Acoustic Assessment Report

Summit Pit

SLR Project No: 203.50207.00000
May 2020

ACOUSTIC ASSESSMENT REPORT

Mountain Ash Limited Partnership
Rocky View County, Alberta
SLR Project No: 203.50207.00000

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1. EXECUTIVE SUMMARY

Mountain Ash Limited Partnership (“Mountain Ash”) is proposing to extract aggregate from a deposit approximately 8 km northeast of Cochrane, AB within Rocky View County (RVC). The operational site will be referred to as Summit Pit (“Site”) once operational and will only operate during daytime hours. This Site is on the south side of Highway 567.

An acoustic assessment has been undertaken to assess the potential sound egress from the Site operations in relation to the nearest noise sensitive receptors. This report details the methodology, results and conclusions of the sound monitoring and propagation modelling and associated assessment.

The site operations will implement some acoustic mitigation measures in the form of a 3 m high berm at the north site perimeter to remove line of sight to the nearest noise sensitive receptors. Furthermore, the operation and phased development approach below the surface level will increase the sound attenuation between the sound sources and receptor locations.

Additionally, acoustic shrouds will be installed on the crusher units to reduce the sound levels due to their operation.

The crusher will also maintain a buffer distance of 100m from the site boundary to control the sound levels at the nearest noise sensitive receptors.

Sound monitoring was undertaken at three locations to provide a good representation of the existing acoustic environment for the variety of surrounding receptors and to determine the operational sound level assessment criterion for each noise sensitive receptor. The monitoring was undertaken over multiple days, inclusive of a weekend period. The predominant sound source at each monitoring locations was road traffic sound from Highway 567 and local residential sound, with occasional sound from the Hillstone Aggregates operations but such sounds were not dominant.

Sound propagation modelling was undertaken to predict the sound levels from the proposed Site Summit Pit operations using calculation methods within ISO 9613-2 and worst-case assumptions for meteorological conditions.

The assessment of predicted sound levels concluded that the Summit operations should not exceed the sound level criterion at any noise sensitive receptors, with the inclusion of the proposed acoustic mitigation measures.

There are no proposed gravel pits with a development permit that have the potential to add to the sound contributions from the Site operations at the assessed noise sensitive receptors. The status of the nearby proposed McNair and Lafarge pits is uncertain and have not been included in a cumulative assessment at this time. There is an agreement between these operators to ensure that a group mitigation agreement is in place to minimize the sound from their operations with respect to cumulative sound and will be undertaken when there is more certainty with respect to permits and exact nature of operations.

TABLE OF CONTENTS

1. **Executive Summary** ii

Table of contents iii

2. **Acoustical glossary** 1

3. **Background and scope of report** 4

4. **Assessed Phases** 5

5. **Operations and Equipment details** 6
   - 5.1 Equipment details 6
   - 5.2 Operating Times 7
   - 5.3 Acoustic Mitigation Measures 7

6. **Relevant guidance and methodology** 7
   - 6.1 Technical Consultation 7
   - 6.2 Assessment Criteria 8

7. **Noise Sensitive Receptors** 8

8. **Sound monitoring survey** 9
   - 8.1 Sound monitoring methodology 10
     - 8.1.1 Monitoring details 10
       - 8.1.1.1 Monitoring locations 11
   - 8.2 Sound level results. 11
   - 8.3 Observation Notes 19
     - 8.3.1 ML1 19
     - 8.3.2 ML2 19
     - 8.3.3 ML3 20

9. **Sound propagation modellling** 20
   - 9.1 Methodology 20

10. **Assessment** 22
    - 10.1 Sound Level Criteria 22
    - 10.2 SOund Level Assessment at Receptor Locations 22
    - 10.3 Cumulative Assessment 23

11. **Conclusion** 23

12. **Statement of limitations** 23

TABLES

Table 1 Typical Sound Sources and Acoustic Environments ... 3
Table 2 Equipment Sound Sources ... 6
Table 3 Site Operating Times ... 7
Table 4 Noise sensitive receptors ... 8
Table 5 SLM Locations Details ... 11
Table 6 Monitoring Location 1 Sound Level Results Summary ... 12
Table 7 Monitoring Location 2 Sound Level Results Summary ... 12
Table 8 Monitoring Location 3 Sound Level Results Summary ... 13
Table 9 Receptor Sound Level Criterion Assessment ... 22
Table 10 Assessment of Operational Sound Levels ... 22

FIGURES

Figure 1 Site Location
Figure 2 Noise Sensitive Receptor Locations
Figure 3 SLM Locations Plan
Figure 4 ML1 Sound Level Time History Chart
Figure 5 ML1 Wind Speed and Direction Time History Chart
Figure 6 ML2 Sound Level Time History Chart
Figure 7 ML2 Wind Speed and Direction Time History Chart
Figure 8 ML3 Sound level Time History Chart
Figure 9 ML3 Wind Speed and Direction Time History Chart

2. ACOUSTICAL GLOSSARY

The primary acoustical metrics used to describe environmental sound in this study were as follows:

L_{eq} Often referred to as the "Equivalent Continuous Sound Level". The L_{eq} value is the sound energy average over the entire measurement time. It is defined as a calculated sound level over the measured time that has the same acoustic energy as the actual fluctuating sound levels that occurred during the same period. L_{eq} is the single number descriptor commonly used for environmental sound measurements.

This parameter is often applied over 24 hours, or over distinct daytime and nighttime periods. For example, the daytime L_{eq} represents the cumulative effects of all sound occurring in the 15-hour daytime period from 07:00 hours to 22:00 hours. The nighttime L_{eq} represents the cumulative effects of all sound events occurring in the nighttime period from 22:00 hours to 07:00 hours;

L_{max} The "Maximum Sound Level". The L_{max} is the maximum sound level observed. This metric is useful for quantifying the highest sound level expected during short duration events such as a vehicle pass by or dog barking;

L_{min} The "Minimum Sound Level". The L_{min} is the minimum sound level observed;

L_{night} is the average annual equivalent outdoor sound pressure level associated with a particular type of sound source during night-time (at least 8 hours);

L_{90} The "Statistical Sound Level" equaled or exceeded 90% of the time. This level represents a good indicator of the baseline sound of the overall acoustic environment. A statistical measure of sound over a period and is defined as the sound level exceeded for a certain percentage of the time; and

L_{w} is the sound power level. It is a measure of the total sound energy radiated by a source of sound and is used to calculate sound pressure levels at a distant location. The LWA is the A-weighted sound power level.

The following descriptions may prove useful when reading the information contained within this report:

Acoustic Environment: the sound with contribution from all sources, as modified by the current environment and associated conditions;

Ambient Sound Level: the sound level that is a composite of different airborne sounds from many sources far away from and near the point of measurement. The ambient sound level does not include sound from wind and must be determined without it and without sound from any source that is being assessed;

Atmospheric Attenuation: the effect of sound absorption by moisture in the air;

A weighting: the ear can recognize a sound depending on the pitch or frequencies found at the source. Microphones cannot differentiate sound in the same way as the ear and to counter this, the sound measuring instrument applies a correction to correspond more closely to the frequency response of the human ear by reducing the low and high frequencies. The correction factor is called 'A Weighting' and the resulting measurements are written as dBA, for broadband sound level. The dBA is internationally accepted and has been found to correspond well with subjective reaction to sound;

Comprehensive Sound Level (CSL): defined in multiple Alberta Regulations as "The sound level that is a composite of different airborne sounds from many sources far away from near the point of measurement. The CSL does include industrial components and should be measured with them, but abnormal noise events are excluded. The CSL is used to determine whether a facility is consistent with this guideline".

