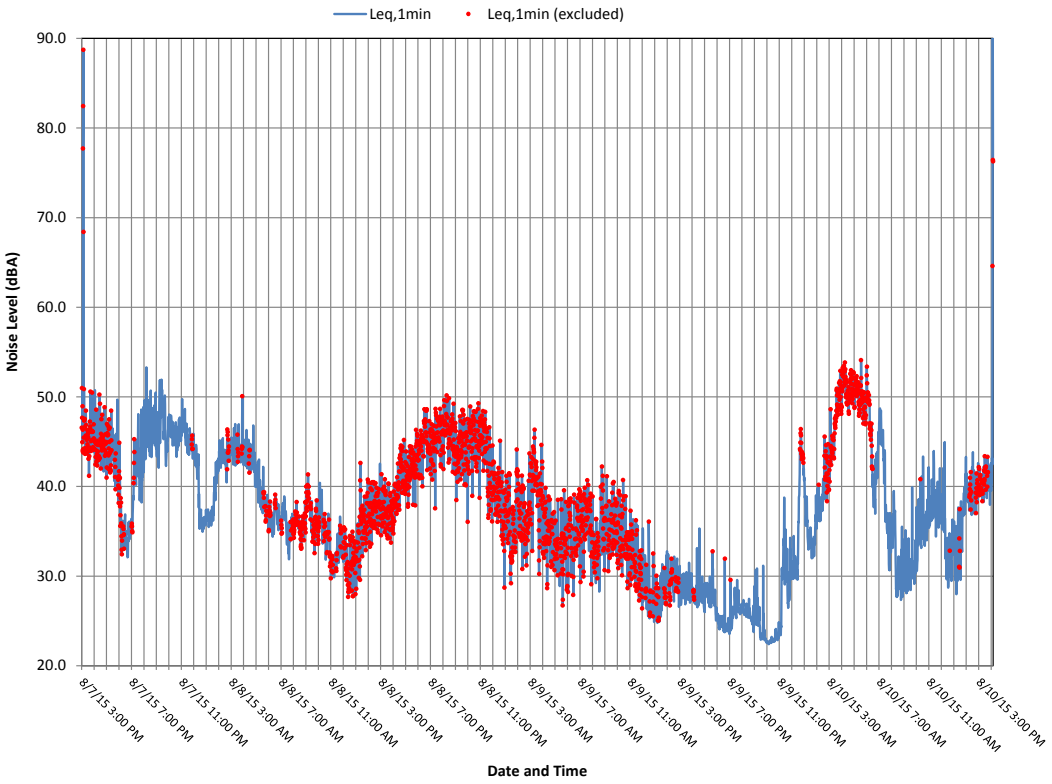


Figure 3-1: One-minute Noise Data Recorded at Monitoring Site R6

Table 3-1: Daytime and Nighttime Noise Levels at Monitoring Site R6

Period	L_{eq} [dBA]	Number of Valid Minutes
Daytime (7:00 a.m. to 10:00 p.m.)	39	1,462
Nighttime (10:00 p.m. to 7:00 a.m.)	41	814

3.2 Monitoring Site R7

Monitoring site R7 was located approximately 1.5 km east from the proposed Haul Road. The SLM was deployed at an elevated area gently sloping towards a nearby lake. The ground surface around the monitoring site at the time of the survey was covered by vegetation typical of tundra (i.e., low vegetation). In addition, the ground surface was covered with scattered rocks. The noise level at R7 was influenced by noise generated by wind and waves on the nearby lake, sporadic presence of wildlife (e.g., birds), and sporadic helicopter flyovers. Invalid noise events removed from the monitored data included technician activities, periods of extensive wind, insects and birds nearby the microphone, and helicopter flyovers in the proximity of the microphone. The sound monitoring equipment deployed at monitoring site R7 is shown in Photo 3-2.

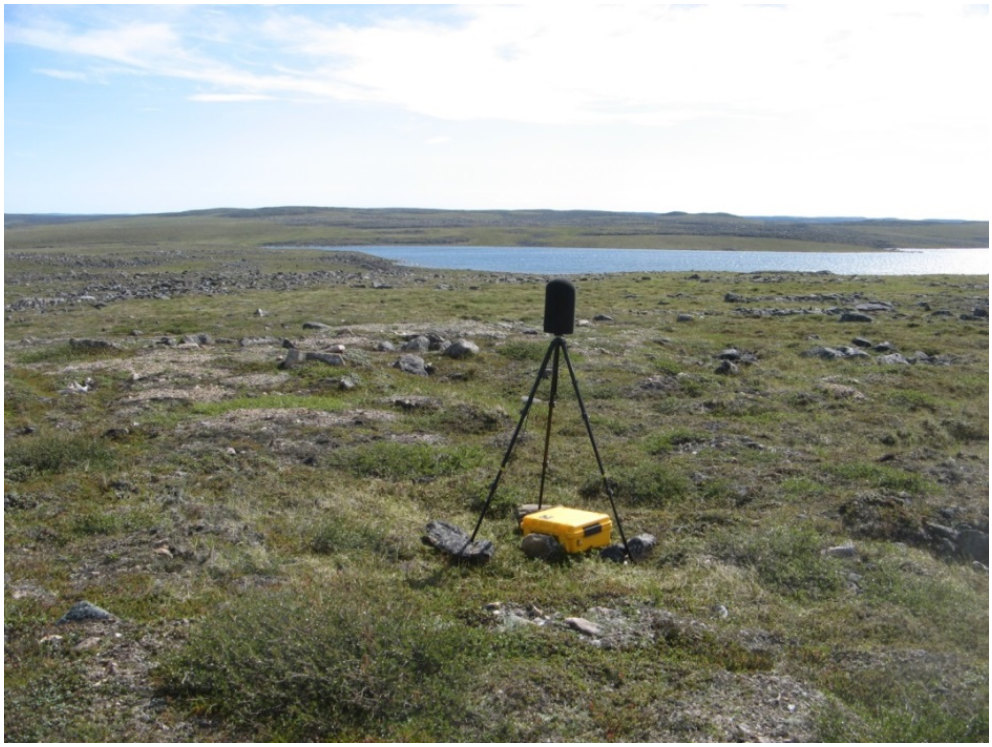


Photo 3-2: Sound Level Meter Deployed at Monitoring Site R7

The individual $L_{eq,1min}$ recorded at R7 are shown graphically in Figure 3-2. The invalid samples removed from the calculation of $L_{eq,day}$ and $L_{eq,night}$ are indicated. The weather data collected during the survey (wind speed, wind direction, temperature, and humidity) are presented in Appendix B.

Filtered hourly noise levels ($L_{eq,1hr}$) and daytime and nighttime noise levels ($L_{eq,day}$ and $L_{eq,night}$) at R7 are presented in Appendix C, Table C-2. As discussed in Section 2.2.1, the $L_{eq,1hr}$ values were obtained by energy averaging the valid $L_{eq,1min}$ data. Daytime and nighttime noise levels ($L_{eq,day}$ and $L_{eq,night}$) are summarized in Table 3-2. There are more than 180 valid minutes during both the daytime and nighttime periods; therefore, the monitoring at R7 is considered acceptable according to Directive 038 criteria.

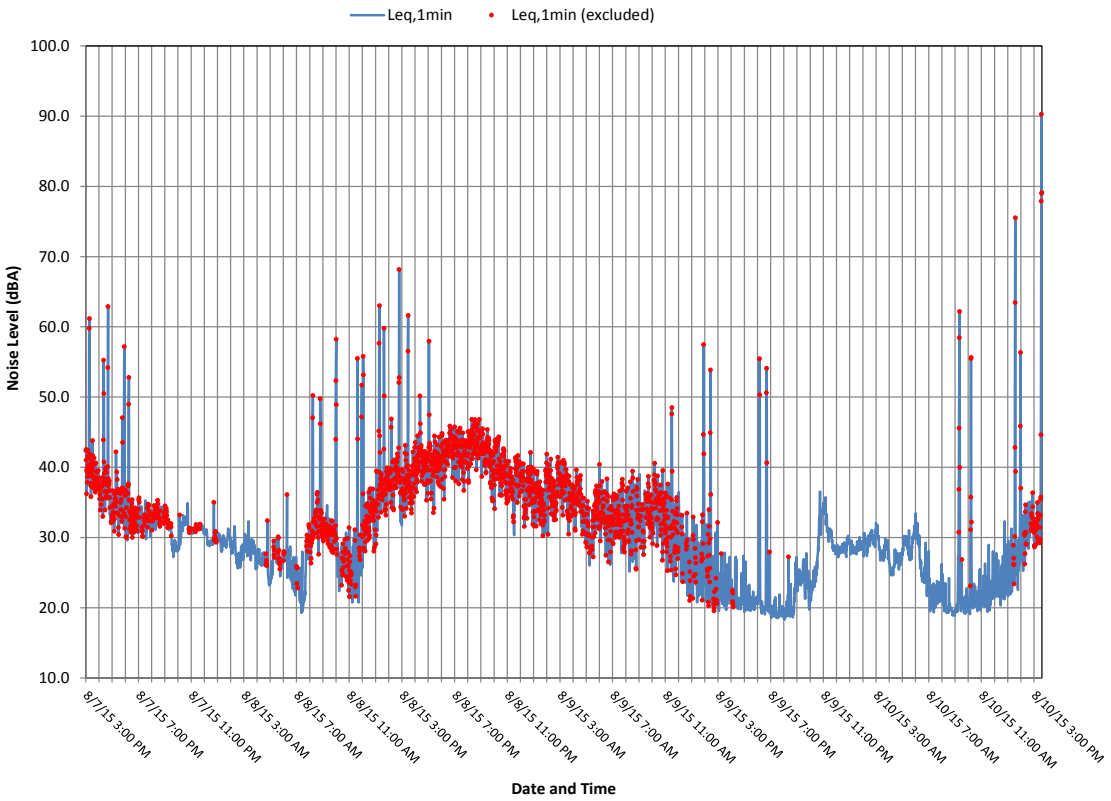


Figure 3-2: One-minute Noise Data Recorded at Monitoring Site R7

Table 3-2: Daytime and Nighttime Noise Levels at Monitoring Site R7

Period	L_{eq} [dBA]	Number of Valid Minutes
Daytime (7:00 a.m. to 10:00 p.m.)	29	1,295
Nighttime (10:00 p.m. to 7:00 a.m.)	29	1,065

3.3 Monitoring Site R8

Monitoring site R8 was located on an elevated plateau approximately 1.5 km northeast from the proposed Whale Tail Pit site. At the time of the survey, the ground surface was covered by vegetation typical of tundra (i.e., low vegetation) and covered by scattered rocks. The noise levels at R8 were influenced by noise generated by wind, operations at the proposed Whale Tail Pit site, and helicopter traffic associated with exploration activities. Invalid noise events removed from the monitored data included technician activities, periods of extensive wind, and helicopter flyovers in the proximity of the microphone. Exploration activities (including several exploration drill rigs) at the proposed satellite deposit were continuously operating during the survey. However, the influence of these potential noise sources was identified not to be dominant at R8 through listening to the sound recordings. The sound monitoring equipment deployed at R8 is shown in Photo 3-3.

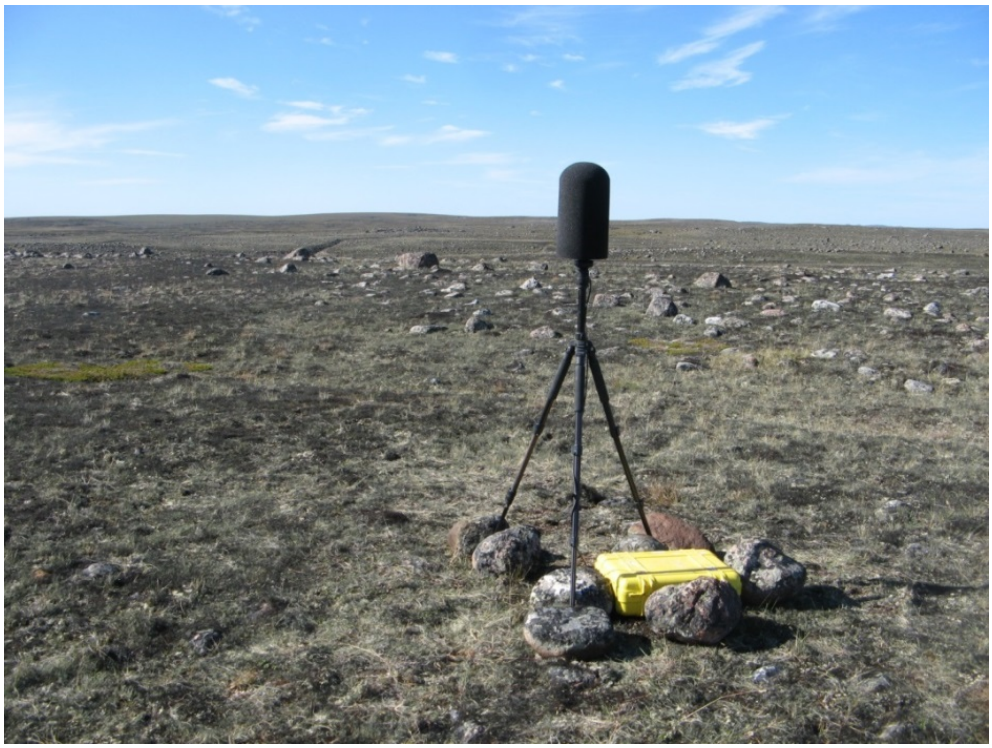


Photo 3-3: Sound Level Meter Deployed at Monitoring Site R8

The individual $L_{eq,1min}$ recorded at R8 are shown graphically in Figure 3-3. The invalid samples removed from the calculation of $L_{eq,day}$ and $L_{eq,night}$ are indicated. The weather data collected during the survey (wind speed, wind direction, temperature, and humidity) are presented in Appendix B.

