Sisson Project:

Baseline Sound Quality Technical Report

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1.0 INTRODUCTION

This document is the Baseline Sound Quality Technical Report in support of the Environmental Impact Assessment (EIA) for the Sisson Project (the Project) proposed by Northcliff Resources Ltd. (Northcliff) near Napadogan, New Brunswick.

The Project consists of a conventional open pit tungsten and molybdenum mine, an ore processing plant, and associated facilities and infrastructure located on provincial Crown land approximately 10 km southwest of the community of Napadogan, New Brunswick, and approximately 60 km directly northwest of the city of Fredericton (Figure 1.1).

1.1 PURPOSE OF TECHNICAL REPORT

The Acoustic Environment has been identified as a valued environmental component (VEC) to be assessed as part of the EIA for the Project due to the importance of sound quality to local area residents and land users. Characterization of existing baseline conditions is necessary background information for the EIA. Thus, the purpose of this Technical Report is to describe the existing sound quality conditions in the vicinity of the Project.

1.2 OVERVIEW OF TECHNICAL REPORT

The sound quality monitoring work conducted for this Technical Report involved conducting baseline monitoring of existing sound pressure levels at specific sound monitoring sites selected near the Project location.

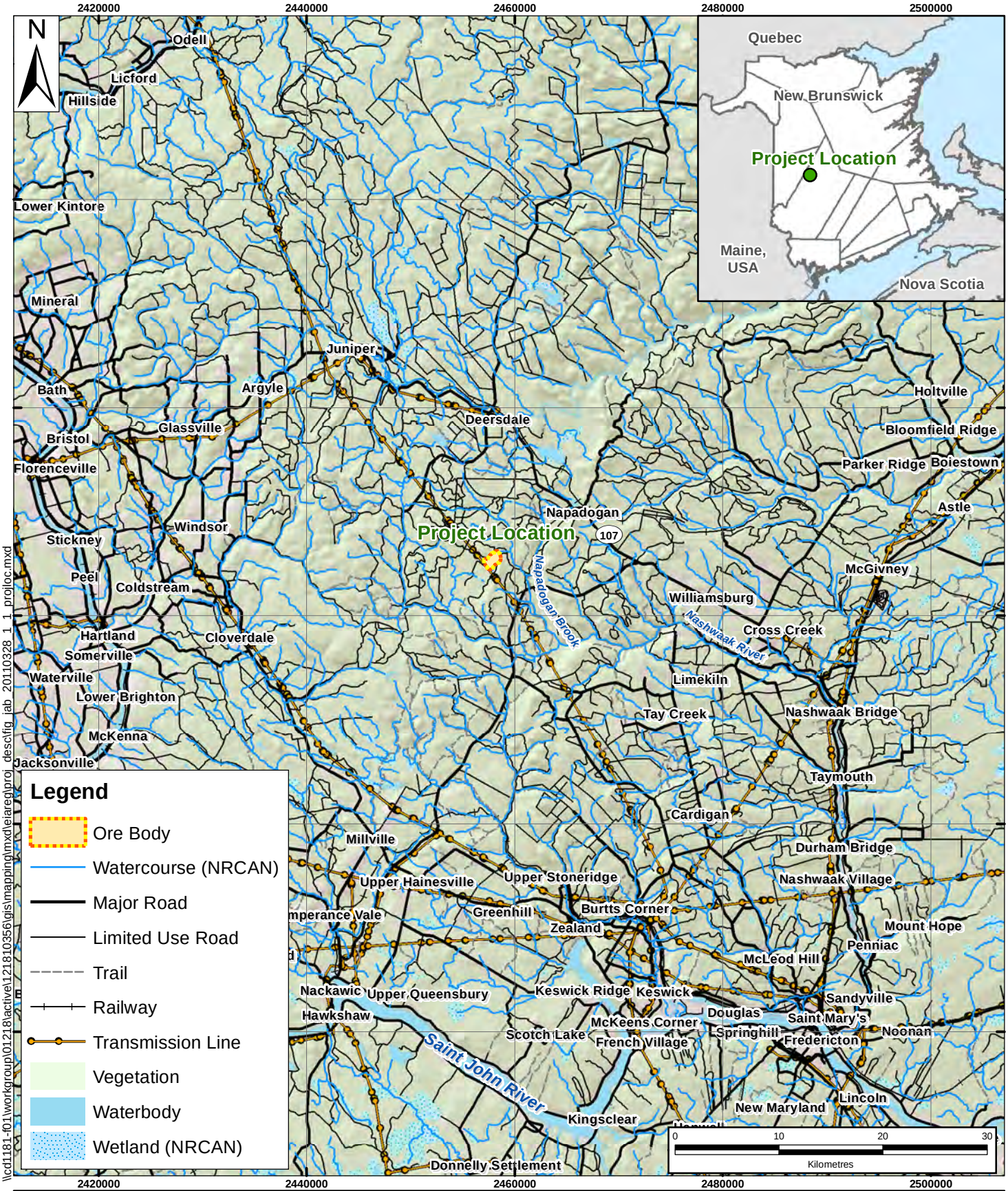
As described in more detail in Section 4.2 of the Terms of Reference for the Environmental Impact Assessment of the Project (Stantec 2012), the potential for sound emissions from the Project to cause environmental effects on the Acoustic Environment will be assessed in the EIA Report on the basis of measured and expected sound quality conditions near the Project. The predicted sound pressure levels from the Construction and Operation of the Project will be determined by conducting modeling of the dispersion and attenuation of Project-related sounds in the vicinity of the Project.

1.3 ORGANIZATION OF THIS TECHNICAL REPORT

In addition to this introduction, the remainder of this Technical Report is presented in three sections, as follows.

- Section 2.0 is an overview of the sound monitoring methodology, the monitoring locations, and the sound pressure guideline values.
- Section 3.0 provides the results of the monitoring and comparisons of measured baseline sound quality to sound quality guideline levels.
- References consulted as part of the work are provided in Section 4.0.

Additional supporting documentation is provided in Appendix A.



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NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Project Location

Sisson Project

Napadogan, N.B.

Client: Northcliff Resources Ltd.

Scale:	Project No.:	Data Sources:	Fig. No.:
1:500,000	121810356	SNB NRCAN, ESRI	1.1

Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:
26/01/2012	JAB	DLM

Stantec

Map: NAD83 CSRS NB Double Stereographic

2.0 SOUND MONITORING METHODOLOGY AND SITE SELECTION

This section outlines the existing sound quality conditions in the vicinity of the Project as monitored by Stantec in support of the EIA of the Sisson Project. The monitoring methodology is described, followed by a brief description of the monitoring locations and their selection, and the sound quality guidelines for comparison with the monitored data.

2.1 MONITORING METHODOLOGY

Baseline sound monitoring was conducted by measuring sound pressure levels at three locations (discussed below) in the vicinity of the proposed Project location.

The baseline noise monitoring was conducted using a Larson Davis Model 824 Type 1 integrating sound pressure level meter. These instruments average the energy level of sound over a selected period of time and express this as an equivalent sound pressure level, L_{eq}, in dB_A (A-weighted decibels). The A-weighted scale is the most commonly used scale for expressing the equivalent physiological impact on the human body. Equivalent sound pressure levels, L_{eq}, are the steady-state sound pressure levels that contain the same amount of energy as the fluctuating sound actually occurring over a specific amount of time. This value represents the integrated noise exposure over the time period of the measurement.

The measuring equipment was calibrated prior to the monitoring event with a calibrator that satisfies the requirements of the International Electrotechnical Commission (IEC) 942-1988 Class 1 standard.

Each measurement session consisted of one-minute readings logged over a 1-week period (168 hours) at each monitoring location to establish the sound pressure variation over time. The logged values were then used to calculate hourly L_{eq} values (1 h L_{eq}), 24 hour average L_{eq} values (24 h L_{eq}), and day/night equivalent sound level values (L_{DN}).

2.2 MONITORING LOCATIONS

Three sound monitoring sites were selected to be representative of the areas that have greater potential to experience changes in sound quality as a result of the Project. The general setup requirements for sound monitoring equipment were as follows:

- the sound monitoring equipment would be battery-powered, as there are few if any sources of electrical power on-site or near the site that could be used;
- the equipment would be located in a secure or hidden location to minimize potential for theft and/or vandalism; and
- the monitor would be located at least 4 metres away from any reflecting structure (and at least 1 metre off the ground), to obtain “free-field‟ levels, *i.e.*, levels where the influence of reflections have been minimized.

Based on these criteria, three sound monitoring locations were identified as follows (Figure 2.1):

- Monitoring Site 1, meteorological station, located on the Christmas Lake Road (near the proposed open pit);
- Monitoring Site 2, site access road, intersection of Four Mile Brook Road and Highway 107; and
- Monitoring Site 3, recreational campsite, located approximately 2 km from the proposed open pit.