C weighting: the A weighting, this is a correction to account for the difference between the frequency response of a microphone and the human ear. However, the C weighting is tailored towards higher sound levels and has less attenuation in the low and high frequency regions. The C weighting is typically used to assess high sound levels in relation to human exposure and an indication of the low frequency content when compared to the A weighted sound level for the same situation. It is typically quoted as a broadband sound level;

dB Average Sound Level refers to the logarithmic average (acoustically referred to as the decibel average) of recorded data values for a sound level parameter over the entire monitoring survey;

Free Field Sound Field: a sound field in which the effects of obstacles or boundaries on propagating sound are negligible;

Frequency: the number of wave oscillations per second (hertz) of an acoustic pressure wave propagating through the air. This is linked to the subjective phenomenon pitch;

Sound Pressure Level: the physical measurement of sound, which utilizes a logarithmic scale and quantifies the amplitude or volume of acoustic pressure waves propagating through the air;

Mean Sound Level refers to the arithmetic average (mean) of recorded data values for a sound level parameter over the entire monitoring survey;

Mode Sound Level refers to the most repeated value (mode) of recorded data values for a sound level parameter over the entire monitoring survey;

One-third Octave Bands: used to represent the frequency or content of a sound. Bass and Treble on a Hi-Fi system is a very basic representation of the frequency content of sound. One-third octave bands are derived by splitting the audio signal into discrete entities. A single octave band comprises 3 one-third octave bands. One-third octave and octave bands are usually presented without a weighting/filter such as A weighting, however such weightings can be applied to frequency spectra to then derive a weighted overall single result;

Sound Level Contribution: the contribution of sound from one or more sources to the overall sound level from all sources affecting a location;

Spectrum: the quantification of the components of a sound as a function of frequency.

Third-Octave: the interval in frequency between two sounds having a ratio of 2 to the one-third power, or approximately 1.26;

Third-Octave Band Sound Pressure Level: the total sound pressure level of sound components in a specific one-third octave band;

Tonality: tonal sound contains a prominent frequency and is characterized by a definite pitch. A broadband sound such as white noise or television static has no tonality, whereas a guitar string when plucked is a tonal sound; and

Z Weighting: Indicates that the sound level has no frequency weighting applied, representing the unweighted levels from the microphone. This is typically used for frequency sound levels such as one-third-octave/octave bands.

Table 1 Typical Sound Sources and Acoustic Environments

Sound Pressure Level dB(A)	Example
0	Threshold of hearing for normal young people
20	Recording studio, ambient level
40	Quiet residential neighborhood, ambient level
60	Department store, restaurant, speech levels
80	Next to busy highway, shouting
100	Textile mill; press room with presses running, punch press and wood planers, at operator’s position
120	Ship’s engine room, rock concert; in front and close to speakers
140	Moon launch at 100mm, artillery fire; gunner’s position and threshold of pain

3. BACKGROUND AND SCOPE OF REPORT

Mountain Ash Limited Partnership ("Mountain Ash") is proposing to extract aggregate from a deposit approximately 8 km northeast of Cochrane, AB within Rocky View County (RVC). The operational site will be referred to as Summit Pit ("Site") once operational and will only operate during daytime hours. This Site is on the south side of Highway 567.

Rocky View County is the applicable regulatory authority for noise emissions from this proposed gravel pit facility.

Figure 1 shows a plan view of the Site area (shown in red) in relation to Highway 567 and the surrounding area. There is another aggregate facility (Hillstone Aggregates, operational 8am to 4pm Monday to Friday) located to the east of the site plus pumpjacks located to the north. Highway 567 is a heavily travelled road with constant traffic during daytime and evening periods.

There are two other aggregate developments proposed in the vicinity namely Lafarge Big Hill Springs Pit (directly adjacent to the west of the site) and McNair BRADI Pit (500 m north-east of the site). These sites were granted land re-designation but there is now uncertainty as per the status of this and are going through appeal to reverse a refusal. These two sites would form part of the Big Hill Springs Aggregate Producers Group (BHSAPG) along with the Site if realized.

Typical aggregate operations are proposed without the use of blasting. Therefore, blasting sound pressure and vibration have been removed from the scope of the acoustic assessment.

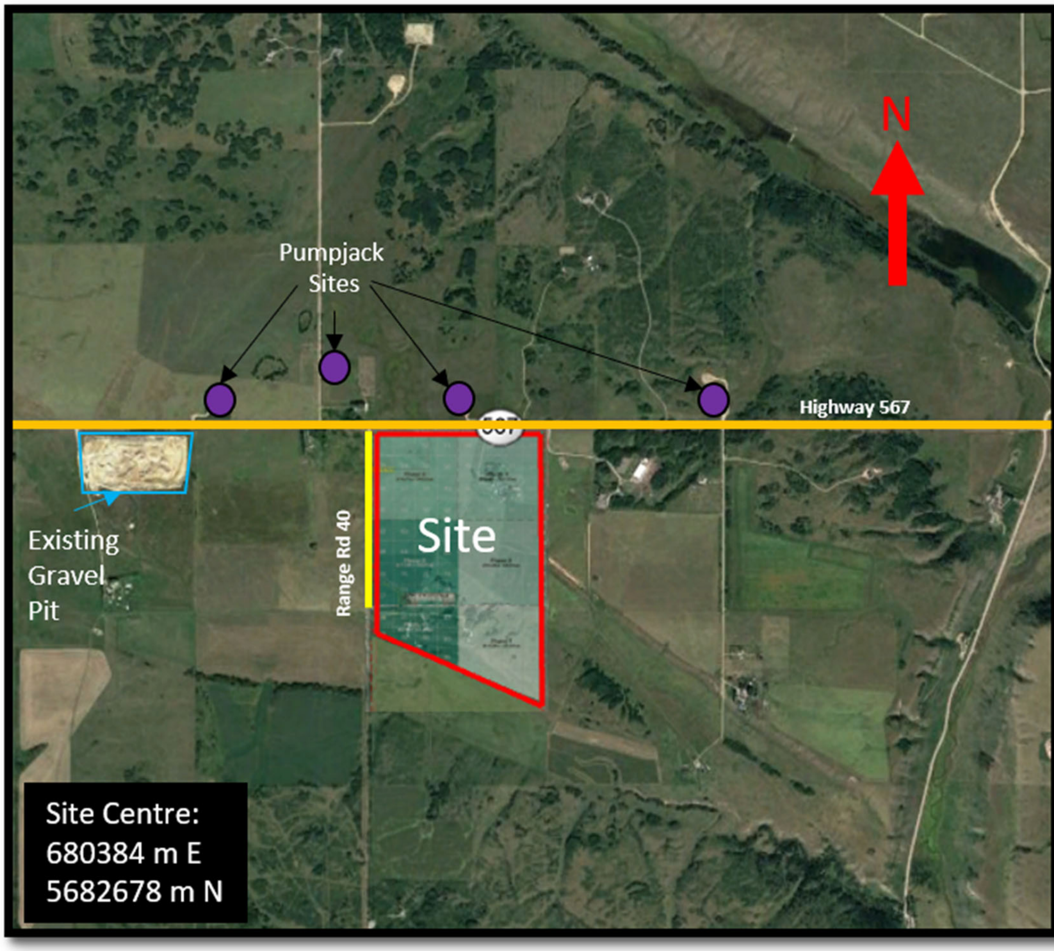


Figure 1 Site Location

An acoustic assessment has been undertaken to assess the potential sound egress from the Site operations in relation to the nearest noise sensitive receptors. This report details the methodology, results and conclusions of the sound monitoring and propagation modelling and associated assessment.