Filtered hourly noise levels ($L_{eq,1hr}$) and daytime and nighttime noise levels ($L_{eq,day}$ and $L_{eq,night}$) at R8 are presented in Appendix C, Table C-3. As discussed in Section 2.2.1, the $L_{eq,1hr}$ values were obtained by energy averaging the valid $L_{eq,1min}$ data. Daytime and nighttime noise levels ($L_{eq,day}$ and $L_{eq,night}$) are summarized in Table 3-3. There are more than 180 valid minutes during both the daytime and nighttime periods; therefore, the monitoring at R8 is considered acceptable according to Directive 038 criteria.

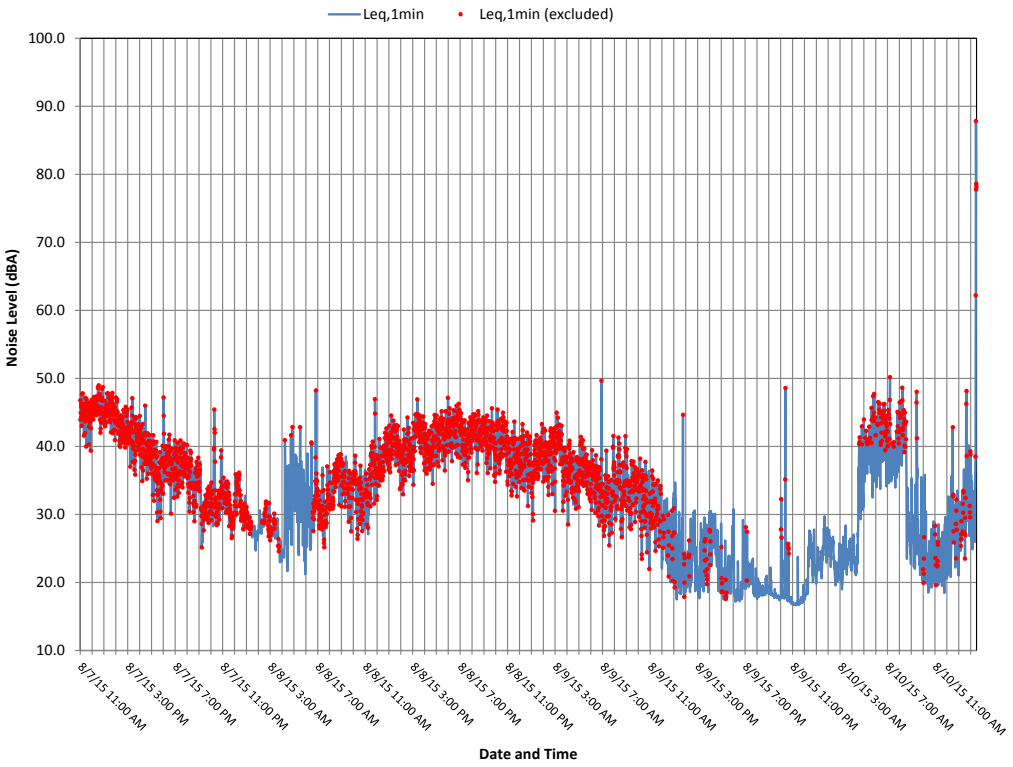


Figure 3-3: One-minute Noise Data Recorded at Monitoring Site R8

Table 3-3: Daytime and Nighttime Noise Levels at Monitoring Site R8

Period	L_{eq} [dBA]	Number of Valid Minutes
Daytime (7:00 a.m. to 10:00 p.m.)	30	1,006
Nighttime (10:00 p.m. to 7:00 a.m.)	31	761

3.4 Monitoring Site R9

Monitoring site R9 was located approximately 1.5 km northwest from the proposed Whale Tail Pit. At the time of the survey, the ground surface was covered by vegetation typical of tundra (i.e., low vegetation) and covered by scattered rocks. The noise levels at R9 were influenced by noise generated by wind, operations at the exploration camp, and helicopter traffic associated with exploration activities. Invalid noise events removed from the monitored data included technician activities, periods of high wind speeds, and helicopter flyovers in the proximity of the microphone. Exploration activities (including several exploration drill rigs) at the proposed Whale Tail Pit satellite deposit were continuously operating during the survey. However, the influence of these potential noise sources was identified not to be dominant at R9 through listening to the sound recordings. The sound monitoring equipment deployed at R9 is shown in Photo 3-4.

Photo 3-4: Sound Level Meter Deployed at Monitoring Site R9

The individual $L_{eq,1min}$ recorded at R9 are shown graphically in Figure 3-4. The invalid samples removed from the calculation of $L_{eq,day}$ and $L_{eq,night}$ are indicated. The weather data collected during the survey (wind speed, wind direction, temperature, and humidity) are presented in Appendix B.

Filtered hourly noise levels ($L_{eq,1hr}$) and daytime and nighttime noise levels ($L_{eq,day}$ and $L_{eq,night}$) at R9 are presented in Appendix C, Table C-4. As discussed in Section 2.2.1, the $L_{eq,1hr}$ values were obtained by energy averaging the valid $L_{eq,1min}$ data. Daytime and nighttime noise levels ($L_{eq,day}$ and $L_{eq,night}$) are summarized in Table 3-4. There are more than 180 valid minutes during both the daytime and nighttime periods; therefore, the monitoring at R9 is considered acceptable according to Directive 038 criteria.

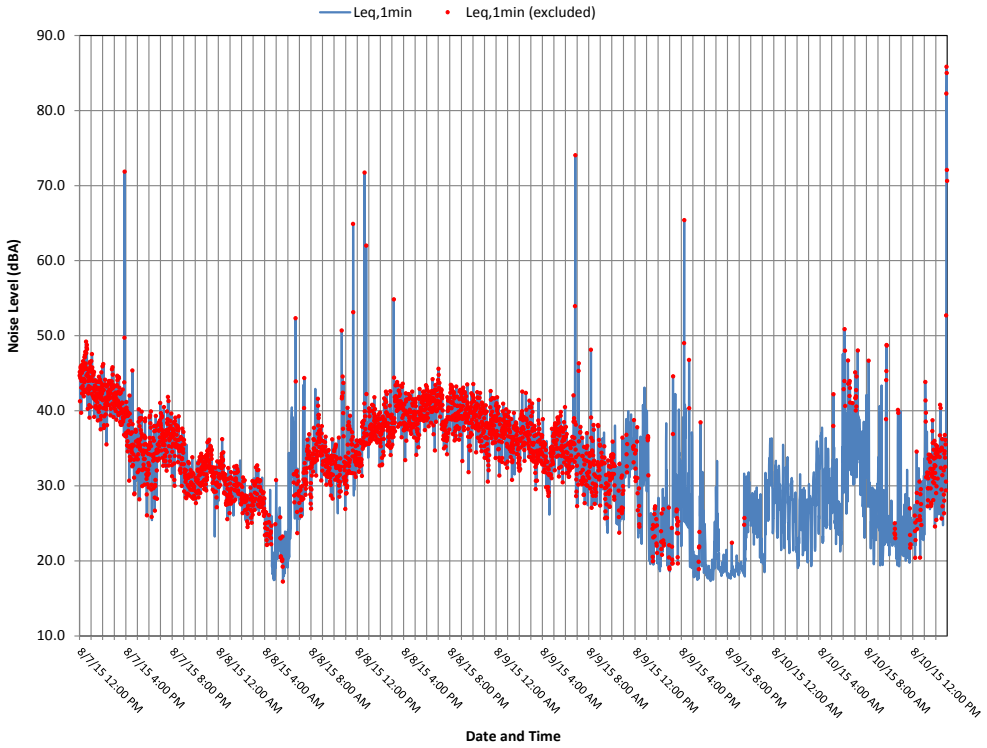


Figure 3-4: One-minute Noise Data Recorded at Monitoring Site R9

Table 3-4: Daytime and Nighttime Noise Levels at Monitoring Site R9

Period	L_{eq} [dBA]	Number of Valid Minutes
Daytime (7:00 a.m. to 10:00 p.m.)	31	1,089
Nighttime (10:00 p.m. to 7:00 a.m.)	31	747

4.0 SUMMARY

Four monitoring locations were chosen to characterize the baseline noise levels for the exploration site and access road of the Project. In future the monitoring locations identified and evaluated for baseline purposes for the Project may be relocated depending on operational requirements.

The results indicate that the baseline noise levels in the area of the proposed Project, except for the area adjacent to Vault Pit operations (i.e., R6), are primarily influenced by noise generated by natural noise sources, such as wind.

Table 4-1 summarizes the daytime and nighttime noise levels at the monitoring sites for the Project. The baseline noise levels established as result of the noise monitoring program are considered representative of the baseline noise conditions in the area associated with the Project. The results presented in Table 4-1 indicate that the noise levels measured at noise monitoring sites varied between 29 dBA and 39 dBA for daytime, and between 29 dBA and 41 dB for nighttime, respectively.

Table 4-1: Daytime and Nighttime Noise Levels at Project Monitoring Sites

Noise Monitoring Site	$L_{eq,day}$ [dBA]	$L_{eq,\ night}$ [dBA]
R6	39	41
R7	29	29
R8	30	31
R9	31	31

Report Signature Page

GOLDER ASSOCIATES LTD.

Victor Young, M.Sc.
Acoustic Scientist

Andrew Faszer, BSc, INCE, PEng
Senior Acoustic Engineer

ZY/VY/AF/DF/jr

https://capws.golder.com/sites/p1524321amaruqwhaletailbaselineandeis/baseline/p1500 noise/noise reporting/doc 031-1524321 whale tail baseline noise report ver a.docx

5.0 REFERENCES

Agnico Eagle (Agnico Eagle Mines Limited). 2009. Noise Management and Abatement Plan, Meadowbank Gold Project. Version 1.

Agnico Eagle. 2013. Noise Management and Abatement Plan, Meadowbank Gold Project. Version 2.

Agnico Eagle. 2014. Meadowbank Gold Project – 2014 Annual Report Appendix G11 Noise Monitoring Report.

De Beers. 2010. Environmental Impact Statement for the Gahcho Kué Project.

Dominion Diamond. 2014. Jay Project Developer's Assessment Report.

EIRB (Environmental Impact Review Board). 2011. Environmental Impact Review Guidelines.

Environment Canada. 2009. Environmental Code of Practice for Metal Mines.

EUB (Alberta Energy and Utilities Board). 2007. Directive 038: Noise Control. Issued February 16, 2007.

APPENDIX A

Calibration Results

This Appendix presents the calibration results for the sound level meters used at the monitoring sites for the Project baseline noise measurements. The Brüel and Kjær Type 4231 calibrator emits a 1,000 Hz tone at a sound pressure level of 94 dB. For a calibration to be valid, the sound level meter must read 94 ± 1 dB.

At each monitoring site, one initial calibration before recording and one final calibration after recording were made for the sound level meter. The results of the calibration process at each monitoring station are presented graphically below with the measured sound pressure level during calibration shown as a blue line (the red lines shown in the figures are cursors and are an artifact of figure generation via screen capture from the data analysis software).

1.0 CALIBRATION RECORD

1.1 Monitoring Site R6

Each of the sound level meter initial and final calibration measurements was at 94 ± 1 dB, as indicated on Figure A-1 and Figure A-2, respectively, at noise monitoring site R6.