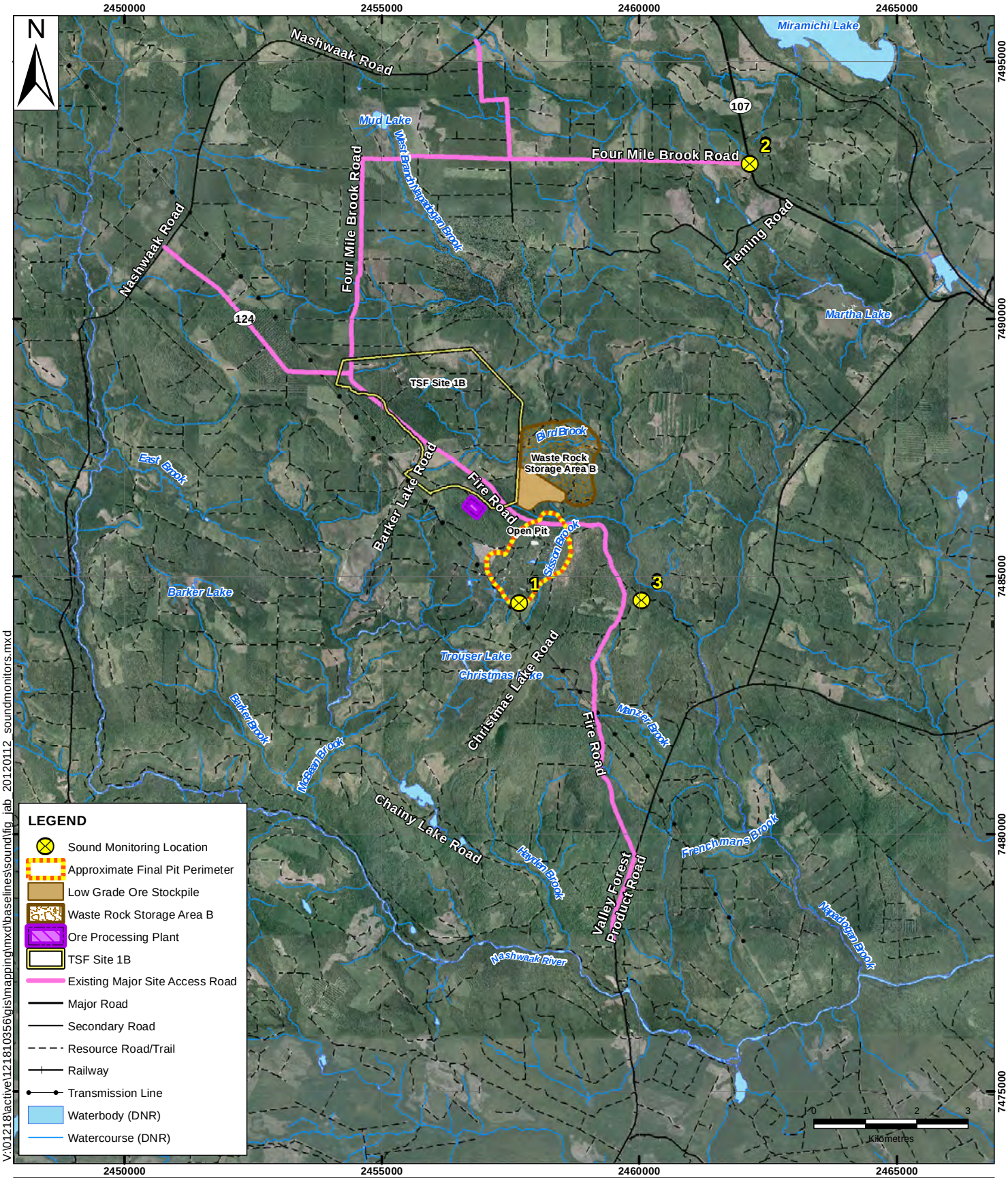
The coordinates and brief description of each sound monitoring location are provided in Table 2.1.

Table 2.1 Baseline Sound Monitoring Locations

Monitoring Site	UTM Coordinates		Monitoring Dates	Description of Location/Dominant Sounds
	Easting (m)	Northing (m)		
1	2457664	7484492	October 20, 2011 to October 27, 2011	Meterological station, monitor placed in grassy area. Dominant sounds are natural (*e.g.*, wind in trees, wildlife).
2	2462149	7493012	November 3, 2011 to November 10, 2011	Monitor placed at the corner of Highway 107 and proposed Project access road (Four Mile Brook Road). Dominant sounds are vehicle traffic on Highway 107, wildlife, and wind noise.
3	2460046	7484530	October 6, 2011 to October 13, 2011	Recreational campsite lease, monitor placed in wooded area beside building. Dominant sounds are natural, with sporadic vehicle sounds.

The meteorological station site (Monitoring Site 1) is situated at the meteorological tower operated and maintained by Northcliff to gather weather and climatological data for the Project. This site is located approximately 1 km from the location of the open pit and was therefore selected to be a monitoring location that would establish a baseline level at the likely location of highest Project-related noise on-site once the Project is operational. The sound monitoring equipment was set up inside the fence. The majority of sound sources expected at this site include natural sounds (*e.g.,* animals, wind), with the potential for some contribution from logging activities (*e.g.,* trucks, heavy machinery).

The highway/site access road location (Monitoring Site 2) was selected as Highway 107 is a main route for large trailer trucks to move from northern to southern New Brunswick. These trucks carry round logs and wood products to facilities throughout New Brunswick. This location is several kilometers northwest of the community of Napadogan. Residents of Napadogan are considered to be a noise sensitive receptor as increased noise levels resulting from the Project could result in increased human exposure to higher than current noise levels (potentially causing annoyance). This location would provide a characterization of sound pressure levels along the existing Highway 107 and would serve as a baseline for prediction of future noise levels that could result from mine-related transportation. The site is located approximately 9 km from the centre of the proposed open pit.



V:\01218\active\121810356\gis\mapping\mxd\baselines\soundfig_jab_20120112_soundmonitors.mxd

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Sound Monitoring Sites

Sisson Project

Napadogan, N.B.

Client: Northcliff Resources Ltd.

Scale:	Project No.:	Data Sources:	Fig. No.:
1:100,000	121810356	NBDNR, SNB NHN, NB Aquatic Data Warehouse Imagery Provided By: NBDNR Google Earth Pro	2.1

Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:
26/01/2012	JAB	DM

Stantec

Map: NAD83 CSRS NB Double Stereographic

The recreational campsite (Monitoring Site 3) is located approximately 2 km from the centre of the proposed open pit. In this area, there are approximately 30 camps on Crown land leases. Sounds at this location represent the baseline sound pressure levels to which humans outside of the Project site may be exposed to as a result of mine-related activities on-site and from Project-related traffic. Although most of these camps are not inhabited continuously, owners and part-time residents of the camps are considered to be noise sensitive receptors due to potential exposure to higher than current levels of noise arising from Project activities in the future. The majority of sound sources expected at this site include natural sounds (*e.g.,* animals, wind), with the potential for some contribution from logging activities (*e.g.,* trucks, heavy machinery).

The collected data are representative of the existing conditions and include the cumulative contributions from traffic and any other substantive sources of noise at the baseline monitoring locations, including those that are natural (*i.e.*, wind in trees, birds, and animals).

2.3 SOUND QUALITY GUIDELINE LEVELS

There are no sound guideline levels, regulations, or standards currently established in the province of New Brunswick for limiting acceptable sound levels from industrial facilities. The New Brunswick Department of Environment and Local Government (NBDELG, formerly the New Brunswick Department of Environment (NBENV)) generally requires that sound emissions from any activity be controlled such that it does not cause substantial loss of enjoyment of the normal use of any property, or substantial interference with the normal conduct of business. In some cases, the acceptable noise levels during certain hours of operation may be restricted. For example, there may be a higher threshold limit set by NBDELG for one period (daytime) and another limit for another period (night time) during the same day. Facility noise levels in New Brunswick are typically set by the NBDELG in specific industrial Approvals to Operate for individual sources of sound emissions. In some industrial Approvals, there may be a sound guideline level of 65 dB_A set during the day (06:00-22:00) and 55 dB_A during the night (22:00-06:00) as a 1 hour $L_{eq.}$ In other Approvals, it may be specified that noise levels at the nearest sensitive receptor should not exceed 10 dB_A above background levels (Glynn, M. Personal communication, February 10, 2012). In New Brunswick, the application of specific limiting criteria for sound pressure levels from specific industrial point sources of sound emissions varies depending on the location of the source, the magnitude of sound emissions, the proximity of the source to and nature of the noise sensitive receptors, environmental setting, and other factors (Glynn, M. Personal communication, February 10, 2012). The province of Nova Scotia has established similar noise guideline levels.

Under Health Canada's "Draft Guidance on Noise Assessment for *Canadian Environmental Assessment Act* (*CEAA*) Projects" (Health Canada 2006), maximum sound levels at the most exposed façade of a noise sensitive receptor are set for both construction and operation of sound emission sources. The maximum levels are based on day-night average sound levels (L_{DN}) and percent annoyance. The L_{DN} is an energy-weighted average, similar to L_{eq} for a full day, except that the night-time hour (23:00 to 07:00) measured levels are adjusted as an increase by 10 dB_A to reflect the sensitivity of the community to sound levels during those hours in the calculation of the 24-hour average, and for comparison with the maximum permissible L_{DN} established by Health Canada. For construction phases less than one year in duration, Health Canada has set an L_{DN} of 62 dB_A. For construction phases greater than one year in duration, the percentage of highly annoyed is to be calculated for the baseline condition and for the baseline plus the construction condition (Health Canada 2006). The percentage highly annoyed during the construction of a Project should not increase

by more than 6.5% over the percentage highly annoyed under baseline conditions. This is also the case during operational phases. The algorithm to calculate the percent highly annoyed is a simple empirical relation defined by ISO 1996-1:2003 (Canadian Standards Association 2003).