4. ASSESSED PHASES

The development will extract gravel through six phases, starting at the south-east and working counter-clockwise to the south-west. Stripping, extraction, production, sales and remediation will all occur simultaneously throughout the Site's lifespan. An access road will allow haul trucks to access the site, which has a route which changes slightly with each operating phase.

Extraction for the Phase 2 area will begin with the mining and processing equipment located in the Phase 1 area, approximately 22.5 m below grade. This equipment will move during the Phases; however, it will remain approximately 22.5 m below grade.

An assessment has been undertaken for all six phases, with the potential for all operations to occur simultaneously.

5. OPERATIONS AND EQUIPMENT DETAILS

5.1 EQUIPMENT DETAILS

The equipment to be utilized for each operation is identified in Table 2.

Table 2 Equipment Sound Sources

Equipment & Model	No.	Power Rating	Hrs/Day	Usage/Working Area	LWA, dB(A)
CAT 374F Excavator	1	472 HP	10	Mining Area, 80% Utilization	107
Twin Engine 657G Motor Scraper	2	600 HP	10	Stripping / Reclamation Areas, 100% Utilization	113
1 MW Crusher Generator	1	1 MW	10	Crusher Area	102
CAT 980M Wheel Loaders	2	425 HP	10	Feed Crusher, 100% Utilization	112
CAT966L Loader	1	207 kW	7	Sales, 6 days/week	111
CAT D-7E Dozer	1	238 HP	6	Remediation, 50% Runtime	110
CAT 14M Grader	1	275 HP	3	Remediation, Haul Road, 30% Runtime	110
Tandem Water Truck	1	550 HP	10	Various	109
Peterbit Quad Trailer - Haul Truck	1	500 HP	8 (7 trips along phase haul route per hour)	Sales, Haul Road	114
Elrus Jaw Crusher	2	450 HP	10	Crushing Area	124*

*Raw LWA, approximately 5 dB attenuation accounted for by acoustic shrouds.

5.2 OPERATING TIMES

Table 3 Site Operating Times

Days	Operating Periods
Monday - Friday	0700 hrs – 1900 hrs
Saturdays	0700 hrs – 1700 hrs
Sundays and Statutory Holidays	No Operations

5.3 ACOUSTIC MITIGATION MEASURES

The site operations will implement some acoustic mitigation measures in the form of a 3 m high berm at the north site perimeter to remove line of sight to the nearest noise sensitive receptors. Furthermore, the operation and phased development approach below the surface level will increase the sound attenuation between the sound sources and receptor locations.

Additionally, acoustic shrouds will be installed on the crusher units to reduce the sound levels due to their operation. The crusher will also maintain an adequate buffer distance from the from the site boundary in order to control the sound levels at the nearest noise sensitive receptors.

White noise/broadband reverse alarms will be installed on all mobile equipment to minimize the tonal sound characteristics from operations.

6. RELEVANT GUIDANCE AND METHODOLOGY

The RVC regulates noise through the Noise Control Bylaw No. C-5772-2003. The bylaw states that no person shall "make, continue, cause, or allow to be made or continued any excessive, unnecessary, or unusual noise of any type." The bylaw also states that, if an activity "necessarily involves the creation of noise," the noise must be "minimized as much as practicable." This bylaw does not prescribe quantitative limits for noise emissions.

There was an attempt made to implement a resource plan for aggregate industries within RVC by the County. A draft policy was put forward detailing the proposed policy and standards for various environmental considerations including noise. However, on April 30, 2019, a Council vote confirmed that no specific policy would come into place and each individual aggregate extraction application would be evaluated on its own merit.

The lack of specific guidance and policy in place for this assessment, with respect to sound egress, made it necessary for technical consultation with RVC regarding appropriate assessment methodology and criteria to be undertaken; prior to assessment.

6.1 TECHNICAL CONSULTATION

A site visit was conducted prior to undertaking any technical consultations to become familiar with the local environment and determine appropriate locations for sound monitoring. This was undertaken by Dan Clayton, SLR Consulting Ltd. in August 2019.

Technical consultation was undertaken with Rocky View County (RVC), in person, on August 30th, 2019 to agree the methodology for the acoustic assessment of the Site. Discussions concluded that appropriate methodology should be used and align with the draft "Aggregate Development Requirements and Standards". Off-site traffic, on public roads, has been excluded from the assessment.

Other specific details were discussed and verbally supported including background sound monitoring details including number, duration, periods and locations. These are all as per the details provided in this report.

6.2 ASSESSMENT CRITERIA

The assessment criteria for each receptor was developed using methodology agreed with RVC, based on that proposed within the draft resource plan for aggregate industries. The criteria were developed using the concept that the daytime operations should not exceed the following for aggregate extraction and/or processing development:

- Daytime (07:00 hrs to 22:00 hrs on weekdays, 09:00 hrs to 22:00 hrs on weekends):
    - 55 dB L_{Aeq} (1 hour, free field) or 10 dB above recorded ambient sound levels (measured as L_{A90}), whichever is the lesser, at the nearest or most impacted dwellings.

The measured sound levels have been used to determine appropriate assessment criterion at each noise sensitive receptor. A proxy location has been used in many instances, which is line with good practice for such an assessment.

7. NOISE SENSITIVE RECEPTORS

The noise sensitive receptors included in the acoustic assessment are those within the vicinity of the Site, as per Table 4 and displayed in Figure 2.

Table 4 Noise sensitive receptors

Receptor	Distance from Property Line (m)	Direction from Site	Easting (m)	Northing (m)
R1	245	E	681019	5682785
R2	106	NW	679899	5683176
R3	695	E	681466	5682866
R4	280	W	679679	5682983
R5	1195	W	678776	5682298
R6	1724	W	678241	5682870
R7	1753	NW	679744	5684819
R8	1790	NW	679394	5684746

Receptor	Distance from Property Line (m)	Direction from Site	Easting (m)	Northing (m)
R9	731	NE	680835	5683831
R10	1066	NE	680914	5684178
R11	1488	E	682262	5682949
R12	905	E	681701	5682111
R13	907	E	681706	5681931
R14	796	SE	681543	5681565
R15	2091	E	682861	5682844
R16	1945	E	682739	5682196
R17	1085	SW	680173	5680907