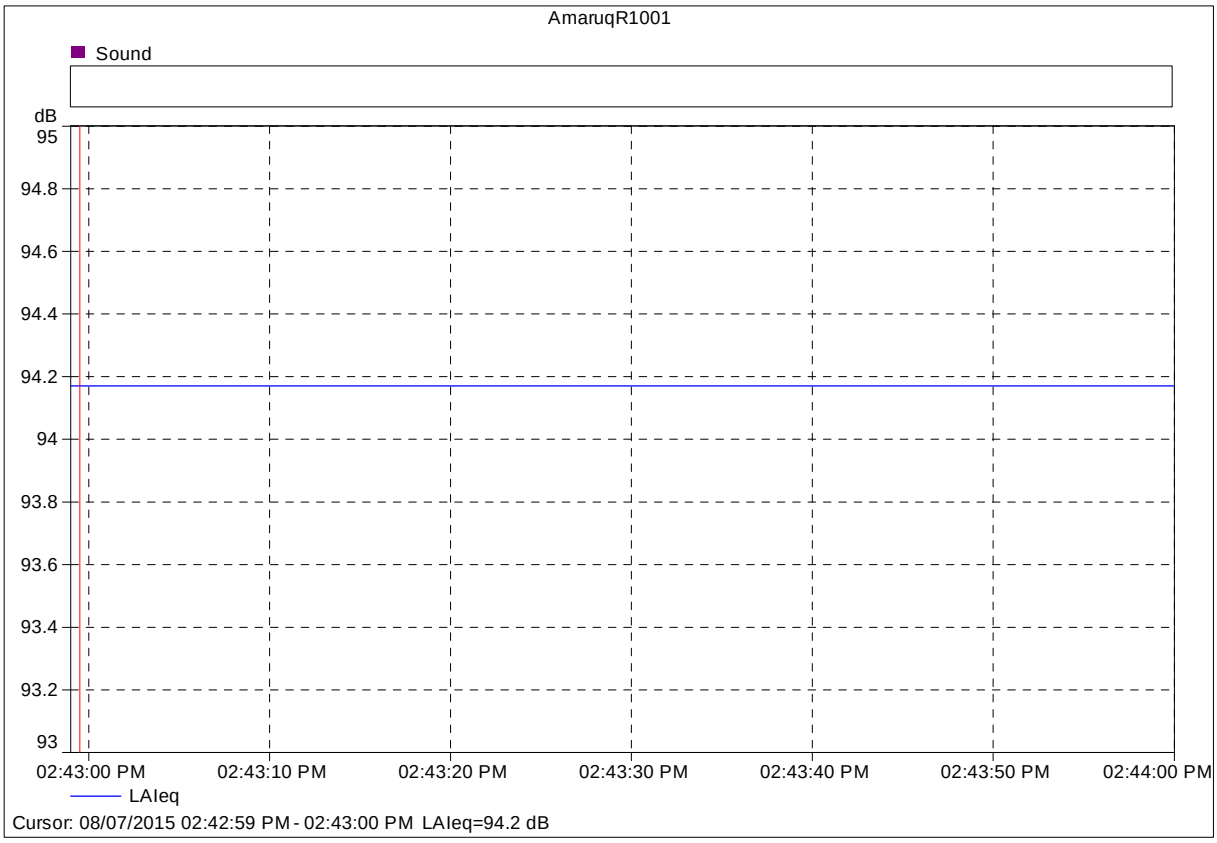


Figure A-1 Monitoring Site R6: Initial Calibration

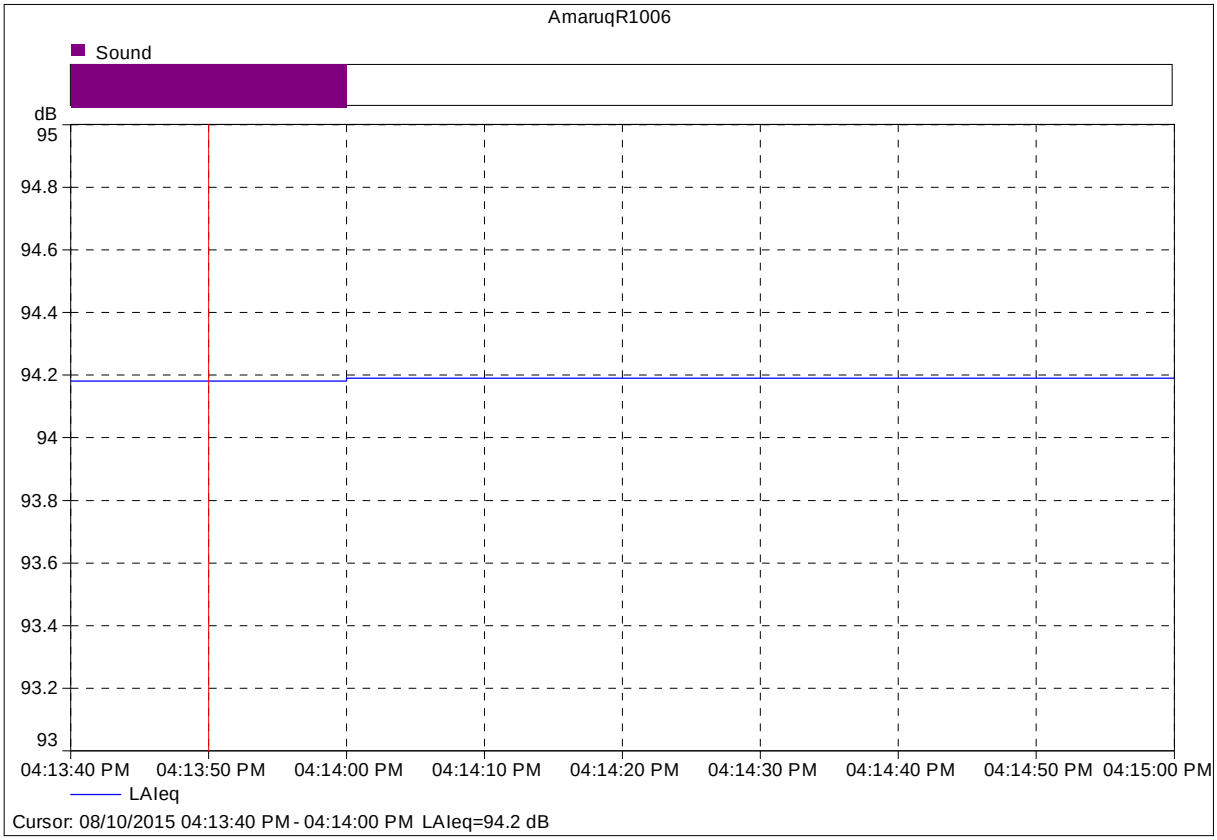


Figure A-2 Monitoring Site R6: Final Calibration

1.2 Monitoring Site R7

Each of the sound level meter initial and final calibration measurements was at 94 ± 1 dB, as indicated on Figure A-3 and Figure A-4, respectively, at noise monitoring site R7.

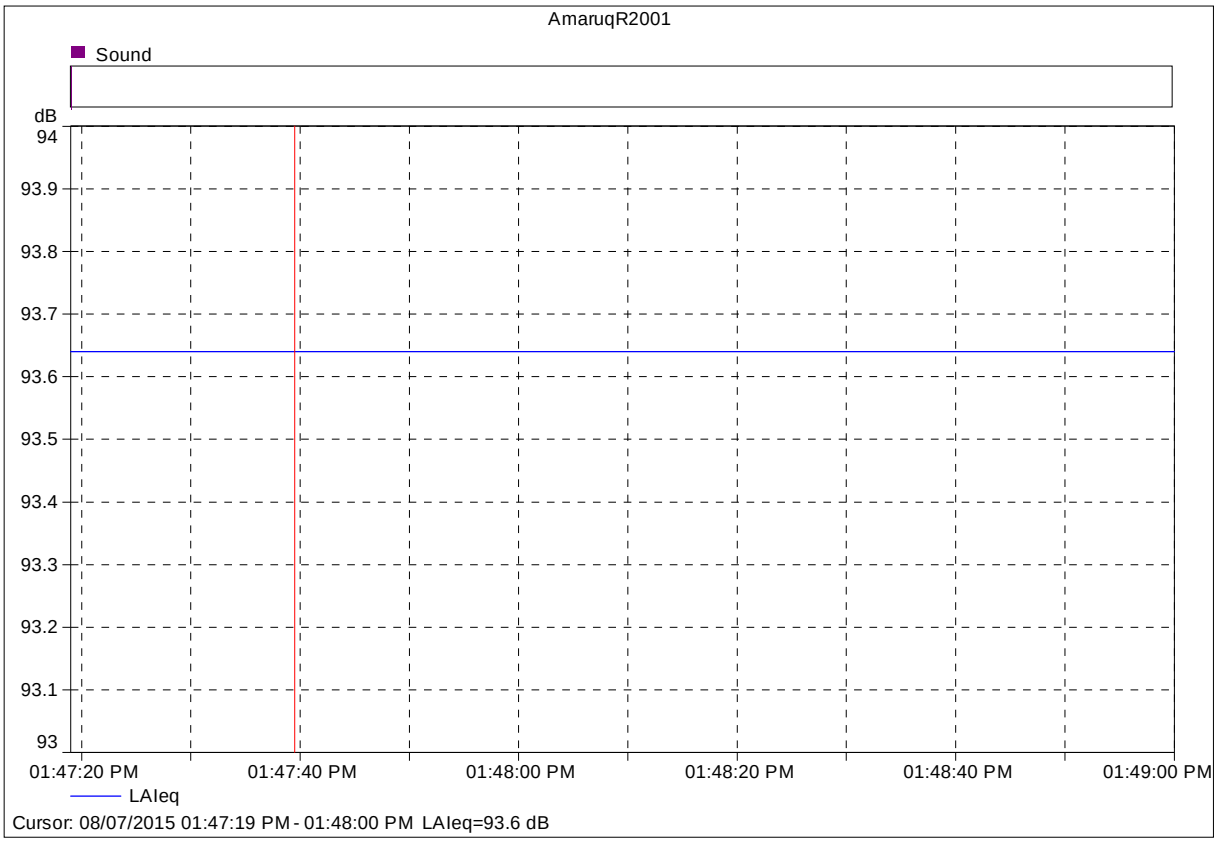


Figure A-3 Monitoring Site R7: Initial Calibration

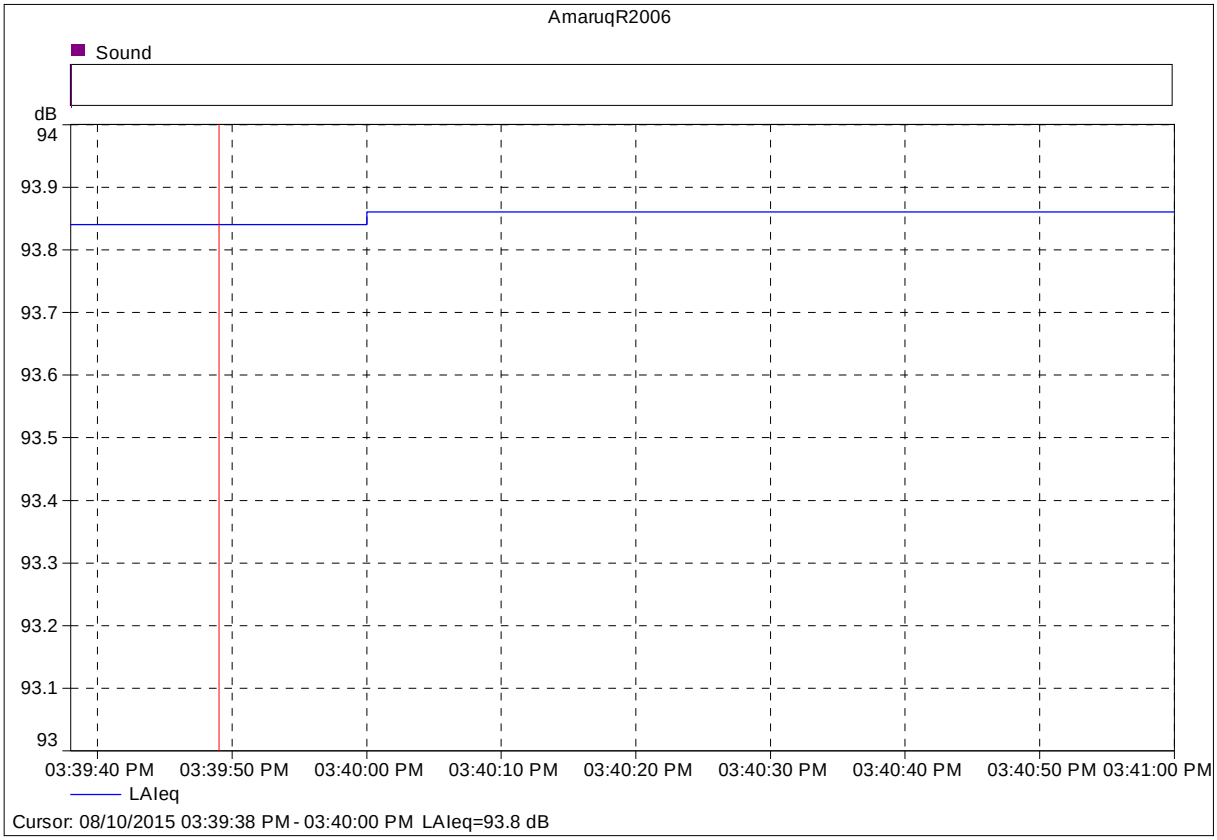


Figure A-4 Monitoring Site R7: Final Calibration

1.3 Monitoring Site R8

Each of the sound level meter initial and final calibration measurements was at 94 ± 1 dB, as indicated on Figure A-5 and Figure A-6, respectively, at noise monitoring site R8.