Blasting is regulated provincially through the *Blasting Code Approval Regulation - Municipalities Act* (Government of New Brunswick 1989), although some municipalities have additional provisions. Under this regulation, the limit for peak overpressure (*i.e.,* instantaneous blasting noise) is 128 dB within the boundaries of a municipality, as legislated by the *Blasting Code Approval Regulation—Municipalities Act.* This regulation also includes a provision to limit vibration resulting from blasting operations to not exceed the peak particle velocity limit of 1.25 cm/s. Both the noise limit and vibration limits are designed to afford protection from damage to structures (such as cracking of drywall) with a reasonable margin of safety. The regulations are applicable at the nearest designated sound receptor site, typically a residence or other building. Regulations may stipulate that pre and post-blast surveys be carried out to assess whether damage has occurred. As the Project is not located within a municipality, this regulation does not specifically apply to the Project, though it will nonetheless be considered as part of the EIA of the Project.

In recognition of these issues, the Final Terms of Reference (Stantec 2012) have defined a significance criterion for sound quality as follows:

> *"For a Change in Sound Quality, in consideration of the accepted practice in New Brunswick for regulating project-related noise in industrial Certificates of Approval and the rural nature of the PDA, a significant adverse residual environmental effect on the Acoustic Environment is one where Project-related sound emissions cause the sound pressure levels at the nearest noise sensitive area or receptor (NSA) to frequently exceed the noise guideline levels of a 1 hour L_{eq} of 65 dB_A during the day (06:00-22:00) and 55 dB_A during the night (22:00-06:00). "Frequently" is defined as once (i.e., one hour) per week.*
>
> *For impulsive noise such as during blasting, a significant adverse residual environmental effect on the Acoustic Environment is one where peak overpressure exceeds 128 dB" (Stantec 2012).*

The comparison of baseline and predicted sound pressure levels in this Technical Report and in the EIA shall be based on these thresholds of significance.

3.0 RESULTS AND DISCUSSION

3.1 MONITORING RESULTS

Wind speed and precipitation rates obtained from the meteorological tower during the monitoring periods indicate that wind speeds remained below 14 km/h and minimal precipitation (less than 2 mm in any given hour) was observed.

The results of the sound pressure level monitoring at the three locations are summarized in Tables 3.1, 3.2, and 3.3. Detailed results, including raw data, charts, and sample calculations, are presented in Appendix A.

Table 3.1 Baseline Sound Pressure Level Monitoring Results – 24 h L_{eq}

Parameter	24 h L_{eq} (dB_A)			Guideline Value (24 h L_{eq}, dB_A)
	Meteorological Station (Monitoring Site 1)	Four Mile Brook Road (Monitoring Site 2)	Recreational Campsite (Monitoring Site 3)	
Day 1	49.8	54.5	43.5	
Day 2	32.7	51.5	44.2	
Day 3	37.2	48.5	50.9	
Day 4	33.3	52.7	43.7	NA
Day 5	32.7	54.5	42.0	
Day 6	46.3	54.3	31.0	
Day 7	43.8	54.7	30.6	
Note: Values in **bold** are in excess of the guideline value.				

Table 3.2 Baseline Sound Pressure Level Monitoring Results – 1 h L_{eq}

Parameter	1 h L_{eq} (dB_A)			Guideline Value (1 h L_{eq}, dB_A)
	Meteorological Station (Monitoring Site 1)	Four Mile Brook Road (Monitoring Site 2)	Recreational Campsite (Monitoring Site 3)	
Maximum L_{eq}				
Day	59.3	59.1	62.4	65
Night	49.4	**59.0**	47.0	55
Minimum L_{eq}	25.8	26.4	26.0	--
Note: Values in **bold** are in excess of the guideline value.				

Table 3.3 Baseline Sound Pressure Level Monitoring Results - L_{DN}

Parameter	L_{DN} (24 hour periods)			Guideline Value (L_{DN}, dB_A)
	Meteorological Station (Monitoring Site 1)	Four Mile Brook Road (Monitoring Site 2)	Recreational Campsite (Monitoring Site 3)	
Day 1	50.7	60.0	43.9	62
Day 2	36.0	54.1	51.0	
Day 3	38.1	49.6	53.3	
Day 4	37.0	57.7	48.4	
Day 5	35.8	59.1	42.6	
Day 6	52.8	58.4	34.4	
Day 7	44.1	58.0	33.8	
Note: Values in **bold** are in excess of the guideline value.				

The results at the monitoring locations were found to be highest during the day and lowest at night.

The 24 h L_{eq} sound pressure levels at the Four Mile Brook Road location were higher than the other two monitoring locations. This is consistent with the observation that this area experiences frequent elevated sound pressure levels due to truck traffic on Highway 107. Sound pressure levels at the meteorological station were low, which is consistent with the isolated nature of the area. Sound pressure levels at the recreational campsite were generally low, with sporadic periods of elevated sound pressure levels.

The maximum L_{DN} was measured at the Four Mill Brook Road location. This L_{DN} corresponds to a baseline percent highly annoyed of 7.71%. The percent highly annoyed is a standard calculation based on a formula described by the Canadian Standards Association and is used to provide an estimate of the percent of individuals that would be highly annoyed by a particular sound level. A sample percent highly annoyed calculation is included in Appendix A.

3.2 COMPARISON OF MONITORING RESULTS TO GUIDELINES

The maximum 1 h L_{eq} measured during the day was 62.4 dB_A, which occurred at Monitoring Site 3 (the Recreational Campsite). This L_{eq} is slightly below the typical New Brunswick daytime noise guideline level of 65 dB_A.

The maximum 1 h L_{eq} measured during the night was 59.0 dB_A, occurred at Monitoring Site 2 (the Four Mile Brook Road site). This L_{eq} is above the typical New Brunswick night-time noise guideline level of 55 dB_A.

The maximum L_{DN} measured was 60.0 dB_A, which occurred at Monitoring Site 2 (the Four Mile Brook Road site). This is slightly below the Health Canada L_{DN} guideline value for construction phases of less than 1 year.

4.0 REFERENCES

4.1 LITERATURE CITED

Canadian Standards Association (CSA). 2005. CAN/CSA-ISO 1996-1:05 (ISO 1996-1:2003). Acoustics - Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures.

Government of New Brunswick. 1989. *Blasting Code Approval Regulation–Municipalities Act.*

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Stantec. 2012. Final Terms of Reference for an Environmental Impact Assessment. Prepared for Northcliff Resources Ltd. by Stantec Consulting Ltd., Fredericton, New Brunswick. April 16, 2012.

4.2 PERSONAL COMMUNICATIONS

Glynn, Mark. Personal Communication, February 10, 2012. Manager, Industrial Processes Section, New Brunswick Department of Environment, Fredericton, NB. Telephone call and email

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Appendix A

Baseline Sound Monitoring Results

Four Mile Brook Road

Date	Time	1 h Leq (dBA)	10^(L/10)
11/3/2011	12:00:00 PM	55.8	380189.4
11/3/2011	1:00:00 PM	55.5	354813.4
11/3/2011	2:00:00 PM	56.4	436515.8
11/3/2011	3:00:00 PM	52.2	165958.7
11/3/2011	4:00:00 PM	57.1	512861.4
11/3/2011	5:00:00 PM	55.5	354813.4
11/3/2011	6:00:00 PM	56.9	489778.8
11/3/2011	7:00:00 PM	49.8	95499.26
11/3/2011	8:00:00 PM	36.6	4570.882
11/3/2011	9:00:00 PM	54.4	275422.9
11/3/2011	10:00:00 PM	52	158489.3
11/3/2011	11:00:00 PM	59	794328.2
11/4/2011	12:00:00 AM	51.9	154881.7
11/4/2011	1:00:00 AM	50	100000
11/4/2011	2:00:00 AM	29.2	831.7638
11/4/2011	3:00:00 AM	45.1	32359.37
11/4/2011	4:00:00 AM	53	199526.2
11/4/2011	5:00:00 AM	46.4	43651.58
11/4/2011	6:00:00 AM	57.6	575439.9
11/4/2011	7:00:00 AM	53.6	229086.8
11/4/2011	8:00:00 AM	57	501187.2
11/4/2011	9:00:00 AM	53.8	239883.3
11/4/2011	10:00:00 AM	54.8	301995.2
11/4/2011	11:00:00 AM	55.7	371535.2
11/4/2011	12:00:00 PM	55.2	331131.1
11/4/2011	1:00:00 PM	56.6	457088.2
11/4/2011	2:00:00 PM	55.8	380189.4
11/4/2011	3:00:00 PM	54.5	281838.3
11/4/2011	4:00:00 PM	54.7	295120.9
11/4/2011	5:00:00 PM	54.7	295120.9
11/4/2011	6:00:00 PM	52.5	177827.9
11/4/2011	7:00:00 PM	46.3	42657.95
11/4/2011	8:00:00 PM	47.1	51286.14
11/4/2011	9:00:00 PM	46.6	45708.82
11/4/2011	10:00:00 PM	47.6	57543.99
11/4/2011	11:00:00 PM	42	15848.93
11/5/2011	12:00:00 AM	48.2	66069.34
11/5/2011	1:00:00 AM	43.4	21877.62
11/5/2011	2:00:00 AM	40.1	10232.93
11/5/2011	3:00:00 AM	43.2	20892.96
11/5/2011	4:00:00 AM	38.1	6456.542
11/5/2011	5:00:00 AM	48.3	67608.3
11/5/2011	6:00:00 AM	49.8	95499.26
11/5/2011	7:00:00 AM	47.2	52480.75
11/5/2011	8:00:00 AM	54.4	275422.9
11/5/2011	9:00:00 AM	48.8	75857.76
11/5/2011	10:00:00 AM	51.3	134896.3
11/5/2011	11:00:00 AM	51.2	131825.7
11/5/2011	12:00:00 PM	51.7	147910.8
11/5/2011	1:00:00 PM	54.2	263026.8
11/5/2011	2:00:00 PM	48.1	64565.42
11/5/2011	3:00:00 PM	50	100000