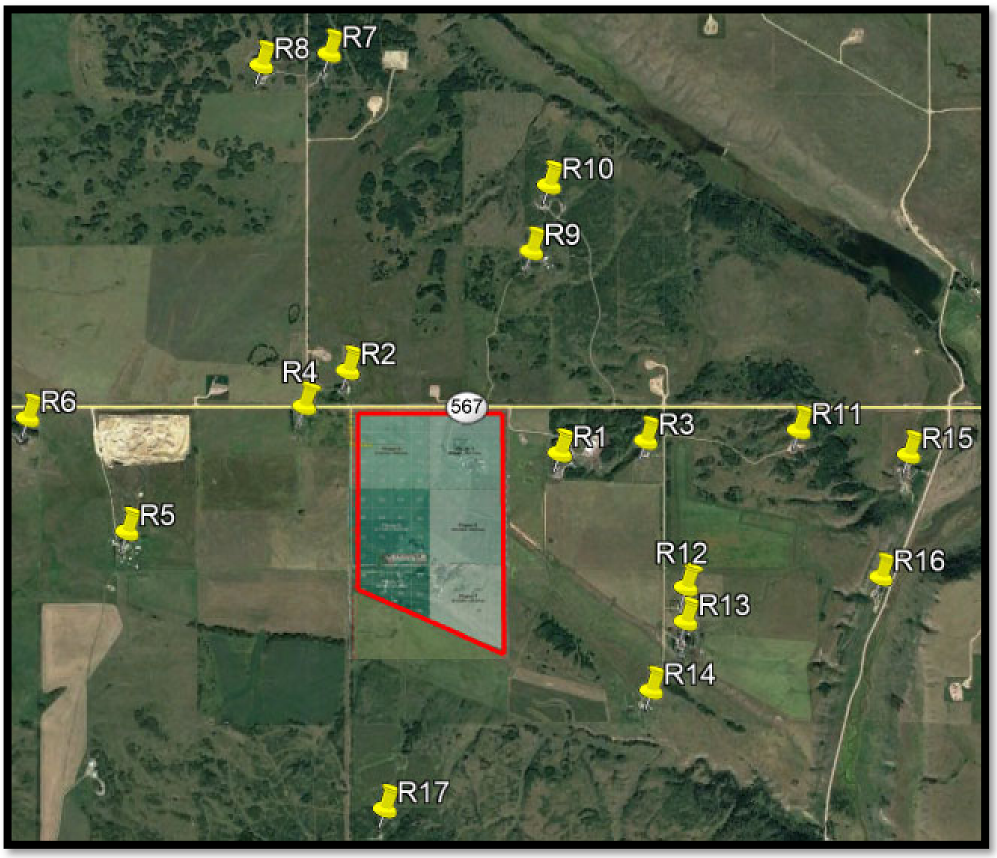


Figure 2 Noise Sensitive Receptor Locations

8. SOUND MONITORING SURVEY

Sound monitoring was undertaken at three locations to provide a good representation of the existing acoustic environment for the variety of surrounding receptors.

8.1 SOUND MONITORING METHODOLOGY

Jasen Stein, B.Sc., MIOA., of SLR deployed sound level meters ("SLMs") and weather recording station and sensors ("weather stations") on Friday 4th October 2019 at 12:00 to continuously record sound pressure levels. The SLMs were collected on Tuesday October 8th, 2019 at 12:00. The following sections outline the more specific details of the sound monitoring methodology.

8.1.1 MONITORING DETAILS

The following details are pertinent to the sound monitoring:

- Larson Davis 831C sound level meters and associated Vaisala meteorological instrumentation used to conduct the sound monitoring survey. All equipment was externally calibrated within industry standard timeframes. The sound level meters meet the Type 1 specification in accordance with the ANSI S1.4 standard.

- The SLM continuously recorded 1-minute sound pressure levels and several associated parameters including A-weighted and C-weighted L_{eq}, L_{min}, L_{max}, L_{10}, L_{50}, and L_{90} levels. One-third octave band spectral data was recorded for L_{eq}, L_{10}, L_{50}, and L_{90}. Simultaneous audio recordings were taken during each measurement.

- A secondary windscreen was used in conjunction with the SLM windscreen to minimise noise in the signal due to wind passing over the microphone.

- The weather station recorded 1-minute meteorological data in proximity to the SLM. The weather station was deployed to help gauge the weather conditions locally, in terms of validity of monitored sound level data. Quantification of weather conditions associated with the measured sound levels was important, as the tonal sound is dependant on wind speed. Several meteorological parameters were recorded including wind speed, wind direction, precipitation, relative humidity and temperature.

- All equipment was battery powered and charged using a solar panel system.

- Observational and equipment servicing/data download visits were undertaken during the monitoring period (12 visits, including deployment and collection).

- The sound level meter (SLM) was calibrated before the SLM was started originally and a calibration check undertaken on completion. Negligible deviation was noted between the deployment calibration and check on monitoring completion.

- Both the SLMs and weather station were deployed at 1.5 m above local ground level.

- Existing aggregate and industrial operations were taking place during the survey. These were deemed suitable for inclusion as they contribute to the existing acoustic environment.

8.1.1.1 Monitoring locations

Figure 3 shows the plan view of the monitoring locations used in the sound monitoring survey.

Figure 3 SLM Locations Plan

Table 5 SLM Locations Details

Location	Easting, m	Northing, m	Representative Receptor
ML1	680996	5682778	R1
ML2	679864	5683002	R4
ML3	680143	5680870	R17

8.2 SOUND LEVEL RESULTS.

There were substantial data collected during the sound monitoring survey. A summary has been provided in Table 6, Table 7 and Table 8 to include the relevant information for the daytime period 0700 hrs to 2200 hrs, based on 10-minute periods. The mean, minimum and maximum sound levels have been presented for the L_{Aeq} and L_{A90} parameters for the assessment time period, 0700 hrs to 2200

Table 6 Monitoring Location 1 Sound Level Results Summary

Day	Descriptor	*Mean*	*Min*	*Max*
1	L_{Aeq}	59*	54	63
	L_{A90}	43	30	53
2	L_{Aeq}	59*	53	62
	L_{A90}	43	30	51
3	L_{Aeq}	58*	62	52
	L_{A90}	42	33	50
4	L_{Aeq}	59*	53	62
	L_{A90}	46	37	51
All	L_{Aeq}	59*	52	63
	L_{A90}	44	30	53

*logarithmic average

Table 7 Monitoring Location 2 Sound Level Results Summary

Day	Descriptor	*Mean*	*Min*	*Max*
1	L_{Aeq}	50*	42	63
	L_{A90}	40	34	47
2	L_{Aeq}	49*	44	52
	L_{A90}	42	34	46
3	L_{Aeq}	48*	43	50
	L_{A90}	42	36	46
4	L_{Aeq}	50*	39	56
	L_{A90}	44	36	48
All	L_{Aeq}	49*	39	63
	L_{A90}	42	34	48

*logarithmic average

Table 8 Monitoring Location 3 Sound Level Results Summary

Day	Descriptor	*Mean*	*Min*	*Max*
1	L_{Aeq}	43*	33	48
	L_{A90}	37	29	44
2	L_{Aeq}	45*	34	50
	L_{A90}	40	31	47
3	L_{Aeq}	47*	37	53
	L_{A90}	43	33	50
4	L_{Aeq}	52*	36	59
	L_{A90}	44	31	56
All	L_{Aeq}	48*	33	59
	L_{A90}	41	29	56

*logarithmic average

Figure 4, Figure 6 and Figure 8 shows the sound level (60 minute periods) against time, as recorded during the survey at each monitoring location. Figure 5, Figure 7 and Figure 9 show the recorded wind speeds and directions (60 minute periods) All sound levels recorded in wind speeds higher than 5 m/s were excluded from the analysis.