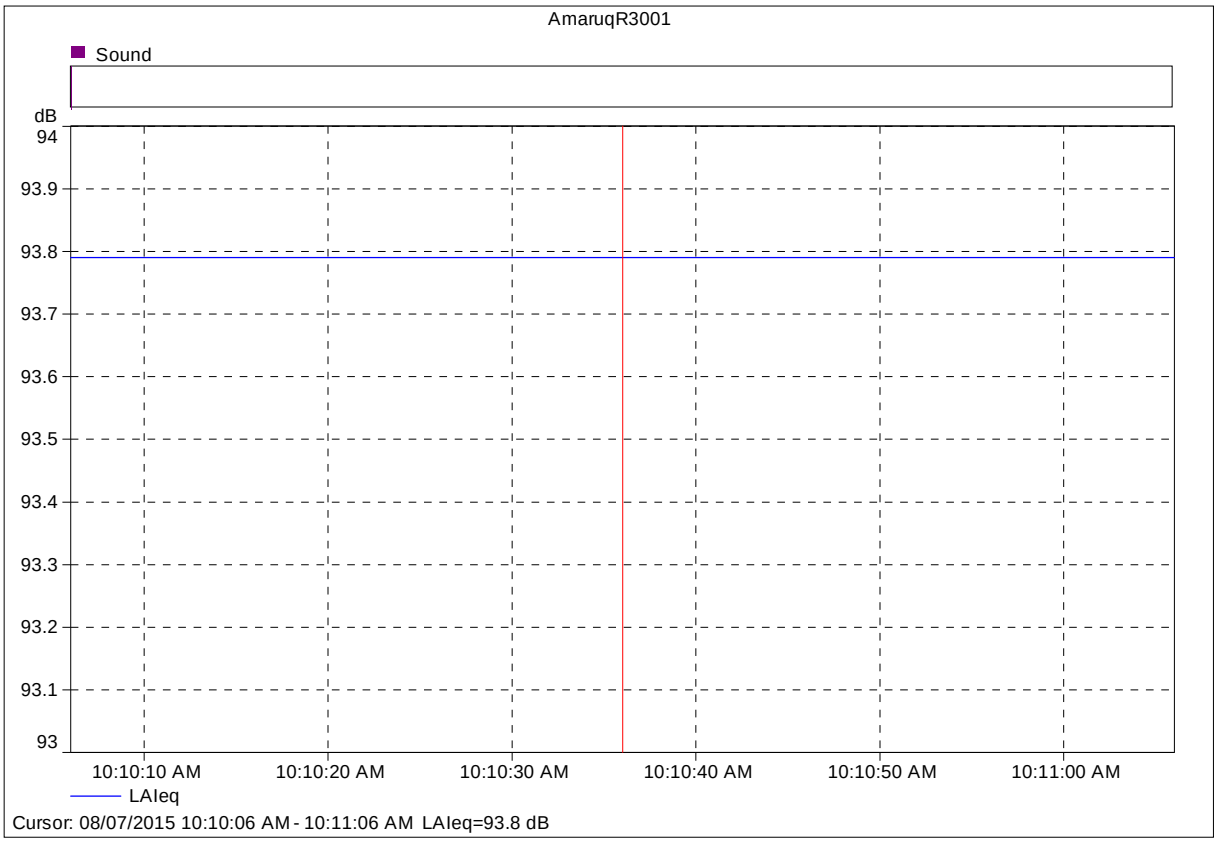


Figure A-5 Monitoring Site R8: Initial Calibration

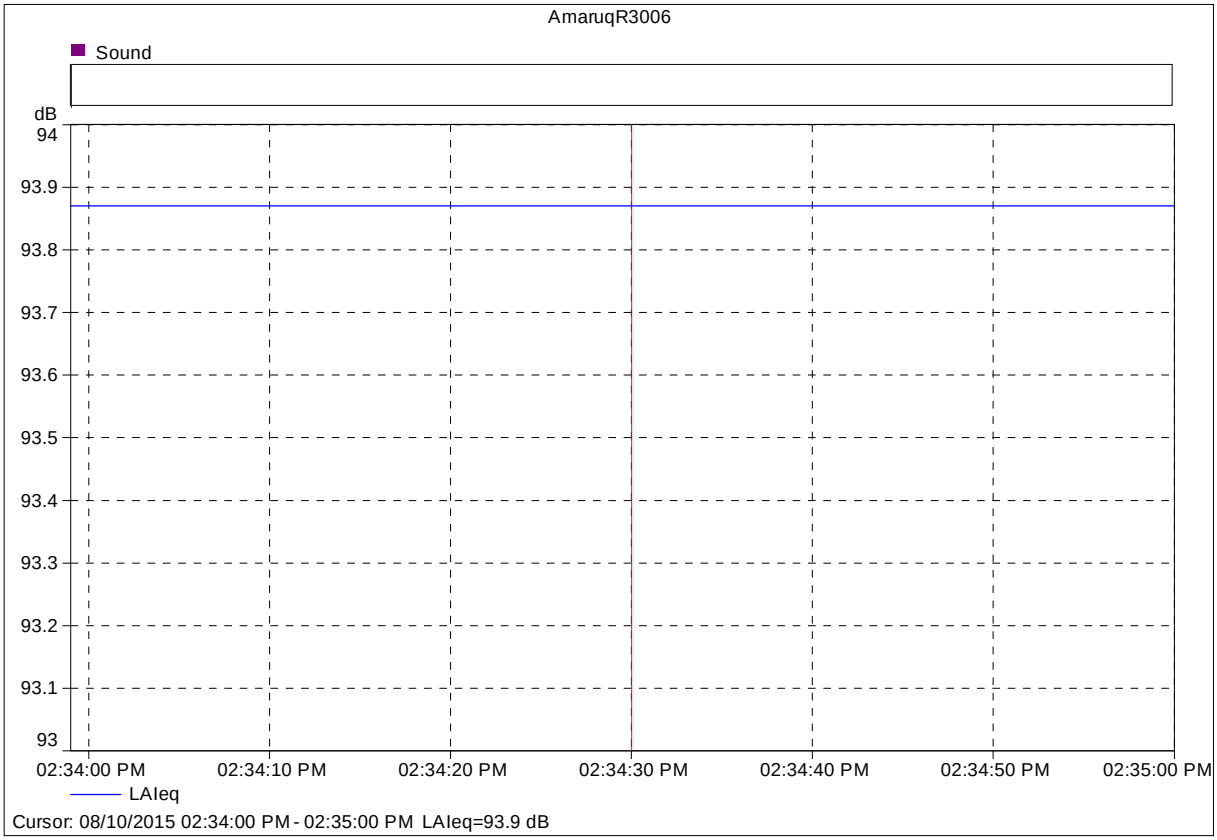


Figure A-6 Monitoring Site R8: Final Calibration

1.4 Monitoring Site R9

Each of the sound level meter initial and final calibration measurements was at 94 ± 1 dB, as indicated on Figure A-7 and Figure A-8, respectively, at noise monitoring site R9.

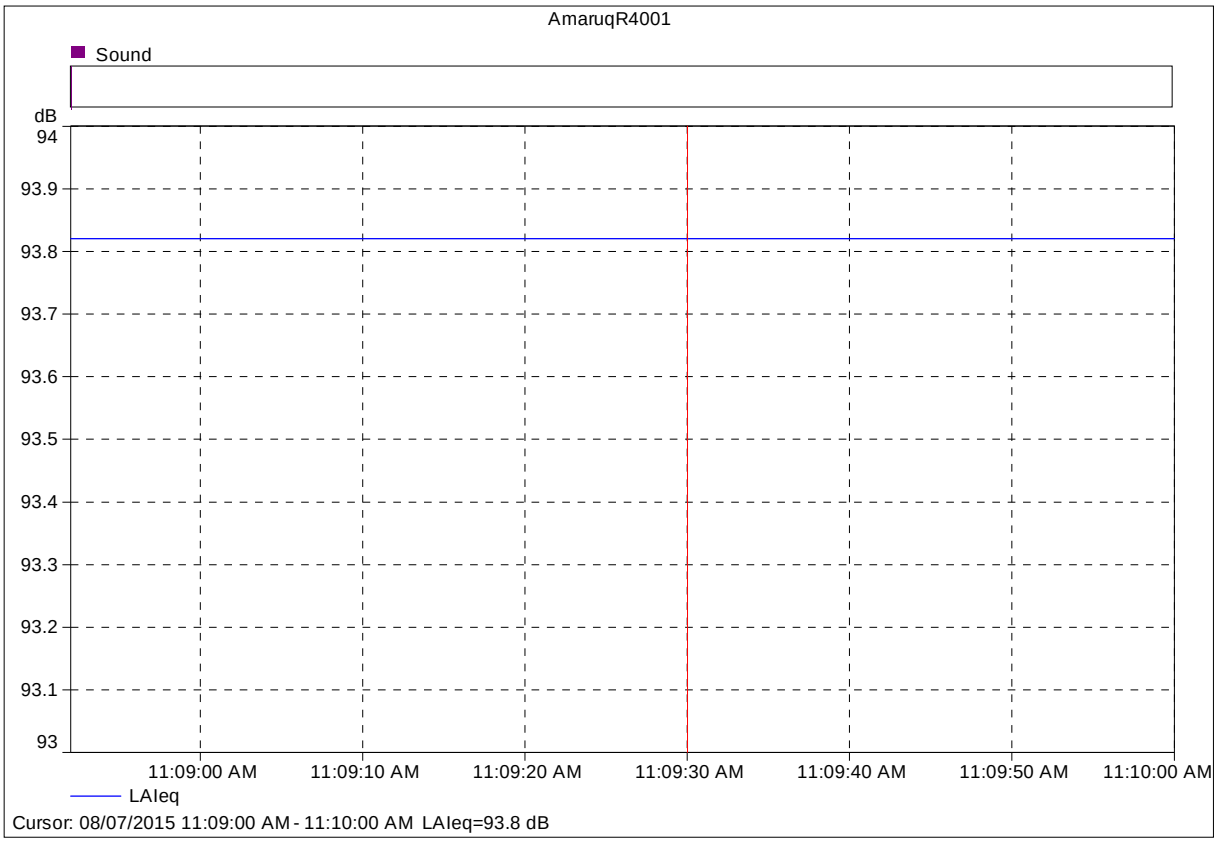


Figure A-7 Monitoring Site R9: Initial Calibration

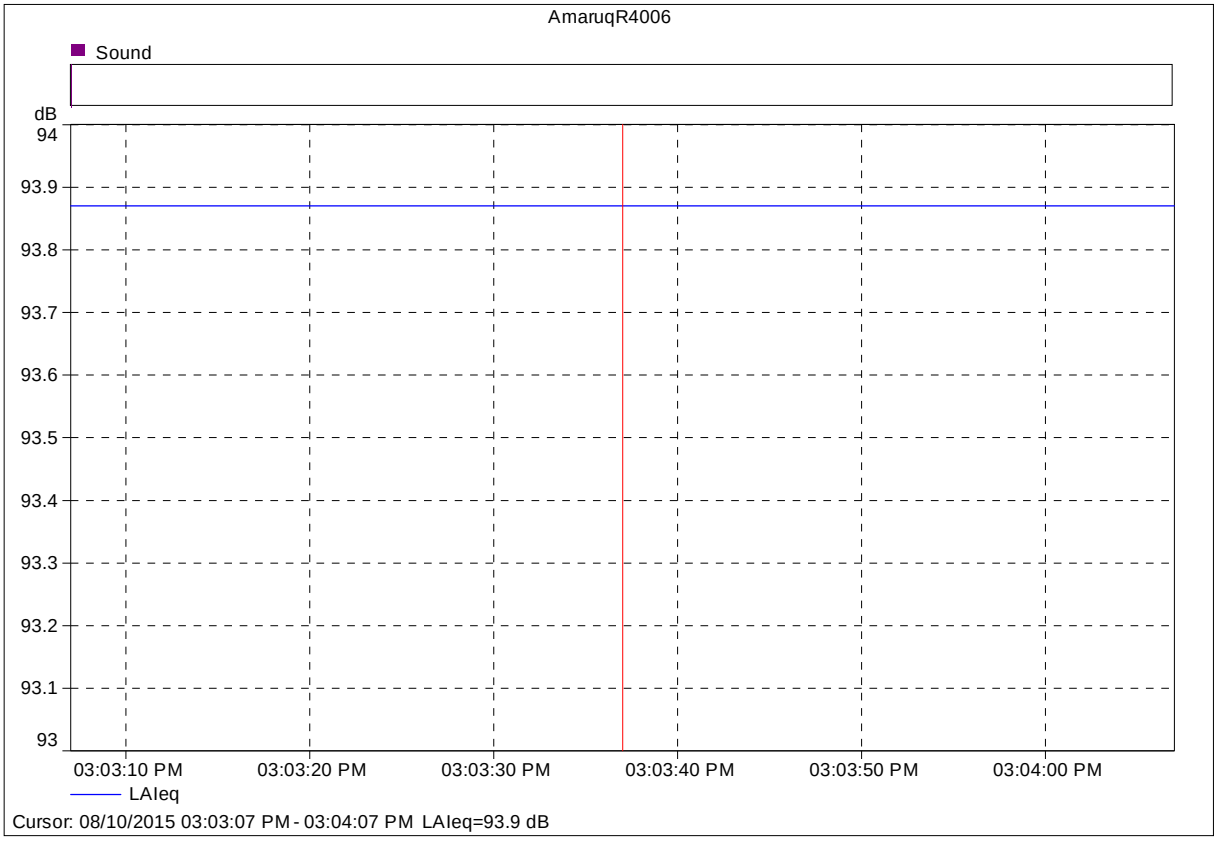


Figure A-8 Monitoring Site R9: Final Calibration

APPENDIX B

Weather Data

Appendix B provides information regarding weather conditions observed at each monitoring site during the noise baseline measurements for the Project.