Calculation of 24 h Leq

	24h sum	Average	24 h Leq (dBA)
Day 1	6773620	282234.2	54.5
Day 2	3390483	141270.1	51.5
Day 3	1701395	70891.44	48.5
Day 4	4501925	187580.2	52.7
Day 5	6765114	281879.7	54.5
Day 6	6477949	269914.6	54.3
Day 7	7055063	293961	54.7

Calculation of LDN (adjusted for day/night)

	24h sum	Average	LDN
1	23882789	995116.2	60.0
2	6130856	255452.3	54.1
3	2171062	90460.91	49.6
3	14009500	583729.2	57.7
4	19362362	806765.1	59.1
5	16654430	693934.6	58.4
7	15163671	631819.6	58.0

Four Mile Brook Road

Date	Time	1 h Leq (dBA)	10^(L/10)
11/5/2011	4:00:00 PM	51.7	147910.8
11/5/2011	5:00:00 PM	52.7	186208.7
11/5/2011	6:00:00 PM	48.9	77624.71
11/5/2011	7:00:00 PM	48.9	77624.71
11/5/2011	8:00:00 PM	45.3	33884.42
11/5/2011	9:00:00 PM	43.4	21877.62
11/5/2011	10:00:00 PM	44.6	28840.32
11/5/2011	11:00:00 PM	37.8	6025.596
11/6/2011	12:00:00 AM	26.4	436.5158
11/6/2011	1:00:00 AM	40.6	11481.54
11/6/2011	2:00:00 AM	38.4	6918.31
11/6/2011	3:00:00 AM	28.1	645.6542
11/6/2011	4:00:00 AM	29.3	851.138
11/6/2011	5:00:00 AM	41.4	13803.84
11/6/2011	6:00:00 AM	40.8	12022.64
11/6/2011	7:00:00 AM	44.2	26302.68
11/6/2011	8:00:00 AM	42.9	19498.45
11/6/2011	9:00:00 AM	49.5	89125.09
11/6/2011	10:00:00 AM	52.9	194984.5
11/6/2011	11:00:00 AM	52.3	169824.4
11/6/2011	12:00:00 PM	52.4	173780.1
11/6/2011	1:00:00 PM	49.7	93325.43
11/6/2011	2:00:00 PM	48.3	67608.3
11/6/2011	3:00:00 PM	52	158489.3
11/6/2011	4:00:00 PM	51.7	147910.8
11/6/2011	5:00:00 PM	53.8	239883.3
11/6/2011	6:00:00 PM	51	125892.5
11/6/2011	7:00:00 PM	46.6	45708.82
11/6/2011	8:00:00 PM	50.8	120226.4
11/6/2011	9:00:00 PM	47.3	53703.18
11/6/2011	10:00:00 PM	46.8	47863.01
11/6/2011	11:00:00 PM	43.3	21379.62
11/7/2011	12:00:00 AM	42.3	16982.44
11/7/2011	1:00:00 AM	48.2	66069.34
11/7/2011	2:00:00 AM	49.5	89125.09
11/7/2011	3:00:00 AM	26.7	467.7351
11/7/2011	4:00:00 AM	54.4	275422.9
11/7/2011	5:00:00 AM	53.5	223872.1
11/7/2011	6:00:00 AM	55.6	363078.1
11/7/2011	7:00:00 AM	57.8	602559.6
11/7/2011	8:00:00 AM	52.5	177827.9
11/7/2011	9:00:00 AM	54.4	275422.9
11/7/2011	10:00:00 AM	58.5	707945.8
11/7/2011	11:00:00 AM	56.1	407380.3
11/7/2011	12:00:00 PM	55.2	331131.1
11/7/2011	1:00:00 PM	57.7	588843.7
11/7/2011	2:00:00 PM	53.3	213796.2
11/7/2011	3:00:00 PM	52.2	165958.7
11/7/2011	4:00:00 PM	54.2	263026.8
11/7/2011	5:00:00 PM	56.7	467735.1
11/7/2011	6:00:00 PM	58.4	691831
11/7/2011	7:00:00 PM	53.5	223872.1

Four Mile Brook Road

Date	Time	1 h Leq (dBA)	10^(L/10)
11/7/2011	8:00:00 PM	56.4	436515.8
11/7/2011	9:00:00 PM	51.7	147910.8
11/7/2011	10:00:00 PM	54.3	269153.5
11/7/2011	11:00:00 PM	50.2	104712.9
11/8/2011	12:00:00 AM	54.6	288403.2
11/8/2011	1:00:00 AM	48.9	77624.71
11/8/2011	2:00:00 AM	37.3	5370.318
11/8/2011	3:00:00 AM	52.6	181970.1
11/8/2011	4:00:00 AM	51.1	128825
11/8/2011	5:00:00 AM	56.3	426579.5
11/8/2011	6:00:00 AM	52.7	186208.7
11/8/2011	7:00:00 AM	55.9	389045.1
11/8/2011	8:00:00 AM	51.3	134896.3
11/8/2011	9:00:00 AM	56.9	489778.8
11/8/2011	10:00:00 AM	51.6	144544
11/8/2011	11:00:00 AM	56.1	407380.3
11/8/2011	12:00:00 PM	56.5	446683.6
11/8/2011	1:00:00 PM	53.4	218776.2
11/8/2011	2:00:00 PM	55.1	323593.7
11/8/2011	3:00:00 PM	55	316227.8
11/8/2011	4:00:00 PM	55.4	346736.9
11/8/2011	5:00:00 PM	57.3	537031.8
11/8/2011	6:00:00 PM	56	398107.2
11/8/2011	7:00:00 PM	55	316227.8
11/8/2011	8:00:00 PM	48.2	66069.34
11/8/2011	9:00:00 PM	52.9	194984.5
11/8/2011	10:00:00 PM	40	10000
11/8/2011	11:00:00 PM	51.6	144544
11/9/2011	12:00:00 AM	48.2	66069.34
11/9/2011	1:00:00 AM	41	12589.25
11/9/2011	2:00:00 AM	46.8	47863.01
11/9/2011	3:00:00 AM	26.7	467.7351
11/9/2011	4:00:00 AM	52.2	165958.7
11/9/2011	5:00:00 AM	56	398107.2
11/9/2011	6:00:00 AM	54.7	295120.9
11/9/2011	7:00:00 AM	57.3	537031.8
11/9/2011	8:00:00 AM	56.7	467735.1
11/9/2011	9:00:00 AM	55.8	380189.4
11/9/2011	10:00:00 AM	57.2	524807.5
11/9/2011	11:00:00 AM	54.2	263026.8
11/9/2011	12:00:00 PM	53.3	213796.2
11/9/2011	1:00:00 PM	53.6	229086.8
11/9/2011	2:00:00 PM	59.1	812830.5
11/9/2011	3:00:00 PM	57.4	549540.9
11/9/2011	4:00:00 PM	56.6	457088.2
11/9/2011	5:00:00 PM	56.4	436515.8
11/9/2011	6:00:00 PM	56.4	436515.8
11/9/2011	7:00:00 PM	56.9	489778.8
11/9/2011	8:00:00 PM	52.7	186208.7
11/9/2011	9:00:00 PM	41.3	13489.63
11/9/2011	10:00:00 PM	52.9	194984.5
11/9/2011	11:00:00 PM	46.6	45708.82

Four Mile Brook Road

Date	Time	1 h Leq (dBA)	10^(L/10)
11/10/2011	12:00:00 AM	51.1	128825
11/10/2011	1:00:00 AM	47.2	52480.75
11/10/2011	2:00:00 AM	48.6	72443.6
11/10/2011	3:00:00 AM	53.5	223872.1
11/10/2011	4:00:00 AM	46.6	45708.82
11/10/2011	5:00:00 AM	52.2	165958.7
11/10/2011	6:00:00 AM	52.2	165958.7
11/10/2011	7:00:00 AM	56	398107.2
11/10/2011	8:00:00 AM	54.7	295120.9
11/10/2011	9:00:00 AM	58.5	707945.8
11/10/2011	10:00:00 AM	56.2	416869.4
11/10/2011	11:00:00 AM	55	316227.8