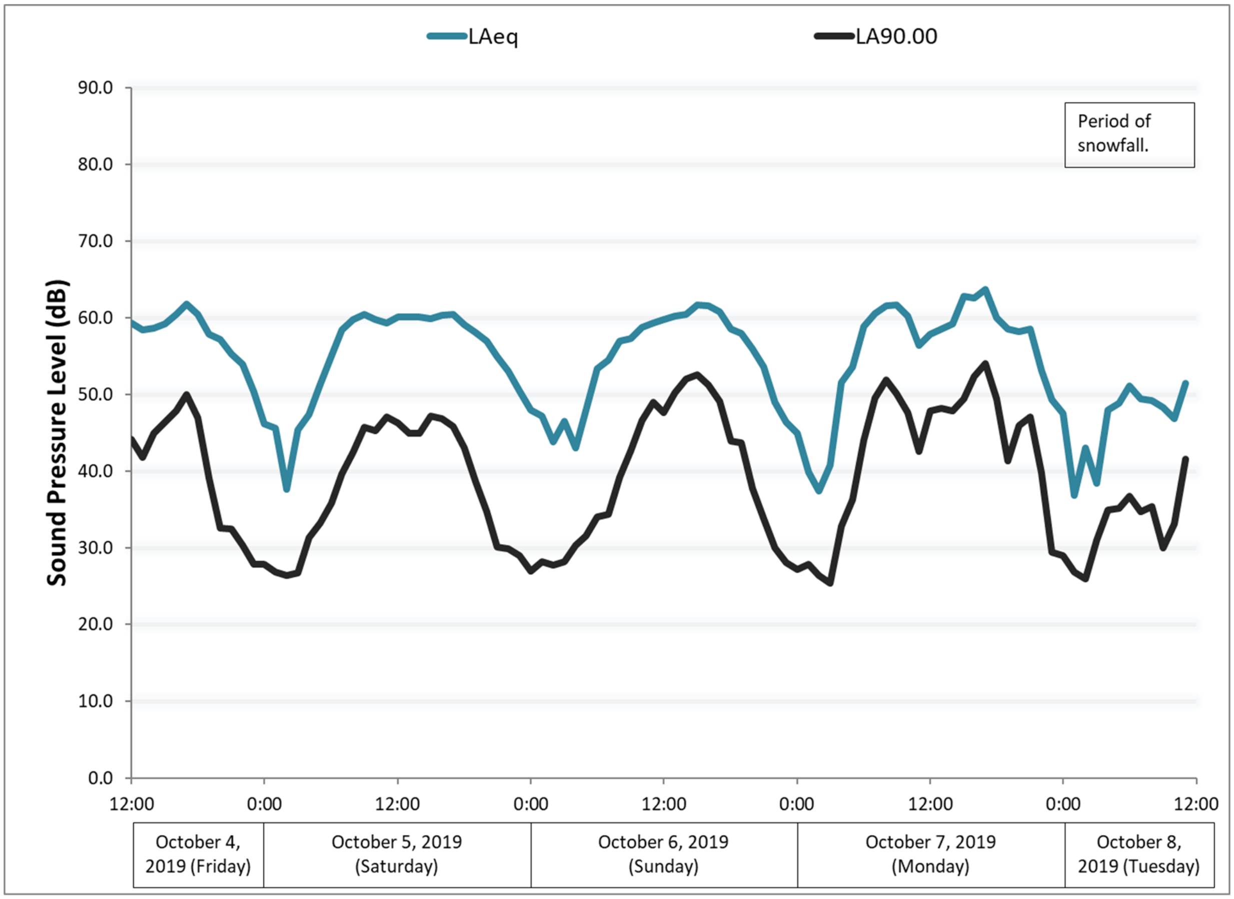
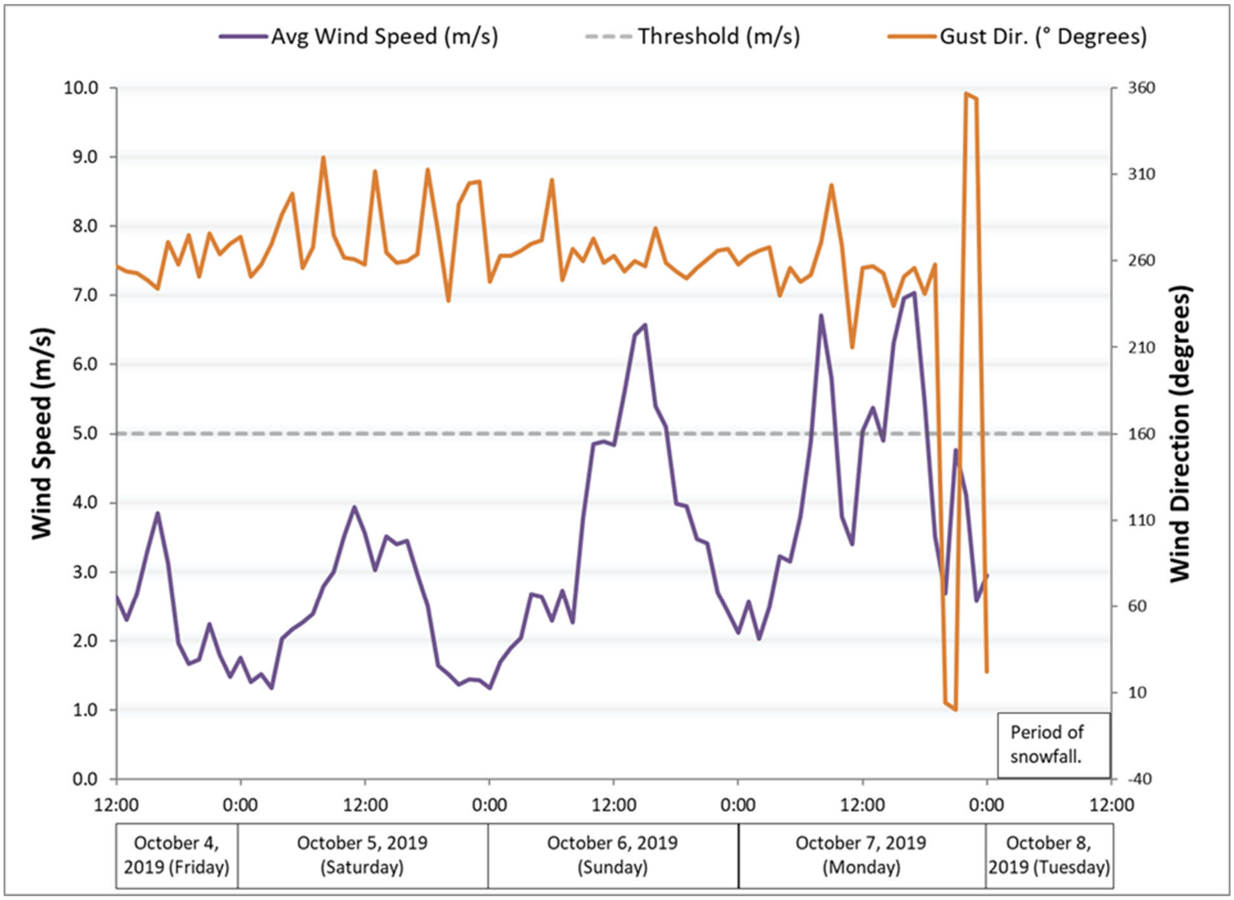