1.0 WEATHER DATA

1.1 Monitoring Site R6

Figure B-1 shows the wind speed and wind direction recorded at monitoring site R6. The acceptable limit of wind speed (15 km/h) for the data analysis based on Directive 038 is shown in Figure B-1 as well.

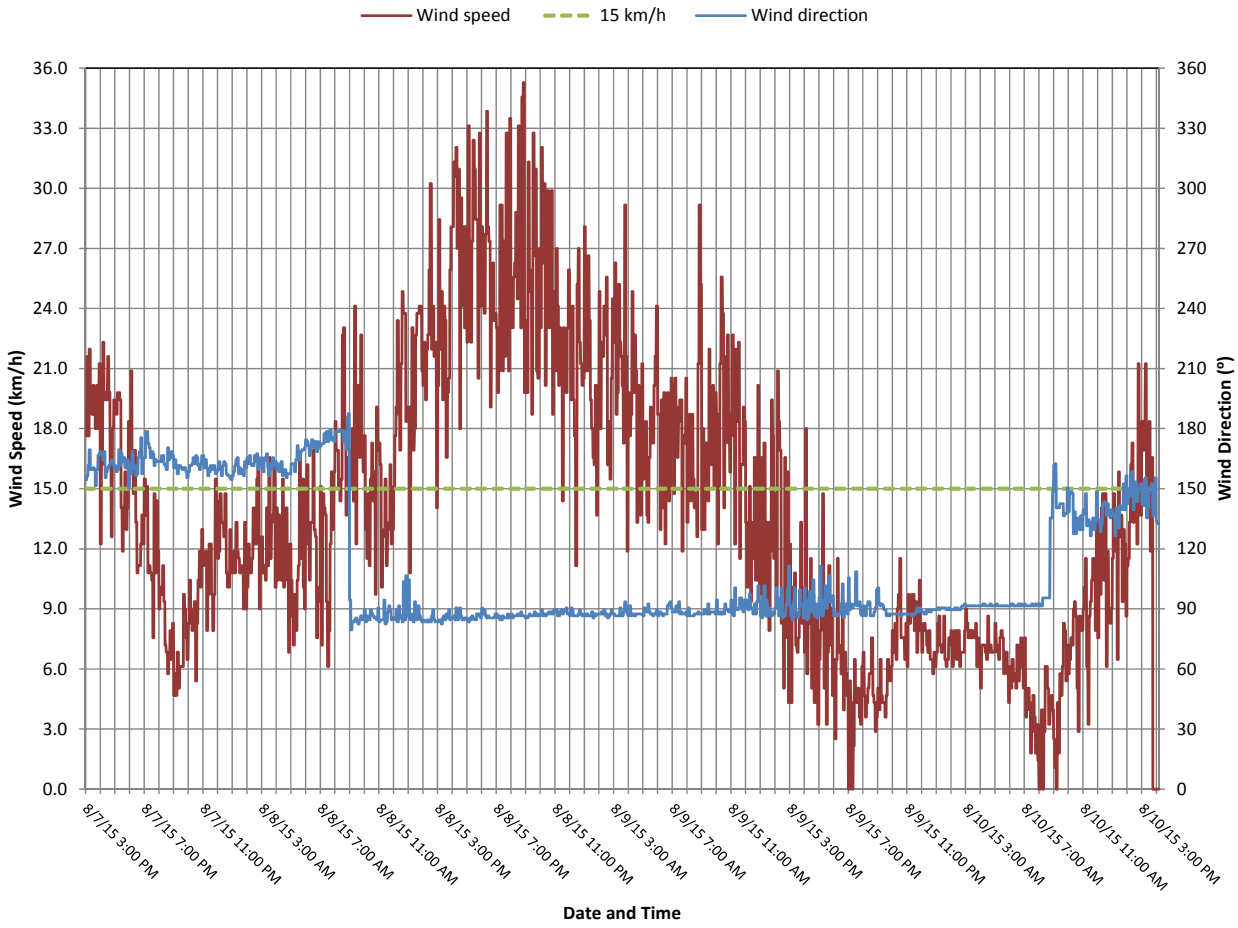


Figure B-1 Wind Speed and Direction Recorded at Monitoring Site R6

Figure B-2 shows the temperature and humidity measured at R6.

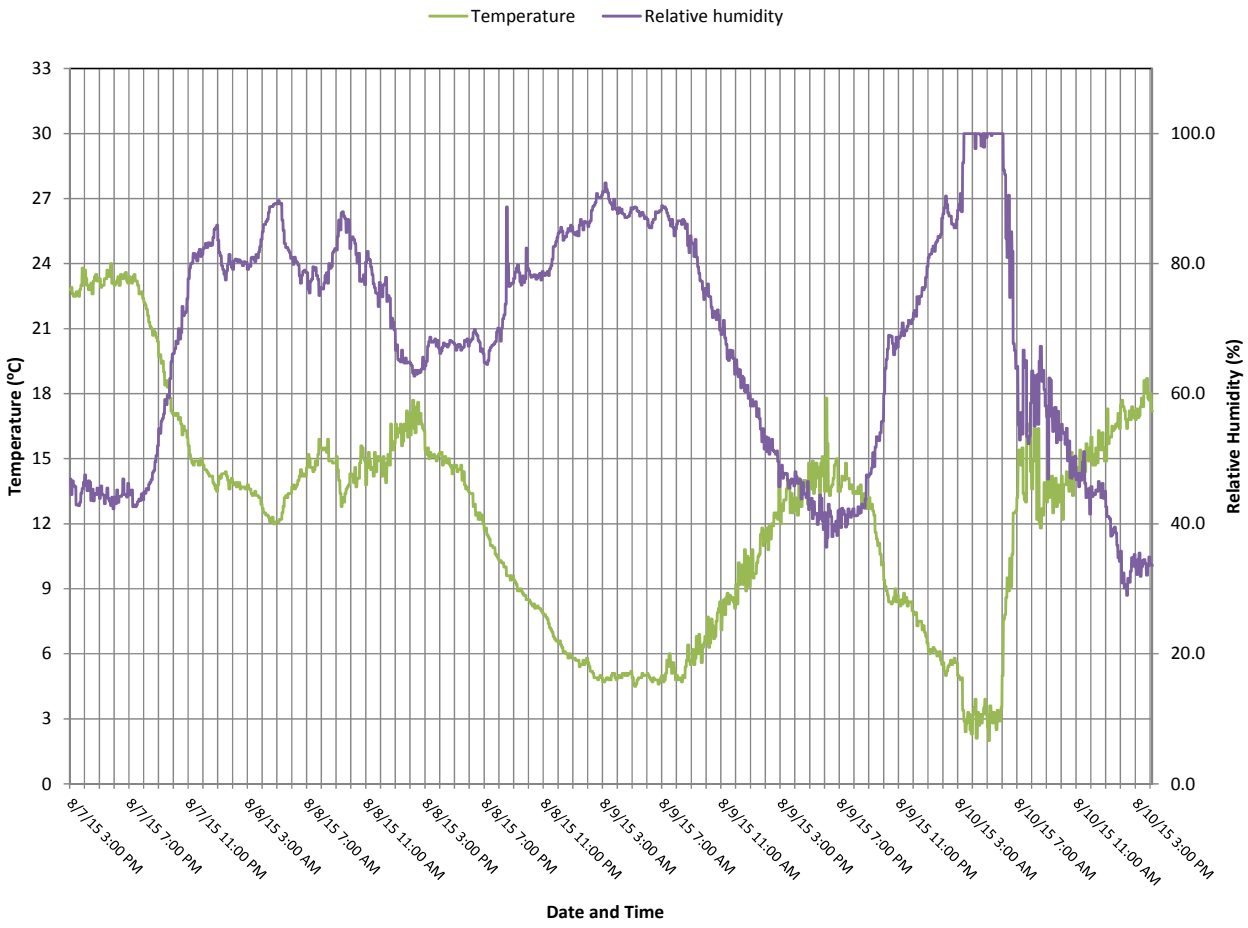


Figure B-2 Temperature and Humidity Measured at Monitoring Site R6

1.2 Monitoring Site R7

Figure B-3 shows the wind speed and wind direction recorded at monitoring site R7. The acceptable limit of wind speed (15 km/h) for the data analysis based on Directive 038 is shown in Figure B-3 as well.

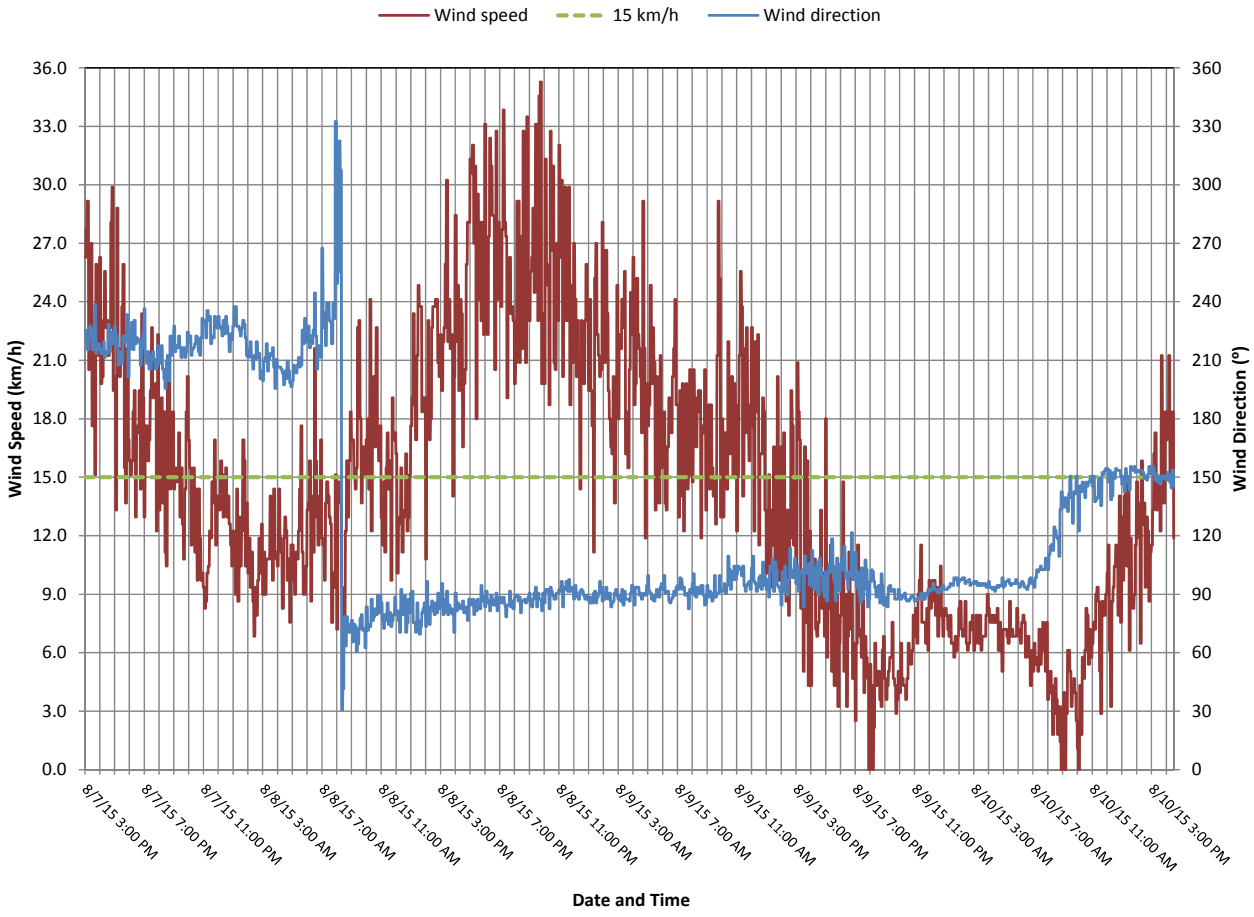


Figure B-3 Wind Speed and Direction Recorded at Monitoring Site R7

Figure B-4 shows the temperature and humidity measured at R7.