Meterological Station

Date	Time	1 h Leq (dBA)	10^(L/10)
10/20/2011	2:00:00 PM	47.8	60255.959
10/20/2011	3:00:00 PM	57.3	537031.8
10/20/2011	4:00:00 PM	56	398107.17
10/20/2011	5:00:00 PM	59.3	851138.04
10/20/2011	6:00:00 PM	52.5	177827.94
10/20/2011	7:00:00 PM	50.1	102329.3
10/20/2011	8:00:00 PM	42.8	19054.607
10/20/2011	9:00:00 PM	36.8	4786.3009
10/20/2011	10:00:00 PM	31.5	1412.5375
10/20/2011	11:00:00 PM	31.5	1412.5375
10/21/2011	12:00:00 AM	36	3981.0717
10/21/2011	1:00:00 AM	37.3	5370.318
10/21/2011	2:00:00 AM	39.5	8912.5094
10/21/2011	3:00:00 AM	37	5011.8723
10/21/2011	4:00:00 AM	39.7	9332.543
10/21/2011	5:00:00 AM	41.9	15488.166
10/21/2011	6:00:00 AM	39	7943.2823
10/21/2011	7:00:00 AM	35.8	3801.894
10/21/2011	8:00:00 AM	35.3	3388.4416
10/21/2011	9:00:00 AM	35.2	3311.3112
10/21/2011	10:00:00 AM	36.6	4570.8819
10/21/2011	11:00:00 AM	45.1	32359.366
10/21/2011	12:00:00 PM	45	31622.777
10/21/2011	1:00:00 PM	39.4	8709.6359
10/21/2011	2:00:00 PM	42.7	18620.871
10/21/2011	3:00:00 PM	32.2	1659.5869
10/21/2011	4:00:00 PM	28.1	645.65423
10/21/2011	5:00:00 PM	26.9	489.77882
10/21/2011	6:00:00 PM	28	630.95734
10/21/2011	7:00:00 PM	31.2	1318.2567
10/21/2011	8:00:00 PM	26.4	436.51583
10/21/2011	9:00:00 PM	26.6	457.08819
10/21/2011	10:00:00 PM	27.2	524.80746
10/21/2011	11:00:00 PM	26.3	426.57952
10/22/2011	12:00:00 AM	28.7	741.31024
10/22/2011	1:00:00 AM	30.4	1096.4782
10/22/2011	2:00:00 AM	28	630.95734
10/22/2011	3:00:00 AM	27.4	549.54087
10/22/2011	4:00:00 AM	30.2	1047.1285
10/22/2011	5:00:00 AM	28.1	645.65423
10/22/2011	6:00:00 AM	26.1	407.38028
10/22/2011	7:00:00 AM	27.1	512.86138
10/22/2011	8:00:00 AM	27.7	588.84366
10/22/2011	9:00:00 AM	29.1	812.83052
10/22/2011	10:00:00 AM	26.7	467.73514
10/22/2011	11:00:00 AM	33.5	2238.7211
10/22/2011	12:00:00 PM	38.2	6606.9345
10/22/2011	1:00:00 PM	35.6	3630.7805
10/22/2011	2:00:00 PM	36.4	4365.1583
10/22/2011	3:00:00 PM	46.7	46773.514
10/22/2011	4:00:00 PM	47.9	61659.5
10/22/2011	5:00:00 PM	26.4	436.51583

Calculation of 24 h Leq

	24h sum	Average	24 h Leq (dBA)
Day 1	2297160	95715.01	49.8
Day 2	45187.25	1882.802	32.7
Day 3	124674.3	5194.761	37.2
Day 4	51302.67	2137.611	33.3
Day 5	44812.27	1867.178	32.7
Day 6	1033953	43081.36	46.3
Day 7	579606.2	24150.26	43.8

Calculation of LDN (adjusted for day/night)

	24h sum	Average	LDN
1	2814231	117259.6	50.7
2	95092.52	3962.188	36.0
3	154330.5	6430.438	38.1
3	119780.2	4990.844	37.0
4	91046.31	3793.596	35.8
5	4622030	192584.6	52.8
7	616902.8	25704.28	44.1

Meterological Station

Date	Time	1 h Leq (dBA)	10^(L/10)
10/22/2011	6:00:00 PM	26.1	407.38028
10/22/2011	7:00:00 PM	28.8	758.57758
10/22/2011	8:00:00 PM	26.3	426.57952
10/22/2011	9:00:00 PM	26.3	426.57952
10/22/2011	10:00:00 PM	28.2	660.69345
10/22/2011	11:00:00 PM	26.3	426.57952
10/23/2011	12:00:00 AM	26.8	478.63009
10/23/2011	1:00:00 AM	25.9	389.04514
10/23/2011	2:00:00 AM	26.3	426.57952
10/23/2011	3:00:00 AM	25.9	389.04514
10/23/2011	4:00:00 AM	25.9	389.04514
10/23/2011	5:00:00 AM	26	398.10717
10/23/2011	6:00:00 AM	26	398.10717
10/23/2011	7:00:00 AM	26.2	416.86938
10/23/2011	8:00:00 AM	26.5	446.68359
10/23/2011	9:00:00 AM	29.3	851.13804
10/23/2011	10:00:00 AM	30.4	1096.4782
10/23/2011	11:00:00 AM	29.5	891.25094
10/23/2011	12:00:00 PM	29.5	891.25094
10/23/2011	1:00:00 PM	29.4	870.96359
10/23/2011	2:00:00 PM	39.8	9549.9259
10/23/2011	3:00:00 PM	32.7	1862.0871
10/23/2011	4:00:00 PM	27	501.18723
10/23/2011	5:00:00 PM	26.3	426.57952
10/23/2011	6:00:00 PM	26.1	407.38028
10/23/2011	7:00:00 PM	25.9	389.04514
10/23/2011	8:00:00 PM	25.9	389.04514
10/23/2011	9:00:00 PM	26	398.10717
10/23/2011	10:00:00 PM	26.3	426.57952
10/23/2011	11:00:00 PM	26	398.10717
10/24/2011	12:00:00 AM	26	398.10717
10/24/2011	1:00:00 AM	26.1	407.38028
10/24/2011	2:00:00 AM	26	398.10717
10/24/2011	3:00:00 AM	25.8	380.1894
10/24/2011	4:00:00 AM	26.4	436.51583
10/24/2011	5:00:00 AM	27.1	512.86138
10/24/2011	6:00:00 AM	36.7	4677.3514
10/24/2011	7:00:00 AM	40	10000
10/24/2011	8:00:00 AM	38.2	6606.9345
10/24/2011	9:00:00 AM	35.7	3715.3523
10/24/2011	10:00:00 AM	34.9	3090.2954
10/24/2011	11:00:00 AM	28.2	660.69345
10/24/2011	12:00:00 PM	31.4	1380.3843
10/24/2011	1:00:00 PM	35.9	3890.4514
10/24/2011	2:00:00 PM	33.8	2398.8329
10/24/2011	3:00:00 PM	29.5	891.25094
10/24/2011	4:00:00 PM	27.9	616.595
10/24/2011	5:00:00 PM	29.6	912.01084
10/24/2011	6:00:00 PM	32.6	1819.7009
10/24/2011	7:00:00 PM	26.4	436.51583
10/24/2011	8:00:00 PM	26.2	416.86938
10/24/2011	9:00:00 PM	27.9	616.595