Figure 4 ML1 Sound Level Time History Chart

Figure 5 ML1 Wind Speed and Direction Time History Chart



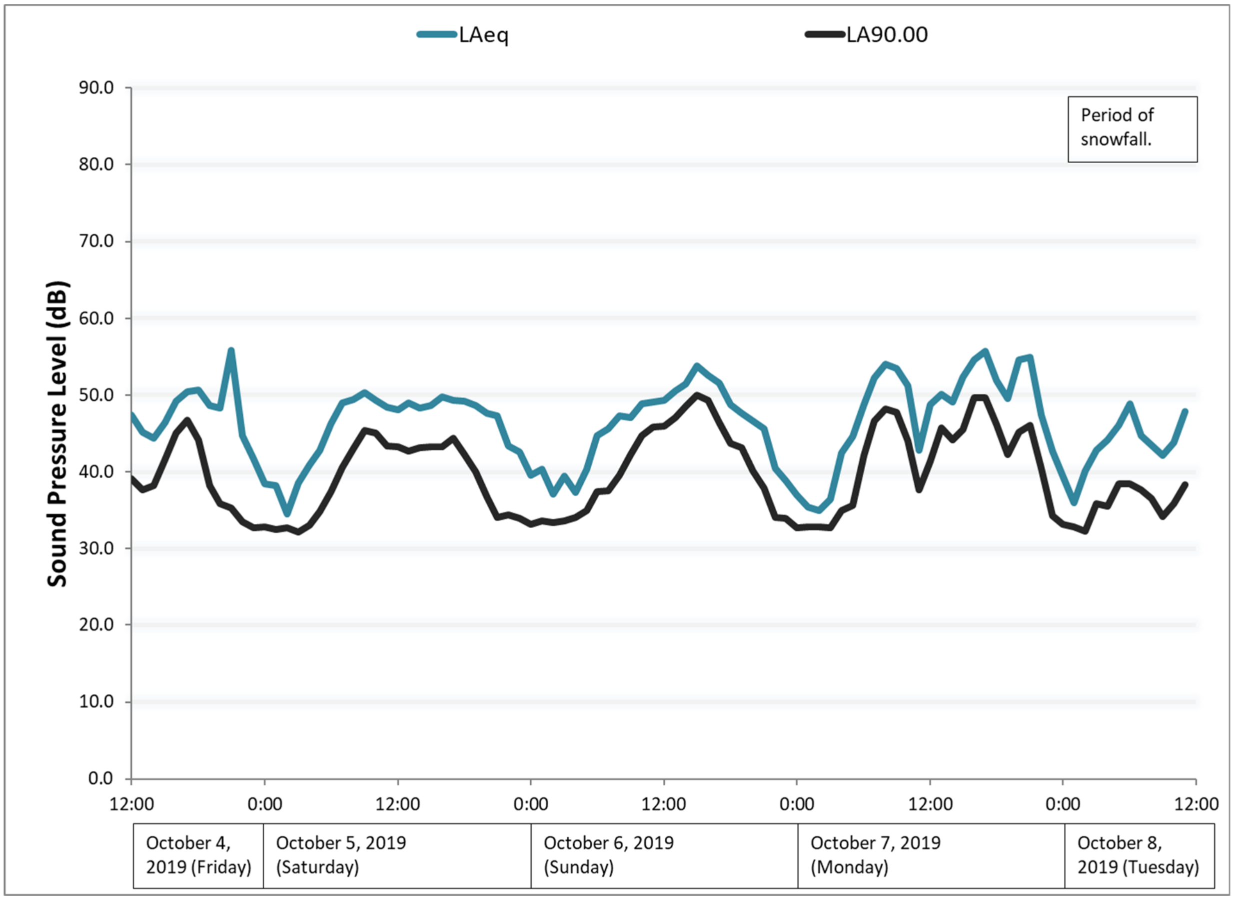


Figure 6 ML2 Sound Level Time History Chart

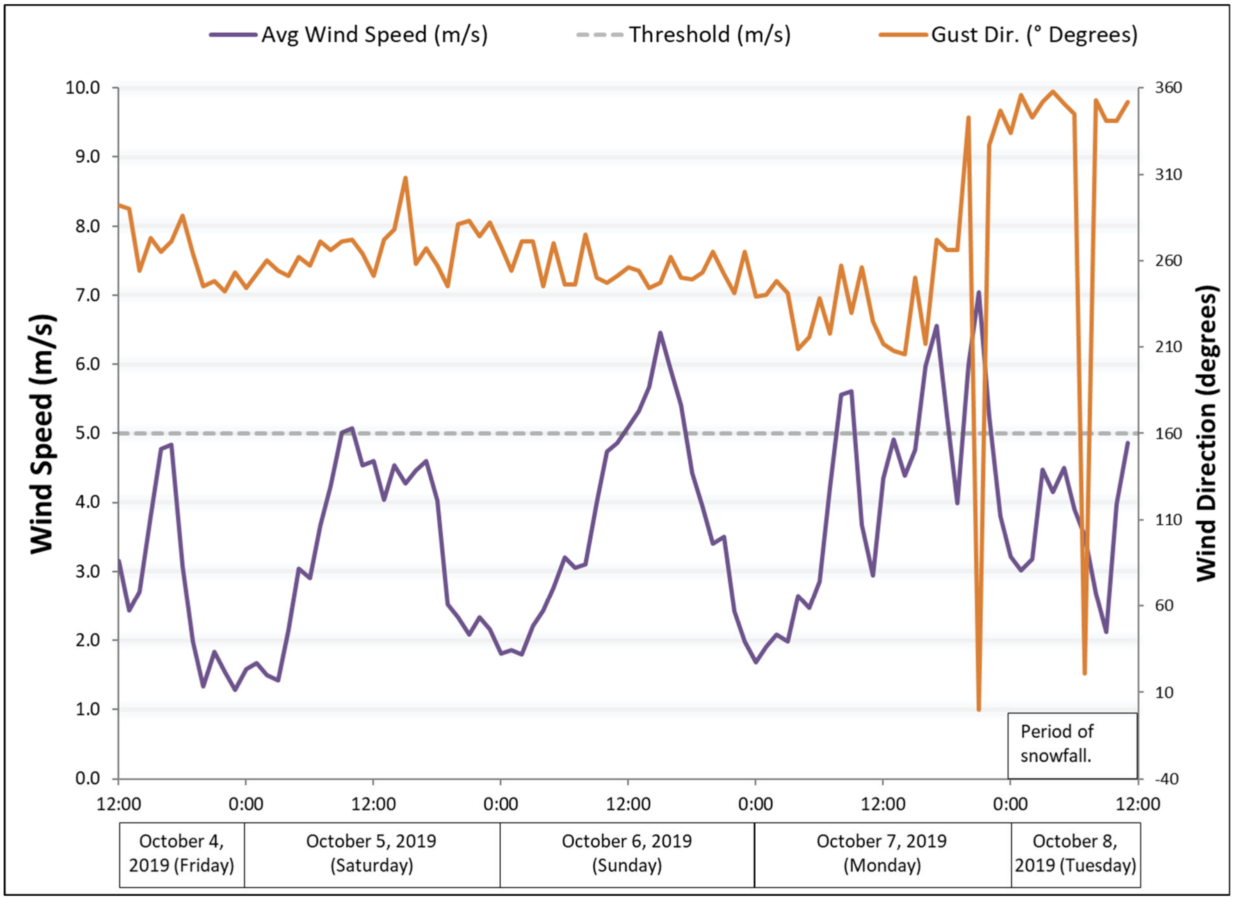


Figure 7 ML2 Wind Speed and Direction Time History Chart

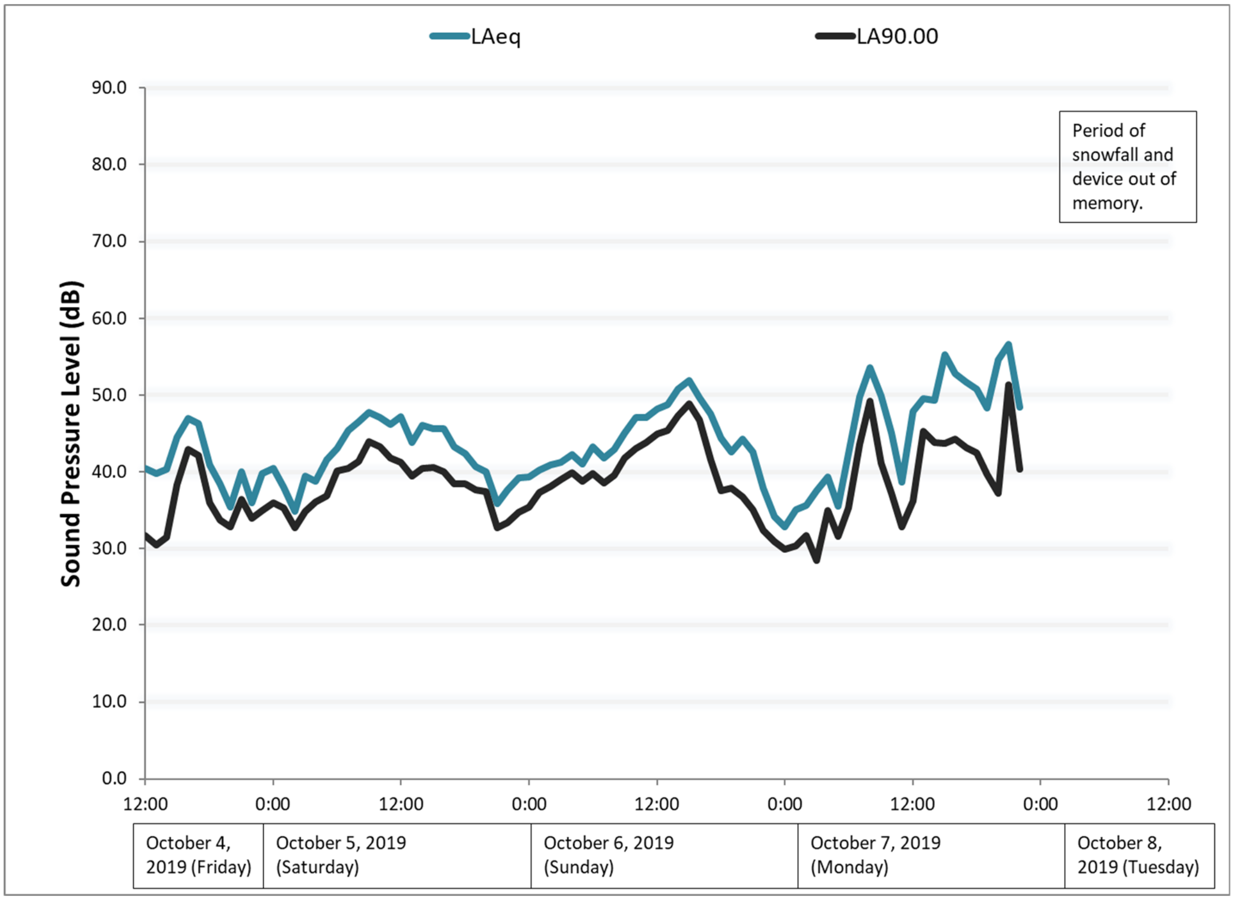


Figure 8 ML3 Sound level Time History Chart

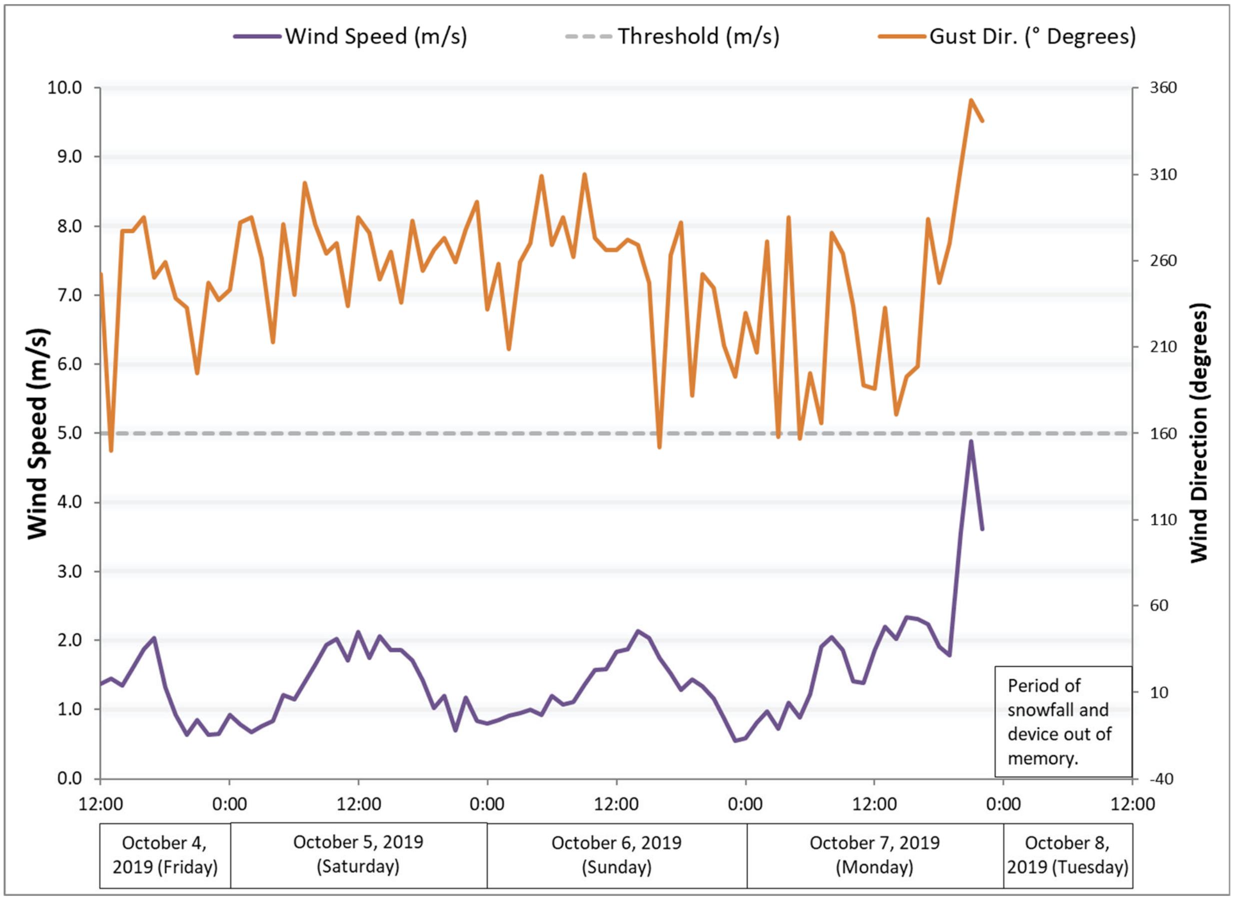


Figure 9 ML3 Wind Speed and Direction Time History Chart

8.3 Observation Notes

8.3.1 ML1

This SLM was located on a residential property within the immediate backyard. The sound monitor and nearby weather sensor were set up approximately 15 meters from the southwest corner of the house in a southwest direction. During both the daytime and nighttime periods, the primary sound sources were due to distant road traffic. During the daytime period on Friday October 4th and Monday October 7th, it was not possible to clearly discern sound from the gravel pit activity to the West over the primary sound sources. There are nearby pump jacks to the northeast and to the northwest which were intermittently operating throughout the survey but never audible. A minor amount of animal sound was observed during the survey, which primarily included birds and once distant cows. A pet pig was present during each monitoring visit, which usually stayed in an outdoor pet-house and remained quiet.