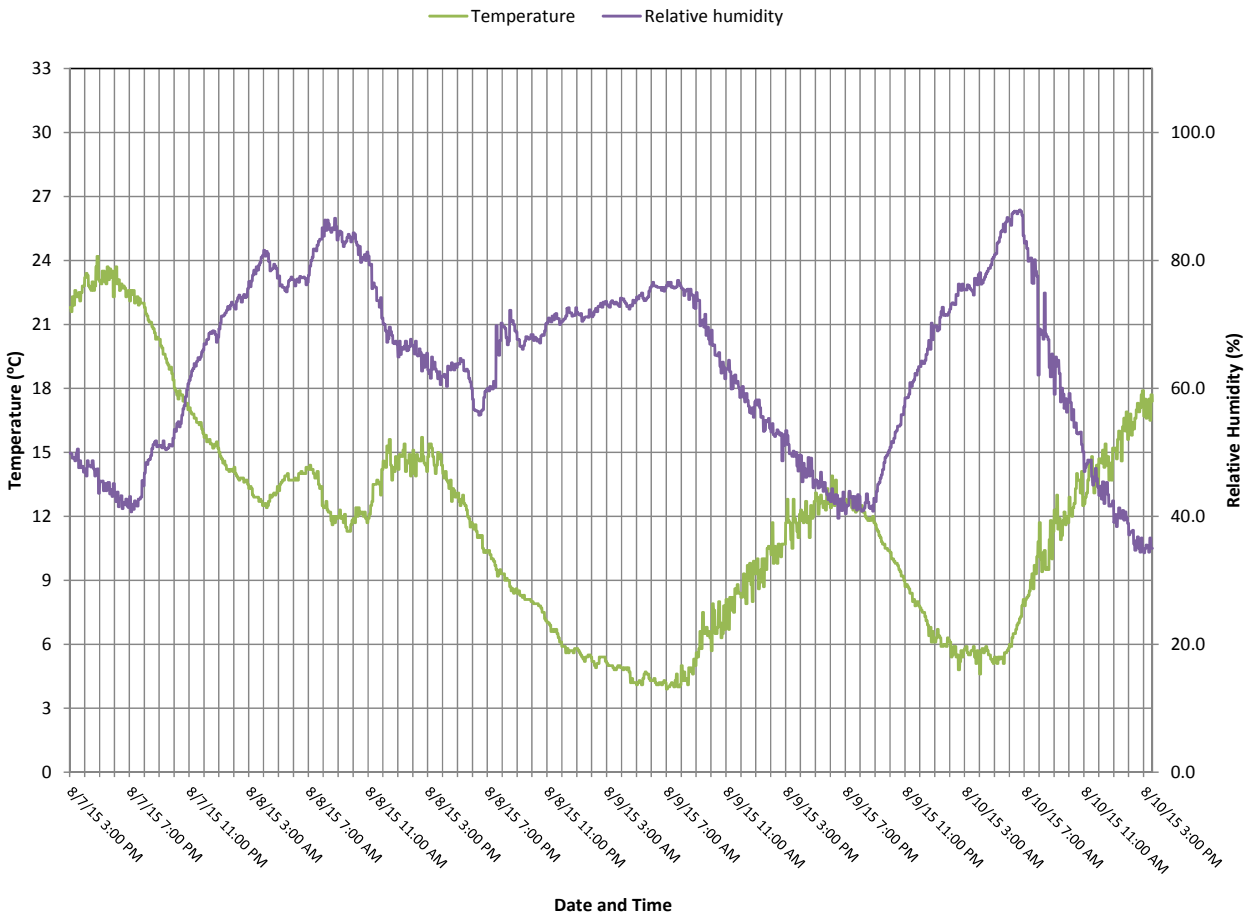


Figure B-4 Temperature and Humidity Measured at Monitoring Site R7

1.3 Monitoring Site R8

Figure B-5 shows the wind speed and wind direction recorded at monitoring site R8. The acceptable limit of wind speed (15 km/h) for the data analysis based on Directive 038 is shown in Figure B-5 as well.

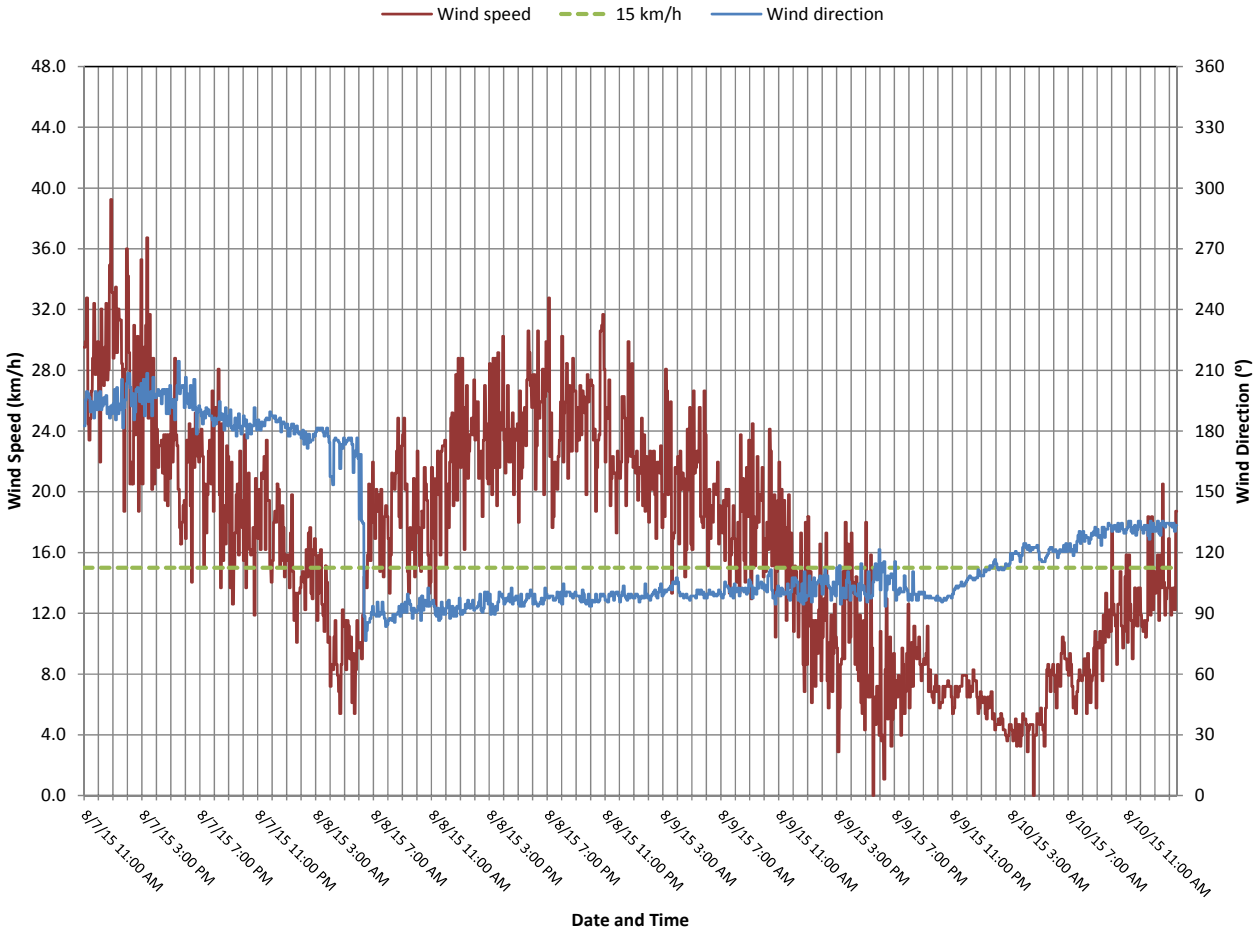


Figure B-5 Wind Speed and Direction Recorded at Monitoring Site R8

Figure B-6 shows the temperature and humidity measured at R8.

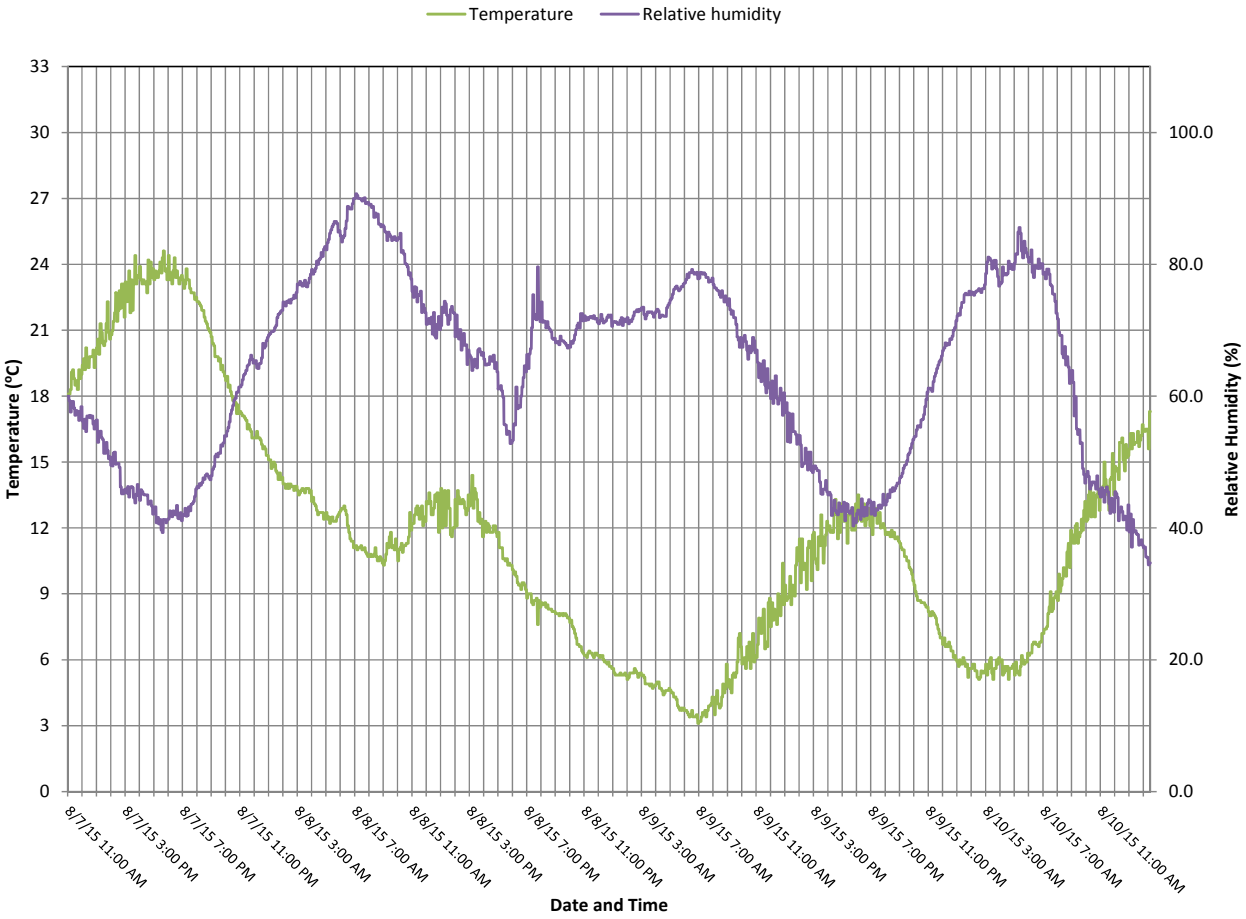


Figure B-6 Temperature and Humidity Measured at Monitoring Site R8

1.4 Monitoring Location R9

Figure B-7 shows the wind speed and wind direction recorded at monitoring site R9. The acceptable limit of wind speed (15 km/h) for the data analysis based on Directive 038 is shown in Figure B-7 as well.