Meterological Station

Date	Time	1 h Leq (dBA)	10^(L/10)
10/24/2011	10:00:00 PM	27.6	575.43994
10/24/2011	11:00:00 PM	27.1	512.86138
10/25/2011	12:00:00 AM	26	398.10717
10/25/2011	1:00:00 AM	25.9	389.04514
10/25/2011	2:00:00 AM	27.9	616.595
10/25/2011	3:00:00 AM	26.1	407.38028
10/25/2011	4:00:00 AM	27.6	575.43994
10/25/2011	5:00:00 AM	28.8	758.57758
10/25/2011	6:00:00 AM	31.7	1479.1084
10/25/2011	7:00:00 AM	39.1	8128.3052
10/25/2011	8:00:00 AM	36.8	4786.3009
10/25/2011	9:00:00 AM	38	6309.5734
10/25/2011	10:00:00 AM	39.8	9549.9259
10/25/2011	11:00:00 AM	29.8	954.99259
10/25/2011	12:00:00 PM	27.9	616.595
10/25/2011	1:00:00 PM	28.1	645.65423
10/25/2011	2:00:00 PM	27.9	616.595
10/25/2011	3:00:00 PM	30.7	1174.8976
10/25/2011	4:00:00 PM	36.1	4073.8028
10/25/2011	5:00:00 PM	26.6	457.08819
10/25/2011	6:00:00 PM	32.9	1949.8446
10/25/2011	7:00:00 PM	27.7	588.84366
10/25/2011	8:00:00 PM	37.7	5888.4366
10/25/2011	9:00:00 PM	42.1	16218.101
10/25/2011	10:00:00 PM	41.2	13182.567
10/25/2011	11:00:00 PM	39.5	8912.5094
10/26/2011	12:00:00 AM	44.2	26302.68
10/26/2011	1:00:00 AM	49	79432.823
10/26/2011	2:00:00 AM	48	63095.734
10/26/2011	3:00:00 AM	46.5	44668.359
10/26/2011	4:00:00 AM	47.6	57543.994
10/26/2011	5:00:00 AM	49.4	87096.359
10/26/2011	6:00:00 AM	45	31622.777
10/26/2011	7:00:00 AM	44.1	25703.958
10/26/2011	8:00:00 AM	43.4	21877.616
10/26/2011	9:00:00 AM	43.1	20417.379
10/26/2011	10:00:00 AM	51.6	144543.98
10/26/2011	11:00:00 AM	55.1	323593.66
10/26/2011	12:00:00 PM	43.4	21877.616
10/26/2011	1:00:00 PM	45.2	33113.112
10/26/2011	2:00:00 PM	50.1	102329.3
10/26/2011	3:00:00 PM	52	158489.32
10/26/2011	4:00:00 PM	50.7	117489.76
10/26/2011	5:00:00 PM	48.4	69183.097
10/26/2011	6:00:00 PM	33.7	2344.2288
10/26/2011	7:00:00 PM	26.4	436.51583
10/26/2011	8:00:00 PM	27.6	575.43994
10/26/2011	9:00:00 PM	26.7	467.73514
10/26/2011	10:00:00 PM	27	501.18723
10/26/2011	11:00:00 PM	27.8	602.55959
10/27/2011	12:00:00 AM	27.6	575.43994
10/27/2011	1:00:00 AM	27.2	524.80746

Meterological Station

Date	Time	1 h Leq (dBA)	10^(L/10)
10/27/2011	2:00:00 AM	26.8	478.63009
10/27/2011	3:00:00 AM	26.1	407.38028
10/27/2011	4:00:00 AM	27.6	575.43994
10/27/2011	5:00:00 AM	26.8	478.63009
10/27/2011	6:00:00 AM	27	501.18723
10/27/2011	7:00:00 AM	35.8	3801.894
10/27/2011	8:00:00 AM	27.7	588.84366
10/27/2011	9:00:00 AM	48.4	69183.097
10/27/2011	10:00:00 AM	39	7943.2823
10/27/2011	11:00:00 AM	38.6	7244.3596
10/27/2011	12:00:00 PM	36	3981.0717
10/27/2011	1:00:00 PM	44.9	30902.954

Recreational Campsite

Date	Time	1 h Leq (dBA)	10^(L/10)
10/6/11	11:00:00	51.4	138038.4
10/6/11	12:00:00	50.9	123026.9
10/6/11	13:00:00	49.8	95499.26
10/6/11	14:00:00	48.7	74131.02
10/6/11	15:00:00	44.4	27542.29
10/6/11	16:00:00	43.8	23988.33
10/6/11	17:00:00	44.1	25703.96
10/6/11	18:00:00	37.4	5495.409
10/6/11	19:00:00	34.6	2884.032
10/6/11	20:00:00	29.7	933.2543
10/6/11	21:00:00	33	1995.262
10/6/11	22:00:00	31.6	1445.44
10/6/11	23:00:00	31.2	1318.257
10/7/11	0:00:00	28.9	776.2471
10/7/11	1:00:00	29.6	912.0108
10/7/11	2:00:00	27.1	512.8614
10/7/11	3:00:00	26.9	489.7788
10/7/11	4:00:00	27.2	524.8075
10/7/11	5:00:00	27.6	575.4399
10/7/11	6:00:00	27.4	549.5409
10/7/11	7:00:00	33.7	2344.229
10/7/11	8:00:00	37.1	5128.614
10/7/11	9:00:00	35	3162.278
10/7/11	10:00:00	35.6	3630.781
10/7/11	11:00:00	38.1	6456.542
10/7/11	12:00:00	38	6309.573
10/7/11	13:00:00	36.8	4786.301
10/7/11	14:00:00	38.3	6760.83
10/7/11	15:00:00	39.4	8709.636
10/7/11	16:00:00	39.9	9772.372
10/7/11	17:00:00	34.8	3019.952
10/7/11	18:00:00	36.1	4073.803
10/7/11	19:00:00	44	25118.86
10/7/11	20:00:00	46.4	43651.58
10/7/11	21:00:00	46	39810.72
10/7/11	22:00:00	45.9	38904.51
10/7/11	23:00:00	45.9	38904.51
10/8/11	0:00:00	45	31622.78
10/8/11	1:00:00	45	31622.78
10/8/11	2:00:00	44.9	30902.95
10/8/11	3:00:00	45	31622.78
10/8/11	4:00:00	45	31622.78
10/8/11	5:00:00	45	31622.78
10/8/11	6:00:00	45.4	34673.69
10/8/11	7:00:00	45.8	38018.94
10/8/11	8:00:00	46.1	40738.03
10/8/11	9:00:00	47.4	54954.09
10/8/11	10:00:00	46.2	41686.94
10/8/11	11:00:00	44.1	25703.96
10/8/11	12:00:00	44.1	25703.96
10/8/11	13:00:00	43.9	24547.09
10/8/11	14:00:00	46.9	48977.88

Calculation of 24 h Leq

	24h sum	Average	24 h Leq (dBA)
Day 1	540608.4	22525.35	43.5
Day 2	635367.7	26473.65	44.2
Day 3	2986226	124426.1	50.9
Day 4	556533.4	23188.89	43.7
Day 5	382885.4	15953.56	42.0
Day 6	30550.34	1272.931	31.0
Day 7	27587.17	1149.466	30.6

Calculation of LDN (adjusted for day/night)

	24h sum	Average	LDN
1	591538.9	24647.45	43.9
2	2998723	124946.8	51.0
3	5140091	214170.5	53.3
3	1649271	68719.63	48.4
4	440234.7	18343.11	42.6
5	66559.3	2773.304	34.4
7	57880	2411.667	33.8