8.3.2 ML2

The SLM was located on private property which was undeveloped bush and grass land. The sound monitor and nearby weather sensor were set up approximately 50 meters south of Big Springs Road. During both the daytime and nighttime periods, the primary sound sources were due to distant road traffic. During the daytime period on Friday October 4th and Monday October 7th, noise from gravel pit activity to the west was discernible. As the noises were intermittent, the pit sound was sometimes more apparent and sometimes inaudible. In general, it was often difficult to hear the gravel pit over the road traffic sound. There are pump jacks located to the northeast, which were intermittently active during the survey period, and never audible. During a daytime visit on Saturday October 6th visit, a grouping of cattle was notice grazing on the easterly property near the adjacent roadway, though they were quiet. Throughout the survey, it appeared that airplane sound was audible to the southwest and southeast, but no airplane was ever seen in that direction. On Monday, October 7th, a plane was spotted to the east but it was not audible. During the collection on Tuesday, October 8th, the consultant notice cows at the property to the north, across Big Hills Springs Road, were mooing. Very little other animal activity was heard at this location, which primarily consisted of birds.

8.3.3 ML3

This SLM was located on a residential property within a forest clearing on the acreage. The sound monitor and nearby weather sensor were set up approximately 40 meters from the southwest corner of the house in a southwest direction. During both the daytime and nighttime periods, the primary sound source was distant road traffic to the west and south. During the daytime period on Friday October 4th, it was possible to discern sound from a gravel pit to the northwest, which appeared to be crushing activities. The majority of the site visit sound observations were performed near the gate of the property, as requested by the landowner, approximately 100 meters from the noise monitoring receptor. The consultant noted that the acoustic environment was very similar in these locations, though the gravel pit was not audible from outside the property on Monday, October 7th. There were two occasions where a plane was observed flying to the east, but the sound was not audible. A minor amount of animal sound was observed during the survey, which primarily included birds.

9. SOUND PROPAGATION MODELLLING

9.1 METHODOLOGY

Sound propagation modelling was performed to determine the predicted environmental sound contributions of the proposed Site. The model was developed using SoundPLAN Version 8.1, utilizing the ISO 9613-1 calculation method for absorption of sound by the atmosphere, and the ISO 9613-2 calculation method for attenuation of sound during propagation outdoors. These calculation methods account for the following outdoor sound propagation effects:

- Geometric spreading;
- Ground attenuation;
- Atmospheric absorption;
- Barrier attenuation;
- Reflection from surfaces; and
- Moderate downwind conditions.

Meteorological parameters and ground attenuation values typical of summer seasonal conditions were used in the computer model calculations. Predicted sound levels were calculated for a temperature of 20°C and a relative humidity of 70%. The calculation method assumes downwind sound propagation or inversion conditions. Downwind or inversion conditions produce downward refraction of air-borne sound, resulting in enhanced sound propagation between the source and receptor. This outdoor sound propagation condition is typically used in facility noise model calculations to evaluate worst case sound levels. A ground absorption factor of 0.7 was used as a realistic representation of the ground cover in the study area.

The sound propagation calculations consider the topography of the study area, which was imported into the modeling software as digital elevation data.

The receptor sound levels were calculated as free field levels at each dwelling at height of 1.5 m above local ground.

The computer noise model results do not include the effects of background sound in the area, such as road traffic, community or natural sounds, or sound from transportation sources. Such contributions were evaluated as part of the sound monitoring survey.

Octave band sound power levels were used to model the sound source outputs in the model. A time correction was also applied to sound sources to account for inactivity during the assessment period.

10. ASSESSMENT

10.1 SOUND LEVEL CRITERIA

The sound level criteria was assessed using the methodology outlined in Section 6.2, which was based on the mean L_{A90} sound level across all days for the daytime assessment period. The entire daytime period was used as a worst case due to the lower sound levels recorded in the evening period being included. Each receptor criterion was assessed using the most representative sound monitoring location and results.

Table 9 Receptor Sound Level Criterion Assessment

Receptor	Relevant Monitoring Location	Criterion dB(A)
R1	ML1	54
R2	ML2	52
R3	ML1	54
R4	ML2	52
R5	ML2	52
R6	ML2	52
R7	ML3	51
R8	ML3	51
R9	ML2	52
R10	ML2	52
R11	ML1	54
R12	ML3	51
R13	ML3	51
R14	ML3	51
R15	ML1	54
R16	ML3	51
R17	ML3	51

10.2 SOUND LEVEL ASSESSMENT AT RECEPTOR LOCATIONS

Table 10 Assessment of Operational Sound Levels

Receptor	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Relevant Monitoring Location	Criterion dB(A)
R1	43.0	48.3	49.2	43.1	41.6	39.9	ML1	54
R2	39.7	43.0	45.1	49.9	46.3	41.1	ML2	52
R3	39.0	40.8	40.2	38.0	37.0	36.0	ML1	54
R4	39.5	41.9	43.4	48.8	46.7	41.2	ML2	52
R5	33.7	33.7	33.4	36.5	37.6	37.6	ML2	52
R6	29.9	30.8	30.9	33.3	33.5	32.5	ML2	52
R7	28.2	30.3	32.0	32.3	31.0	29.1	ML3	51
R8	28.1	29.9	31.6	32.1	30.9	29.1	ML3	51

Receptor	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Relevant Monitoring Location	Criterion dB(A)
R9	34.1	37.3	39.8	37.9	36.3	33.6	ML2	52
R10	27.7	30.1	31.8	30.7	33.1	28.2	ML2	52
R11	33.5	34.4	34.5	32.2	31.5	31.1	ML1	54
R12	39.5	38.8	37.2	34.8	35.1	35.6	ML3	51
R13	39.6	38.1	36.1	34.2	35.0	35.4	ML3	51
R14	37.5	37.3	35.0	33.7	34.5	35.6	ML3	51
R15	21.8	24.0	24.5	26.4	26.9	23.2	ML1	54
R16	15.0	16.0	14.9	16.0	17.7	16.3	ML3	51
R17	38.4	37.4	33.8	33.4	35.4	38.3	ML3	51

10.3 CUMULATIVE ASSESSMENT

There are no proposed gravel pits with a development permit that have the potential to add to the sound contributions from the Site operations at the assessed noise sensitive receptors. The status of the nearby proposed McNair and Lafarge pits is uncertain and have not been included in a cumulative assessment at this time. There is an agreement between these operators to ensure that a group mitigation agreement is in place to minimize the sound from each of their operations with respect to cumulative sound and will be undertaken when there is more certainty with respect to future permits and the exact nature of operations.

11. CONCLUSION

An acoustic assessment of the environmental sound due to operations of the proposed Summit Pit was undertaken. The assessment included a sound monitoring survey to assess the current acoustic environment to develop assessment criteria in line with the technical consultations with RVC.

Sound propagation modelling predicts that the operational sound at the nearest noise sensitive receptors would be below the criteria for all phases with inclusion of appropriate acoustic mitigation and best practice. As required by the Rocky View County Noise Control Bylaw No. C-5772-2003, through the noise impact control measures identified, noise emissions would be minimized as much as practicable.

12. STATEMENT OF LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SLR for Mountain Ash Limited Partnership., hereafter referred to as the “Client”. The report has been prepared in accordance with the Scope of Work and agreement between SLR and the Client. It is intended for the sole and exclusive use of the Client. Other than by the Client and as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of SLR.

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