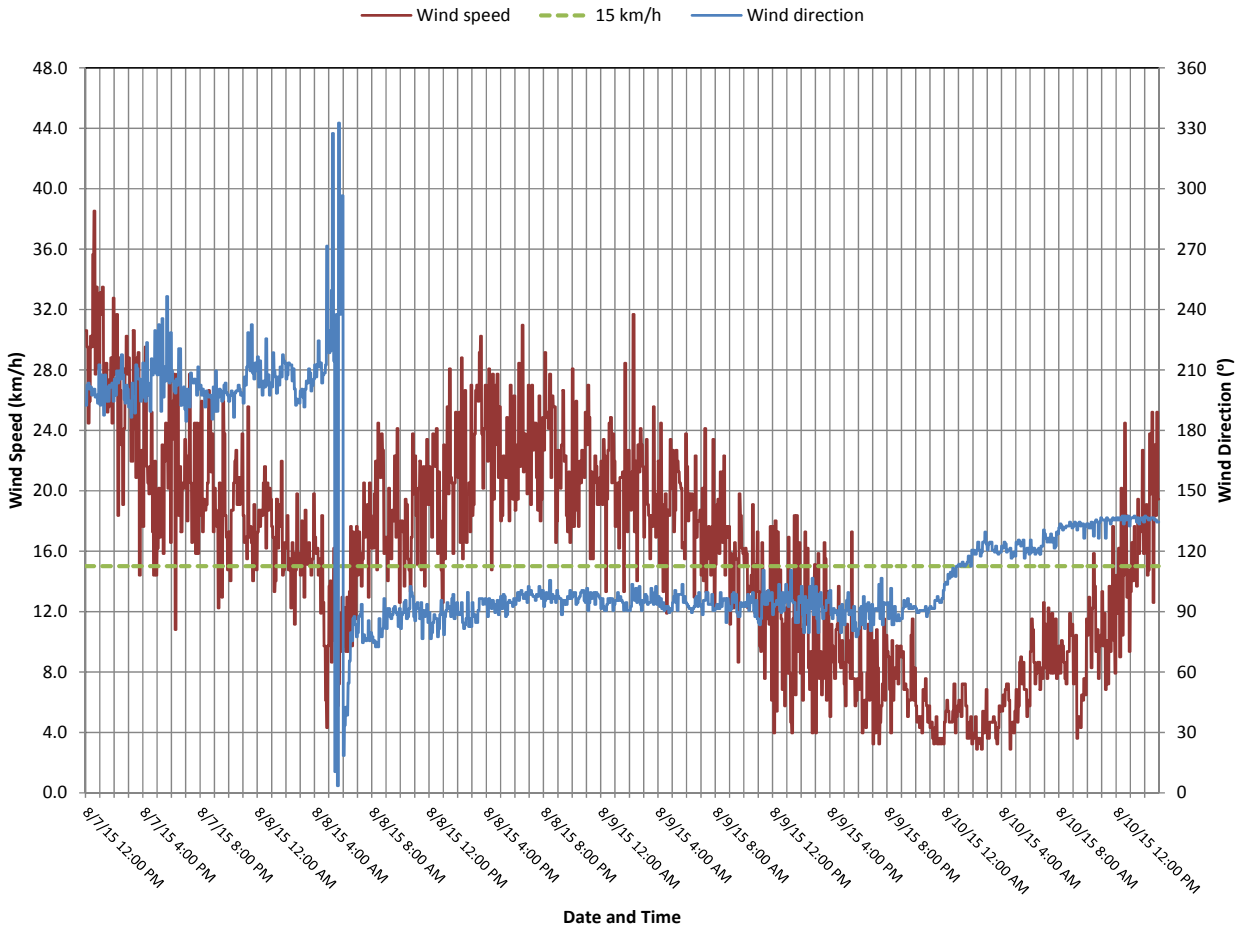


Figure B-7 Wind Speed and Direction Recorded at Monitoring Site R9

Figure B-8 shows the temperature and humidity measured at R9.

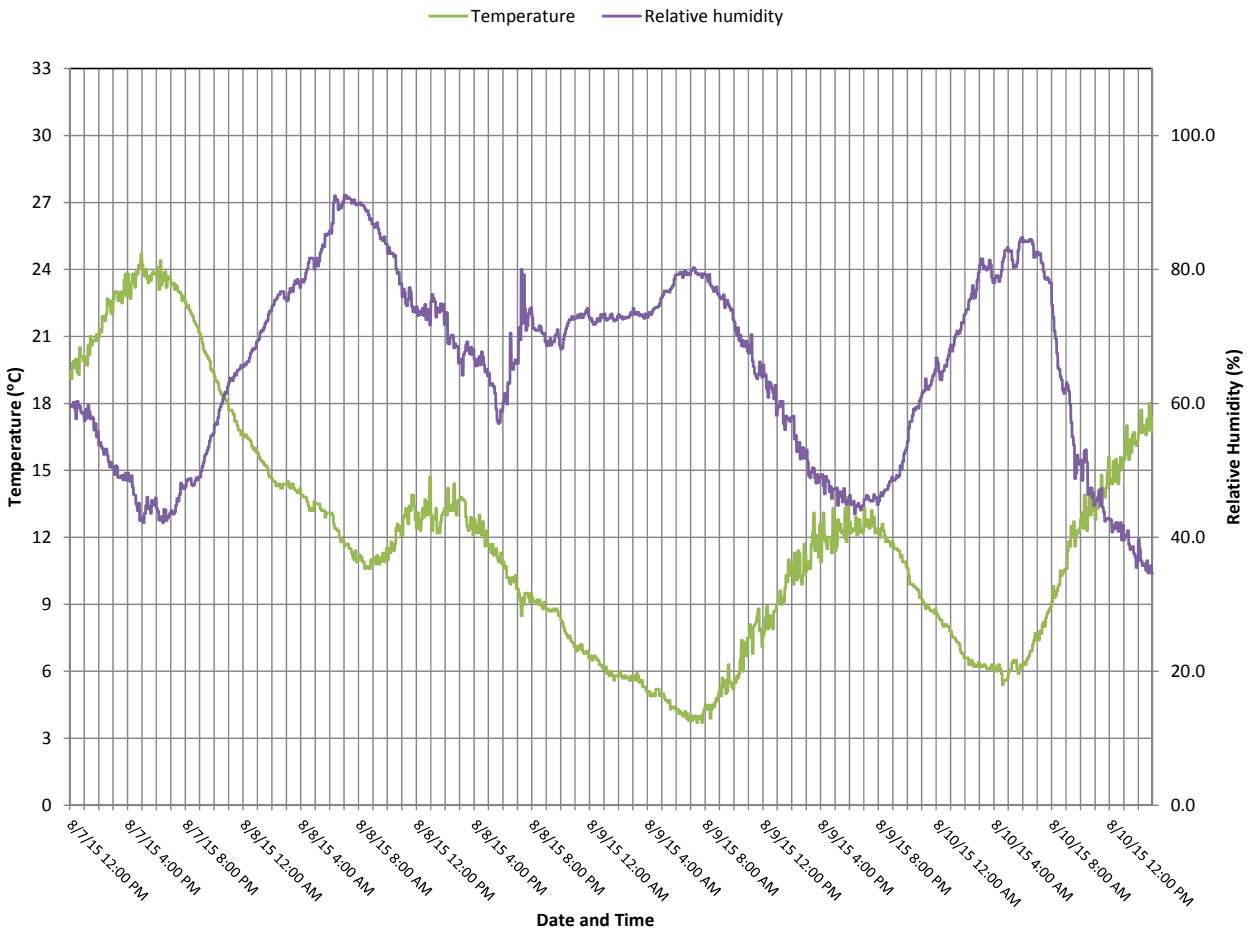


Figure B-8 Temperature and Humidity Measured at Monitoring Site R9

APPENDIX C

Noise Data

Filtered hourly noise levels ($L_{eq,1hr}$) and daytime and nighttime noise levels ($L_{eq,day}$ and $L_{eq,night}$) at R6, R7, R8, and R9 are presented in Tables C-1, C-2, C-3, and C-4, respectively. A count of the one-minute noise data recorded, including a breakdown for the daytime and nighttime periods are also presented.

Table C-1: Filtered Hourly Noise Levels at Monitoring Site R6

Date	Start Hour	$L_{eq, 1hr}$ [dBA]	Number of Valid Minutes
08/07/2015	3:00 p.m.	No Valid Data	0
08/07/2015	4:00 p.m.	46	10
08/07/2015	5:00 p.m.	45	25
08/07/2015	6:00 p.m.	35	40
08/07/2015	7:00 p.m.	43	50
08/07/2015	8:00 p.m.	47	60
08/07/2015	9:00 p.m.	47	60
08/07/2015	10:00 p.m.	46	60
08/07/2015	11:00 p.m.	46	55
08/08/2015	12:00 a.m.	40	60
08/08/2015	1:00 a.m.	39	60
08/08/2015	2:00 a.m.	43	50
08/08/2015	3:00 a.m.	44	50
08/08/2015	4:00 a.m.	43	55
08/08/2015	5:00 a.m.	39	50
08/08/2015	6:00 a.m.	36	45
08/08/2015	7:00 a.m.	36	45
08/08/2015	8:00 a.m.	36	10
08/08/2015	9:00 a.m.	38	10
08/08/2015	10:00 a.m.	37	30
08/08/2015	11:00 a.m.	33	40
08/08/2015	12:00 p.m.	No Valid Data	0
08/08/2015	1:00 p.m.	33	5
08/08/2015	2:00 p.m.	40	5
08/08/2015	3:00 p.m.	No Valid Data	0
08/08/2015	4:00 p.m.	No Valid Data	0
08/08/2015	5:00 p.m.	No Valid Data	0
08/08/2015	6:00 p.m.	No Valid Data	0
08/08/2015	7:00 p.m.	No Valid Data	0
08/08/2015	8:00 p.m.	No Valid Data	0
08/08/2015	9:00 p.m.	No Valid Data	0
08/08/2015	10:00 p.m.	No Valid Data	0
08/08/2015	11:00 p.m.	45	5
08/09/2015	12:00 a.m.	41	5
08/09/2015	1:00 a.m.	36	2
08/09/2015	2:00 a.m.	No Valid Data	0

Table C-1: Filtered Hourly Noise Levels at Monitoring Site R6 (continued)

Date	Start Hour	$L_{eq, 1hr}$ [dBA]	Number of Valid Minutes
08/09/2015	3:00 a.m.	No Valid Data	0
08/09/2015	4:00 a.m.	35	9
08/09/2015	5:00 a.m.	32	10
08/09/2015	6:00 a.m.	33	8
08/09/2015	7:00 a.m.	34	5
08/09/2015	8:00 a.m.	34	20
08/09/2015	9:00 a.m.	35	15
08/09/2015	10:00 a.m.	34	7
08/09/2015	11:00 a.m.	34	10
08/09/2015	12:00 p.m.	29	44
08/09/2015	1:00 p.m.	28	40
08/09/2015	2:00 p.m.	30	35
08/09/2015	3:00 p.m.	29	60
08/09/2015	4:00 p.m.	28	55
08/09/2015	5:00 p.m.	28	59
08/09/2015	6:00 p.m.	25	59
08/09/2015	7:00 p.m.	26	59
08/09/2015	8:00 p.m.	26	60
08/09/2015	9:00 p.m.	25	60
08/09/2015	10:00 p.m.	23	60
08/09/2015	11:00 p.m.	31	60
08/10/2015	12:00 a.m.	36	43
08/10/2015	1:00 a.m.	36	60
08/10/2015	2:00 a.m.	38	36
08/10/2015	3:00 a.m.	No Valid Data	0
08/10/2015	4:00 a.m.	No Valid Data	0
08/10/2015	5:00 a.m.	No Valid Data	0
08/10/2015	6:00 a.m.	42	31
08/10/2015	7:00 a.m.	43	60
08/10/2015	8:00 a.m.	33	60
08/10/2015	9:00 a.m.	32	60
08/10/2015	10:00 a.m.	37	59
08/10/2015	11:00 a.m.	38	60
08/10/2015	12:00 p.m.	35	59
08/10/2015	1:00 p.m.	37	55
08/10/2015	2:00 p.m.	40	40
08/10/2015	3:00 p.m.	41	25
08/10/2015	4:00 p.m.	42	6
$L_{eq,day}$ [dBA]	**7 a.m. to 10 p.m.**	**39**	**1,462**
$L_{eq,night}$ [dBA]	**10 p.m. to 7 a.m.**	**41**	**814**