Recreational Campsite

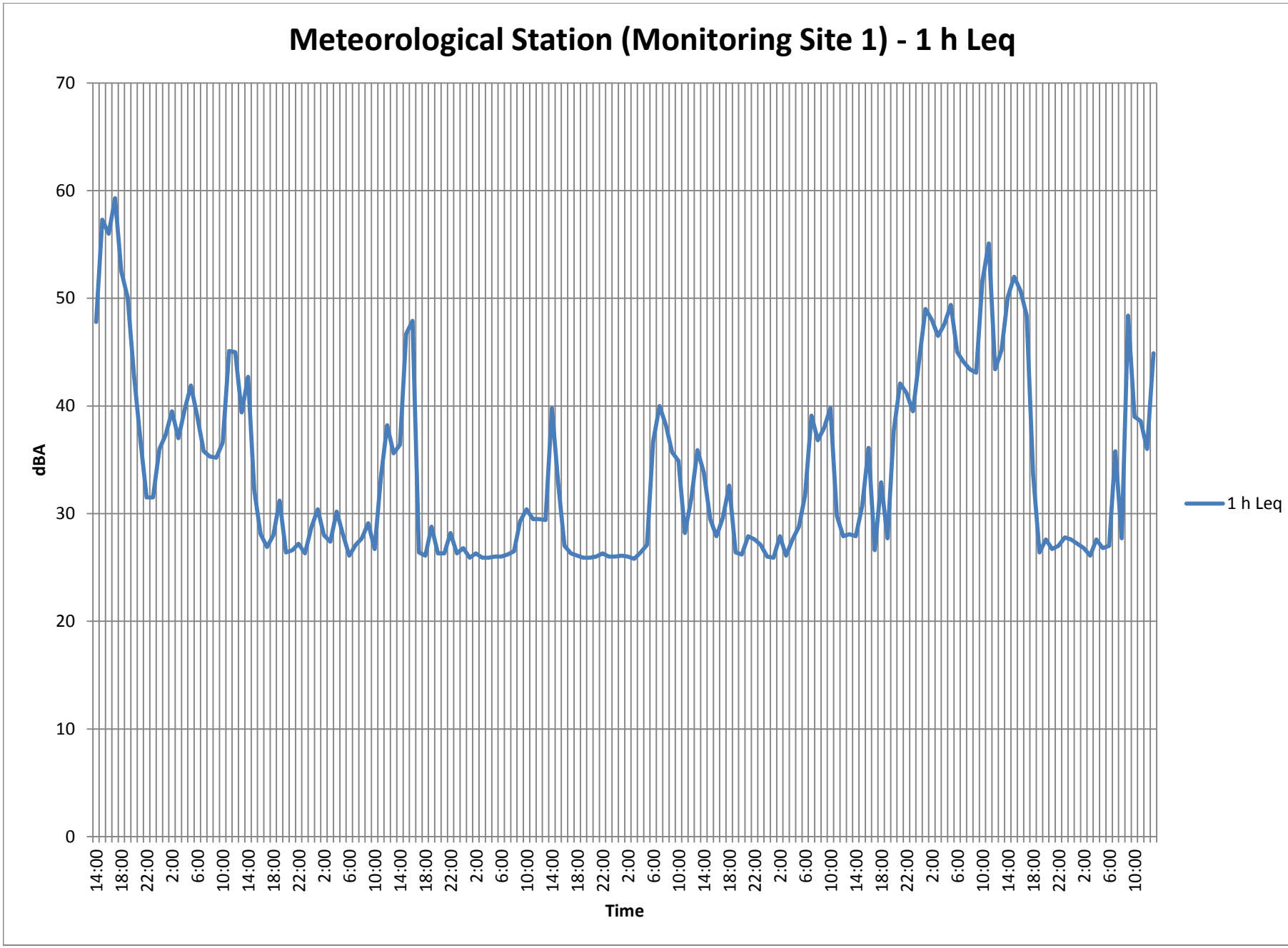
Date	Time	1 h Leq (dBA)	10^(L/10)
10/8/11	15:00:00	62.4	1737801
10/8/11	16:00:00	58.2	660693.4
10/8/11	17:00:00	43.7	23442.29
10/8/11	18:00:00	44.8	30199.52
10/8/11	19:00:00	43	19952.62
10/8/11	20:00:00	42.9	19498.45
10/8/11	21:00:00	42.8	19054.61
10/8/11	22:00:00	43.9	24547.09
10/8/11	23:00:00	45.7	37153.52
10/9/11	0:00:00	44.1	25703.96
10/9/11	1:00:00	45.9	38904.51
10/9/11	2:00:00	47	50118.72
10/9/11	3:00:00	45.3	33884.42
10/9/11	4:00:00	44.1	25703.96
10/9/11	5:00:00	42.4	17378.01
10/9/11	6:00:00	40.2	10471.29
10/9/11	7:00:00	39.9	9772.372
10/9/11	8:00:00	41.6	14454.4
10/9/11	9:00:00	44.8	30199.52
10/9/11	10:00:00	45.1	32359.37
10/9/11	11:00:00	45.1	32359.37
10/9/11	12:00:00	45.9	38904.51
10/9/11	13:00:00	44.3	26915.35
10/9/11	14:00:00	45	31622.78
10/9/11	15:00:00	42.2	16595.87
10/9/11	16:00:00	41.4	13803.84
10/9/11	17:00:00	45.3	33884.42
10/9/11	18:00:00	43	19952.62
10/9/11	19:00:00	42.5	17782.79
10/9/11	20:00:00	41.2	13182.57
10/9/11	21:00:00	40.1	10232.93
10/9/11	22:00:00	39.8	9549.926
10/9/11	23:00:00	39.1	8128.305
10/10/11	0:00:00	38.5	7079.458
10/10/11	1:00:00	40.8	12022.64
10/10/11	2:00:00	44.5	28183.83
10/10/11	3:00:00	41.2	13182.57
10/10/11	4:00:00	40.6	11481.54
10/10/11	5:00:00	42.1	16218.1
10/10/11	6:00:00	44	25118.86
10/10/11	7:00:00	43.9	24547.09
10/10/11	8:00:00	46.8	47863.01
10/10/11	9:00:00	46.2	41686.94
10/10/11	10:00:00	47.5	56234.13
10/10/11	11:00:00	48.7	74131.02
10/10/11	12:00:00	47.8	60255.96
10/10/11	13:00:00	47	50118.72
10/10/11	14:00:00	47.1	51286.14
10/10/11	15:00:00	45.8	38018.94
10/10/11	16:00:00	46.7	46773.51
10/10/11	17:00:00	41.8	15135.61
10/10/11	18:00:00	38.8	7585.776

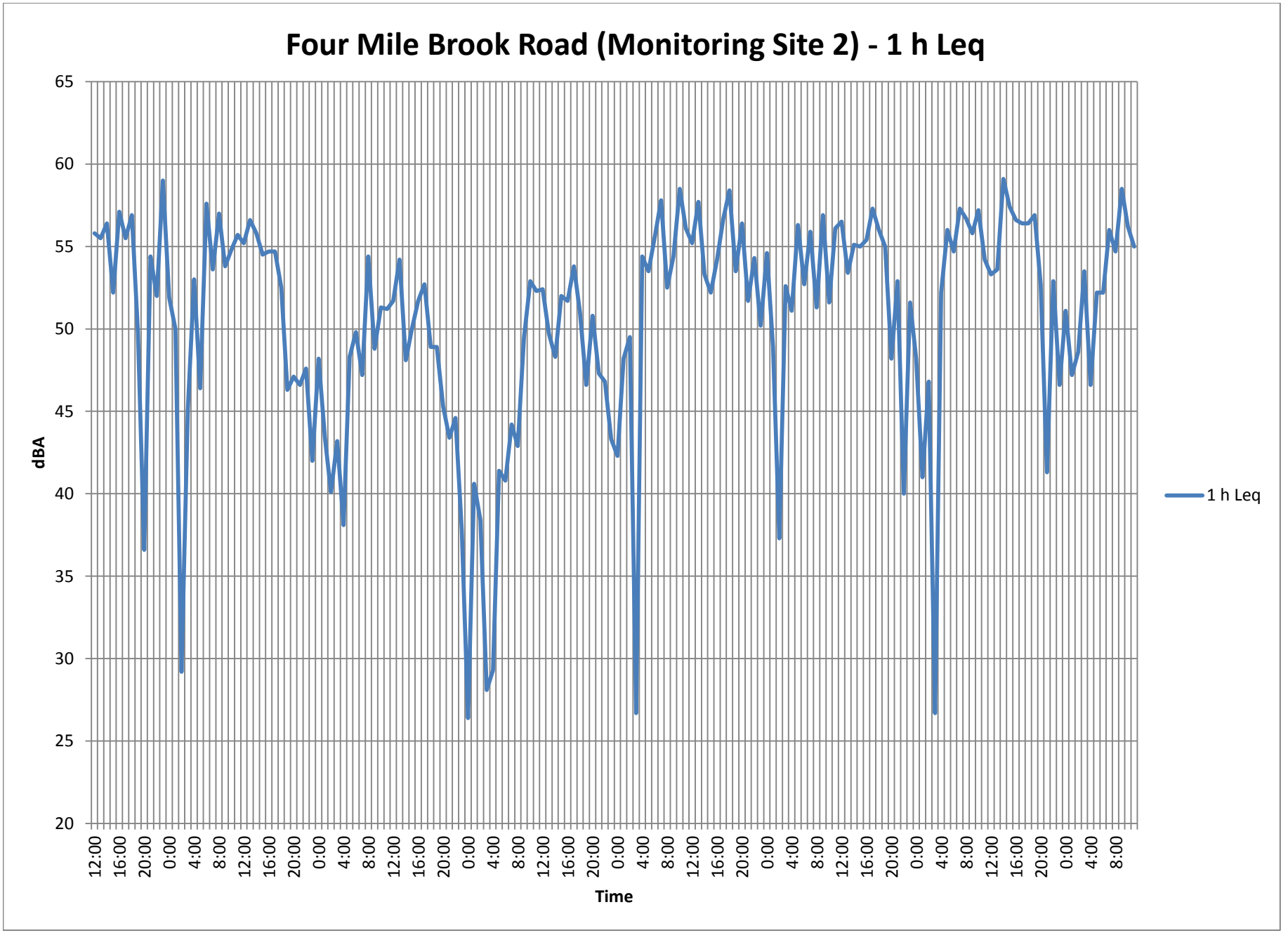
Recreational Campsite

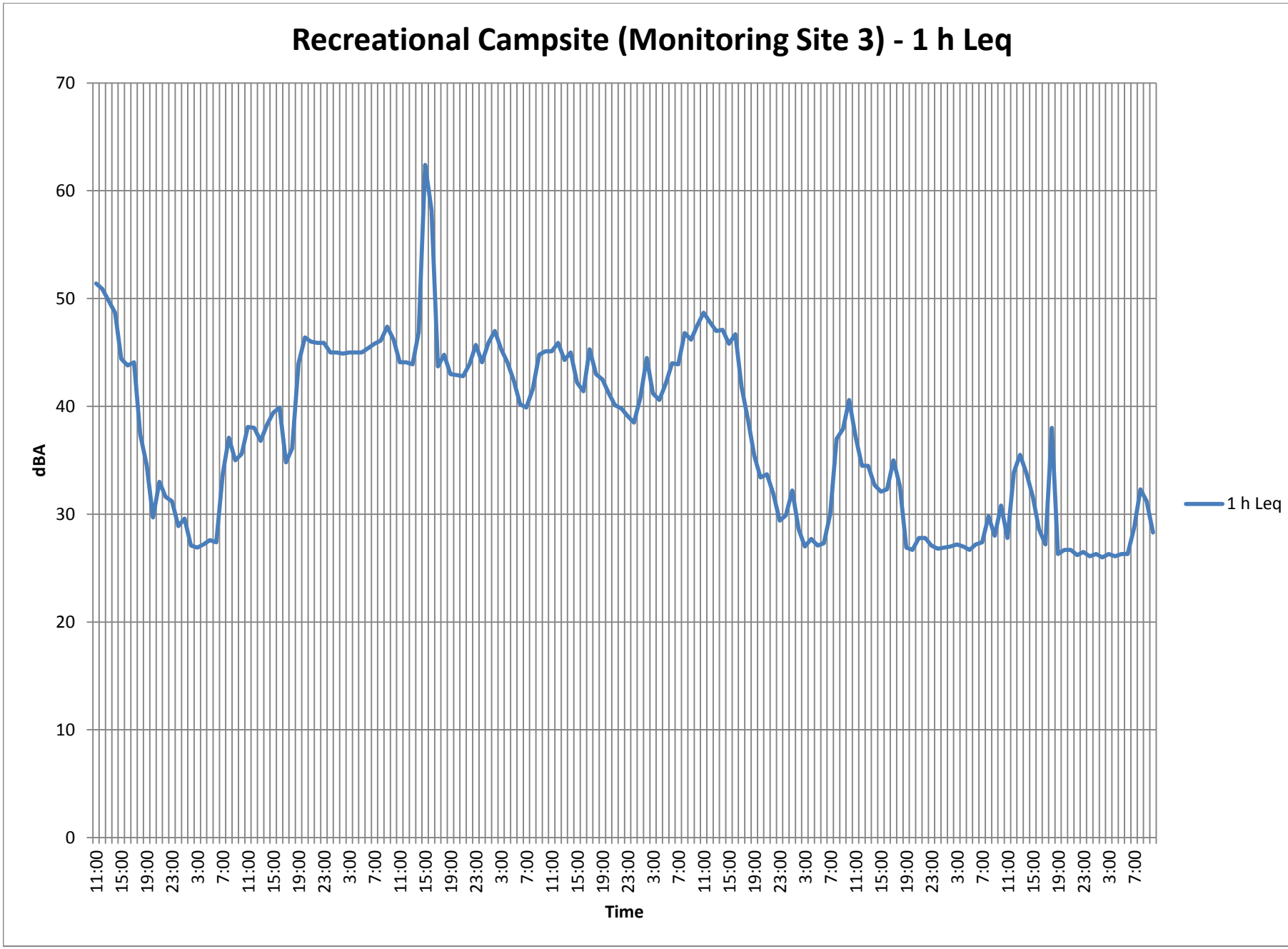
Date	Time	1 h Leq (dBA)	10^(L/10)
10/10/11	19:00:00	35.4	3467.369
10/10/11	20:00:00	33.4	2187.762
10/10/11	21:00:00	33.7	2344.229
10/10/11	22:00:00	31.9	1548.817
10/10/11	23:00:00	29.4	870.9636
10/11/11	0:00:00	29.9	977.2372
10/11/11	1:00:00	32.2	1659.587
10/11/11	2:00:00	28.6	724.436
10/11/11	3:00:00	27	501.1872
10/11/11	4:00:00	27.7	588.8437
10/11/11	5:00:00	27.1	512.8614
10/11/11	6:00:00	27.3	537.0318
10/11/11	7:00:00	30	1000
10/11/11	8:00:00	37	5011.872
10/11/11	9:00:00	37.9	6165.95
10/11/11	10:00:00	40.6	11481.54
10/11/11	11:00:00	37.2	5248.075
10/11/11	12:00:00	34.5	2818.383
10/11/11	13:00:00	34.5	2818.383
10/11/11	14:00:00	32.7	1862.087
10/11/11	15:00:00	32.1	1621.81
10/11/11	16:00:00	32.3	1698.244
10/11/11	17:00:00	35	3162.278
10/11/11	18:00:00	32.6	1819.701
10/11/11	19:00:00	26.9	489.7788
10/11/11	20:00:00	26.7	467.7351
10/11/11	21:00:00	27.8	602.5596
10/11/11	22:00:00	27.8	602.5596
10/11/11	23:00:00	27.1	512.8614
10/12/11	0:00:00	26.8	478.6301
10/12/11	1:00:00	26.9	489.7788
10/12/11	2:00:00	27	501.1872
10/12/11	3:00:00	27.2	524.8075
10/12/11	4:00:00	27	501.1872
10/12/11	5:00:00	26.7	467.7351
10/12/11	6:00:00	27.2	524.8075
10/12/11	7:00:00	27.4	549.5409
10/12/11	8:00:00	29.8	954.9926
10/12/11	9:00:00	28	630.9573
10/12/11	10:00:00	30.8	1202.264
10/12/11	11:00:00	27.8	602.5596
10/12/11	12:00:00	33.9	2454.709
10/12/11	13:00:00	35.5	3548.134
10/12/11	14:00:00	33.8	2398.833
10/12/11	15:00:00	31.6	1445.44
10/12/11	16:00:00	28.6	724.436
10/12/11	17:00:00	27.2	524.8075
10/12/11	18:00:00	38	6309.573
10/12/11	19:00:00	26.3	426.5795
10/12/11	20:00:00	26.7	467.7351
10/12/11	21:00:00	26.7	467.7351
10/12/11	22:00:00	26.2	416.8694

Recreational Campsite

Date	Time	1 h Leq (dBA)	10^(L/10)
10/12/11	23:00:00	26.5	446.6836
10/13/11	0:00:00	26.1	407.3803
10/13/11	1:00:00	26.3	426.5795
10/13/11	2:00:00	26	398.1072
10/13/11	3:00:00	26.3	426.5795
10/13/11	4:00:00	26.1	407.3803
10/13/11	5:00:00	26.3	426.5795
10/13/11	6:00:00	26.3	426.5795
10/13/11	7:00:00	28.7	741.3102
10/13/11	8:00:00	32.3	1698.244
10/13/11	9:00:00	31.2	1318.257
10/13/11	10:00:00	28.3	676.083


Meteorological Station (Monitoring Site 1) - 1 h Leq
70
60
50
40
30
20
10
0
dBA
14:00
18:00
22:00
2:00
6:00
10:00
14:00
18:00
22:00
2:00
6:00
10:00
14:00
18:00
22:00
2:00
6:00
10:00
14:00
18:00
22:00
2:00
6:00
10:00
14:00
18:00
22:00
2:00
6:00
10:00
14:00
18:00
22:00
2:00
6:00
10:00
Time
1 h Leq


Four Mile Brook Road (Monitoring Site 2) - 1 h Leq
65
60
55
50
45
40
35
30
25
20
dBA
12:00
16:00
20:00
0:00
4:00
8:00
12:00
16:00
20:00
0:00
4:00
8:00
12:00
16:00
20:00
0:00
4:00
8:00
12:00
16:00
20:00
0:00
4:00
8:00
12:00
16:00
20:00
0:00
4:00
8:00
12:00
16:00
20:00
0:00
4:00
8:00
Time
1 h Leq


Recreational Campsite (Monitoring Site 3) - 1 h Leq
70
60
50
40
30
20
10
0
dBA
11:00
15:00
19:00
23:00
3:00
7:00
11:00
15:00
19:00
23:00
3:00
7:00
11:00
15:00
19:00
23:00
3:00
7:00
11:00
15:00
19:00
23:00
3:00
7:00
11:00
15:00
19:00
23:00
3:00
7:00
11:00
15:00
19:00
23:00
3:00
7:00
11:00
15:00
19:00
23:00
3:00
7:00
Time
1 h Leq

Stantec

Appendix A
Sample Hand Calculations
Christina Flogeras

121810356

January 23, 2012

1) 24 hour L_{eq}

$$24\,h\,L_{eq} = 10 \cdot \log\left(\frac{\sum(10^{\wedge}(L_i/10))}{24}\right)$$

where L_i is the one hour L_{eq}.

For the Meteorological Station, site 1, the first 24 1 h L_{eq} values are:

1	47.8	5	52.5	9	31.5	13	39.5
2	57.3	6	50.1	10	31.5	14	37.0
3	56.0	7	42.8	11	36.0	15	39.7
4	59.3	8	36.8	12	37.3	16	41.9
		17	39.0	21	36.6		
		18	35.8	22	45.1		
		19	35.3	23	45.0		
		20	35.2	24	39.4		

(dBA)

The $10^{\wedge}(L/10)$ term for the first 4 points is

$10^{\wedge}(L/10) = 10^{\wedge}(47.8/10) = 60256$
$= 10^{\wedge}(57.3/10) = 537032$
$= 10^{\wedge}(56.0/10) = 398107$
$= 10^{\wedge}(59.3/10) = 912011$

The sum of all 24 points is 2297160

$$\therefore 24\,h\,L_{eq} = 10 \cdot \log\left(\frac{2297160}{24}\right)$$

$= 10 \cdot 4.98$
$= 49.8\ dB_A$

Designed by: Checked by:

(Contd)

2) Percent highly annoyed

$$HA = \frac{100}{1 + \exp(10.4 - 0.132 L_{dn})} \%$$

The maximum L_{DN} was 60.0 dBA, measured at Monitoring Site 2.

$$\therefore HA = \frac{100}{1 + \exp(10.4 - 0.132(60.0)} \%$$

$$= \frac{100}{1 + \exp(2.48)}$$

$$= \frac{100}{12.97}$$

$$= 7.71\%$$

The L_{DN} value used in the calculation was not rounded, and resulted in a percent highly annoyed of 7.71%.