Table C-2: Filtered Hourly Noise Levels at Monitoring Site R7

Date	Start Hour	$L_{eq, 1hr}$ [dBA]	Number of Valid Minutes
08/07/2015	3:00 p.m.	No Valid Data	0
08/07/2015	4:00 p.m.	35	10
08/07/2015	5:00 p.m.	45	10
08/07/2015	6:00 p.m.	33	10
08/07/2015	7:00 p.m.	32	35
08/07/2015	8:00 p.m.	33	30
08/07/2015	9:00 p.m.	30	40
08/07/2015	10:00 p.m.	32	54
08/07/2015	11:00 p.m.	31	45
08/08/2015	12:00 a.m.	30	49
08/08/2015	1:00 a.m.	30	60
08/08/2015	2:00 a.m.	28	60
08/08/2015	3:00 a.m.	29	60
08/08/2015	4:00 a.m.	27	54
08/08/2015	5:00 a.m.	27	45
08/08/2015	6:00 a.m.	26	54
08/08/2015	7:00 a.m.	24	45
08/08/2015	8:00 a.m.	33	8
08/08/2015	9:00 a.m.	32	10
08/08/2015	10:00 a.m.	27	30
08/08/2015	11:00 a.m.	29	36
08/08/2015	12:00 p.m.	No Valid Data	0
08/08/2015	1:00 p.m.	33	4
08/08/2015	2:00 p.m.	35	5
08/08/2015	3:00 p.m.	No Valid Data	0
08/08/2015	4:00 p.m.	No Valid Data	0
08/08/2015	5:00 p.m.	No Valid Data	0
08/08/2015	6:00 p.m.	No Valid Data	0
08/08/2015	7:00 p.m.	No Valid Data	0
08/08/2015	8:00 p.m.	No Valid Data	0
08/08/2015	9:00 p.m.	No Valid Data	0
08/08/2015	10:00 p.m.	No Valid Data	0
08/08/2015	11:00 p.m.	34	5
08/09/2015	12:00 a.m.	No Valid Data	0
08/09/2015	1:00 a.m.	32	4
08/09/2015	2:00 a.m.	No Valid Data	0
08/09/2015	3:00 a.m.	No Valid Data	0
08/09/2015	4:00 a.m.	33	9
08/09/2015	5:00 a.m.	29	10
08/09/2015	6:00 a.m.	33	16

Table C-2: Filtered Hourly Noise Levels at Monitoring Site R7 (continued)

Date	Start Hour	$L_{eq, 1hr}$ [dBA]	Number of Valid Minutes
08/09/2015	7:00 a.m.	33	6
08/09/2015	8:00 a.m.	33	21
08/09/2015	9:00 a.m.	35	15
08/09/2015	10:00 a.m.	35	9
08/09/2015	11:00 a.m.	33	10
08/09/2015	12:00 p.m.	29	45
08/09/2015	1:00 p.m.	26	39
08/09/2015	2:00 p.m.	26	31
08/09/2015	3:00 p.m.	23	59
08/09/2015	4:00 p.m.	22	55
08/09/2015	5:00 p.m.	21	60
08/09/2015	6:00 p.m.	22	54
08/09/2015	7:00 p.m.	19	60
08/09/2015	8:00 p.m.	21	59
08/09/2015	9:00 p.m.	24	60
08/09/2015	10:00 p.m.	30	60
08/09/2015	11:00 p.m.	31	60
08/10/2015	12:00 a.m.	29	60
08/10/2015	1:00 a.m.	29	60
08/10/2015	2:00 a.m.	30	60
08/10/2015	3:00 a.m.	29	60
08/10/2015	4:00 a.m.	27	60
08/10/2015	5:00 a.m.	29	60
08/10/2015	6:00 a.m.	28	60
08/10/2015	7:00 a.m.	22	60
08/10/2015	8:00 a.m.	20	60
08/10/2015	9:00 a.m.	21	53
08/10/2015	10:00 a.m.	21	54
08/10/2015	11:00 a.m.	23	60
08/10/2015	12:00 p.m.	25	60
08/10/2015	1:00 p.m.	27	47
08/10/2015	2:00 p.m.	32	40
08/10/2015	3:00 p.m.	31	5
$L_{eq,day}$ [dBA]	**7:00 a.m. to 10:00 p.m.**	**29**	**1,295**
$L_{eq,night}$ [dBA]	**10:00 p.m. to 7:00 a.m.**	**29**	**1,065**

Table C-3: Filtered Hourly Noise Levels at Monitoring Site R8

Date	Start Hour	$L_{eq, 1hr}$ [dBA]	Number of Valid Minutes
8/07/2015	11:00 a.m.	No Valid Data	0
08/07/2015	12:00 p.m.	No Valid Data	0
08/07/2015	1:00 p.m.	No Valid Data	0
08/07/2015	2:00 p.m.	No Valid Data	0
08/07/2015	3:00 p.m.	No Valid Data	0
08/07/2015	4:00 p.m.	No Valid Data	0
08/07/2015	5:00 p.m.	No Valid Data	0
08/07/2015	6:00 p.m.	35	1
08/07/2015	7:00 p.m.	No Valid Data	0
08/07/2015	8:00 p.m.	36	5
08/07/2015	9:00 p.m.	34	10
08/07/2015	10:00 p.m.	32	10
08/07/2015	11:00 p.m.	30	5
08/08/2015	12:00 a.m.	31	5
08/08/2015	1:00 a.m.	27	40
08/08/2015	2:00 a.m.	29	35
08/08/2015	3:00 a.m.	27	40
08/08/2015	4:00 a.m.	33	57
08/08/2015	5:00 a.m.	34	59
08/08/2015	6:00 a.m.	33	33
08/08/2015	7:00 a.m.	31	10
08/08/2015	8:00 a.m.	32	5
08/08/2015	9:00 a.m.	35	15
08/08/2015	10:00 a.m.	33	15
08/08/2015	11:00 a.m.	34	5
08/08/2015	12:00 p.m.	No Valid Data	0
08/08/2015	1:00 p.m.	No Valid Data	0
08/08/2015	2:00 p.m.	No Valid Data	0
08/08/2015	3:00 p.m.	No Valid Data	0
08/08/2015	4:00 p.m.	No Valid Data	0
08/08/2015	5:00 p.m.	No Valid Data	0
08/08/2015	6:00 p.m.	No Valid Data	0
08/08/2015	7:00 p.m.	No Valid Data	0
08/08/2015	8:00 p.m.	No Valid Data	0
08/08/2015	9:00 p.m.	No Valid Data	0
08/08/2015	10:00 p.m.	No Valid Data	0
08/08/2015	11:00 p.m.	No Valid Data	0
08/09/2015	12:00 a.m.	No Valid Data	0
08/09/2015	1:00 a.m.	No Valid Data	0
08/09/2015	2:00 a.m.	No Valid Data	0

Table C-3: Filtered Hourly Noise Levels at Monitoring Site R8 (continued)

Date	Start Hour	$L_{eq, 1hr}$ [dBA]	Number of Valid Minutes
08/09/2015	3:00 a.m.	No Valid Data	0
08/09/2015	4:00 a.m.	32	4
08/09/2015	5:00 a.m.	No Valid Data	0
08/09/2015	6:00 a.m.	No Valid Data	0
08/09/2015	7:00 a.m.	32	5
08/09/2015	8:00 a.m.	31	9
08/09/2015	9:00 a.m.	34	10
08/09/2015	10:00 a.m.	32	14
08/09/2015	11:00 a.m.	30	15
08/09/2015	12:00 p.m.	28	45
08/09/2015	1:00 p.m.	27	49
08/09/2015	2:00 p.m.	25	55
08/09/2015	3:00 p.m.	24	50
08/09/2015	4:00 p.m.	27	55
08/09/2015	5:00 p.m.	22	50
08/09/2015	6:00 p.m.	22	60
08/09/2015	7:00 p.m.	21	57
08/09/2015	8:00 p.m.	19	60
08/09/2015	9:00 p.m.	18	60
08/09/2015	10:00 p.m.	19	51
08/09/2015	11:00 p.m.	17	60
08/10/2015	12:00 a.m.	24	60
08/10/2015	1:00 a.m.	25	60
08/10/2015	2:00 a.m.	24	60
08/10/2015	3:00 a.m.	24	60
08/10/2015	4:00 a.m.	32	55
08/10/2015	5:00 a.m.	38	39
08/10/2015	6:00 a.m.	38	28
08/10/2015	7:00 a.m.	38	39
08/10/2015	8:00 a.m.	35	35
08/10/2015	9:00 a.m.	29	57
08/10/2015	10:00 a.m.	25	55
08/10/2015	11:00 a.m.	24	50
08/10/2015	12:00 p.m.	28	49
08/10/2015	1:00 p.m.	33	37
08/10/2015	2:00 p.m.	32	24
$L_{eq,day}$ [dBA]	**7:00 a.m. to 10:00 p.m.**	**30**	**1,006**
$L_{eq,night}$ [dBA]	**10:00 p.m. to 7:00 a.m.**	**31**	**761**

Table C-4: Filtered Hourly Noise Levels at Monitoring Site R9

Date	Start Hour	$L_{eq, 1hr}$ [dBA]	Number of Valid Minutes
08/07/2015	12:00 p.m.	No Valid Data	0
08/07/2015	1:00 p.m.	No Valid Data	0
08/07/2015	2:00 p.m.	No Valid Data	0
08/07/2015	3:00 p.m.	No Valid Data	0
08/07/2015	4:00 p.m.	35	10
08/07/2015	5:00 p.m.	No Valid Data	0
08/07/2015	6:00 p.m.	34	5
08/07/2015	7:00 p.m.	No Valid Data	0
08/07/2015	8:00 p.m.	No Valid Data	0
08/07/2015	9:00 p.m.	31	15
08/07/2015	10:00 p.m.	31	5
08/07/2015	11:00 p.m.	30	10
08/08/2015	12:00 a.m.	No Valid Data	0
08/08/2015	1:00 a.m.	29	20
08/08/2015	2:00 a.m.	28	20
08/08/2015	3:00 a.m.	29	15
08/08/2015	4:00 a.m.	23	33
08/08/2015	5:00 a.m.	22	50
08/08/2015	6:00 a.m.	33	40
08/08/2015	7:00 a.m.	35	15
08/08/2015	8:00 a.m.	39	5
08/08/2015	9:00 a.m.	34	10
08/08/2015	10:00 a.m.	32	11
08/08/2015	11:00 a.m.	33	10
08/08/2015	12:00 p.m.	37	10
08/08/2015	1:00 p.m.	No Valid Data	0
08/08/2015	2:00 p.m.	No Valid Data	0
08/08/2015	3:00 p.m.	No Valid Data	0
08/08/2015	4:00 p.m.	39	5
08/08/2015	5:00 p.m.	No Valid Data	0
08/08/2015	6:00 p.m.	No Valid Data	0
08/08/2015	7:00 p.m.	No Valid Data	0
08/08/2015	8:00 p.m.	No Valid Data	0
08/08/2015	9:00 p.m.	No Valid Data	0
08/08/2015	10:00 p.m.	No Valid Data	0
08/08/2015	11:00 p.m.	No Valid Data	0
08/09/2015	12:00 a.m.	38	5
08/09/2015	1:00 a.m.	37	5
08/09/2015	2:00 a.m.	36	4
08/09/2015	3:00 a.m.	No Valid Data	0

Table C-4: Filtered Hourly Noise Levels at Monitoring Site R9 (continued)

Date	Start Hour	$L_{eq, 1hr}$ [dBA]	Number of Valid Minutes
08/09/2015	4:00 a.m.	33	10
08/09/2015	5:00 a.m.	No Valid Data	0
08/09/2015	6:00 a.m.	35	5
08/09/2015	7:00 a.m.	33	25
08/09/2015	8:00 a.m.	29	5
08/09/2015	9:00 a.m.	33	20
08/09/2015	10:00 a.m.	30	30
08/09/2015	11:00 a.m.	35	50
08/09/2015	12:00 p.m.	36	45
08/09/2015	1:00 p.m.	28	40
08/09/2015	2:00 p.m.	27	45
08/09/2015	3:00 p.m.	33	43
08/09/2015	4:00 p.m.	32	56
08/09/2015	5:00 p.m.	24	54
08/09/2015	6:00 p.m.	20	60
08/09/2015	7:00 p.m.	22	60
08/09/2015	8:00 p.m.	19	59
08/09/2015	9:00 p.m.	25	58
08/09/2015	10:00 p.m.	26	60
08/09/2015	11:00 p.m.	30	60
08/10/2015	12:00 a.m.	29	60
08/10/2015	1:00 a.m.	29	60
08/10/2015	2:00 a.m.	26	60
08/10/2015	3:00 a.m.	30	60
08/10/2015	4:00 a.m.	32	60
08/10/2015	5:00 a.m.	36	58
08/10/2015	6:00 a.m.	36	47
08/10/2015	7:00 a.m.	35	51
08/10/2015	8:00 a.m.	31	59
08/10/2015	9:00 a.m.	31	55
08/10/2015	10:00 a.m.	30	53
08/10/2015	11:00 a.m.	24	55
08/10/2015	12:00 p.m.	28	40
08/10/2015	1:00 p.m.	33	15
08/10/2015	2:00 p.m.	32	15
$L_{eq,day}$ [dBA]	**7:00 a.m. to 10:00 p.m.**	**31**	**1,089**
$L_{eq,night}$ [dBA]	**10:00 p.m. to 7:00 a.m.**	**31**	**747**

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 44 1628 851851
North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

solutions@golder.com
www.golder.com

Golder Associates Ltd.
102, 2535 - 3rd Avenue S.E.
Calgary, Alberta, T2A 7W5
Canada
T: +1 (403) 299 5600

Golder Associates