

QUARRY OPERATION NOISE MONITORING

**Albion Park Quarry Extension - Stages 5 & 6
July 2019**

Prepared for:

Cleary Bros (Bombo) Pty Ltd
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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Cleary Bros (Bombo) Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.04156-R01-v1.0	22 October 2019	Dick Godson	John Sleeman	Dick Godson

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1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Cleary Bros (Bombo) Pty Ltd (CB) to conduct the 2019 annual noise compliance monitoring of its Albion Park Quarry Operations, Albion Park Rail, NSW.

Subsequent to the submission of the January 2009 to March 2009 noise compliance report to the Department of Planning and Infrastructure (DPI, now the Department of Planning, Industry and Environment, DPIE), concerns were raised by the DPIE in relation to the lack of supporting evidence to justify the reported findings of compliance with the noise limits in the then current Consent for the Albion Park Quarry.

Accordingly, SLR prepared a noise monitoring methodology in order to accommodate the requirements of the DPIE. The resulting methodology differs from that in the Noise Monitoring Programme developed in 2006 for the Albion Park Quarry. This report is considered sufficient to meet the requirements of the 2017 Modified Development Consent.

2 SITE DESCRIPTION

Albion Park Quarry is located at Albion Park to the west of Princes Highway and to the east of Terry Street. A site map showing the location of the noise sensitive premises in relation to the Albion Park Quarry Processing Plant and Quarry Extension Area (currently operating in the Stages 5/6 Extraction Area) is presented in **Appendix A**.

It should be noted that The Cottage residence corresponds to the most sensitive privately owned residence located closest to the Quarry Extension Area and that the Greenmeadows Residential Estate is potentially affected by noise from the Processing Plant the operation of which has not changed due to the Quarry Extension.

The noise bund required under the original Development Consent to attenuate noise transmission from the Quarry Extension Area activities has been constructed and is approximately 5 m high.

3 QUARRY ENVIRONMENTAL MANAGEMENT PLAN

The criteria and procedures in the Quarry Environmental Management Plan (QEMP) for the Albion Park Quarry which relate to noise are as follows:

“4.5 NOISE LIMITS

4.5.1 Performance Objective

Source - Quarry development consent: schedule 4, conditions 4, 7 and 8; Access road consent: conditions 16, 17 and 18 (identical).

Requirement - Operational noise generated by the development must not exceed criteria specified in the Table below under conditions of wind speeds (10 metres above ground) of up to 0.5 metres per second and under temperature gradients of up to 0°C per 100 metres (Condition 4).

Receiver Locations	Noise Limits $L_{Aeq15min}$		
	Stages 1-2	Stages 3-4	Stages 5-6
"The Hill" residence (Dunster premises)	35	38	35
"The Cottage" residence (Dunster premises)	35	38	35
Approved rural worker's dwelling (Dunster premises)	35	38	35
Greenmeadows residential estate	41	41	41

Verification - Noise measurement to be undertaken at the most affected point on the receptor boundary or within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary. Measurements to be undertaken by a qualified person on an annual basis during the Winter months. Results are to be included in the Annual Review. Noise monitoring procedures are included in the Noise and Blast Management Plan and summarised in section 6.2 of this QEMP.

Notification - Within seven days of detecting an exceedance of a noise limit in the table above, the exceedance is to be reported to the EPA, the Secretary and the owner of the property."

"6.2 NOISE MONITORING

Source - Noise monitoring requirements are detailed in the Noise and Blast Management Plan and summarised below.

Location - Noise monitoring locations are as follows:

Location Type	Monitoring
Unattended monitor	Quarry Extension Area
Unattended monitor	Processing Plant
Residential Assessment Location (attended)	"The Cottage" (Fig Tree Hill Residence)
Residential Assessment Location (attended)	Greenmeadows Residential Estate

Operator attended monitoring and unattended noise logging shall be carried at all of the above locations, except as detailed under "Frequency".

Frequency - Unattended noise logging is to be carried out for a minimum period of seven days on an annual basis during the Winter months, and is to be accompanied by operator attended monitoring.

Method - Operator attended monitoring shall quantify and characterise the maximum (L_{Amax}) and the average ($L_{Aeq(15minute)}$) intrusive noise from quarrying over a 15 minute measuring period.

Unattended continuous noise logging shall be conducted to quantify overall ambient noise amenity levels resulting from quarrying and processing emissions and other environmental noise sources.

Measurements will be taken with acoustic instrumentation carrying current NATA or manufacturer calibration certificates. Instrument calibration will be checked before and after each measurement survey.

All noise measurements will be accompanied by qualitative and quantitative measurements of prevailing local weather conditions. The operator shall record any significant quarry generated noise sources and obtain the operating logs for quarry plant and equipment during the measurement period.

Performance Targets Performance targets are summarised in Section 4.5 of this QEMP.

Assessment - Operator attended residential measurements are designed to confirm that noise generated by the development does not exceed the noise limits specified in the development consent (see Section 4.5 of this QEMP).

Unattended noise logger data shall be correlated with weather data and quarry operating conditions, with data from periods of unstable weather deleted. The results shall be presented graphically.

Review and reporting The results of noise monitoring are to be included in the Annual Review.

In the event of any exceedance of relevant criteria, the matter will immediately be brought to the attention of the Quarry Production Manager, who will report the exceedance as required in Section 6.7 of this QEMP."

4 OPERATING HOURS

Conditions 5 and 6, Schedule 4 of the 2017 Modified Quarry Extension DA Consent states that:

5. "The Applicant must comply with the operating hours in Table 2.

Activity	Days of the Week	Time
<i>Drilling, rock breaking, loading and haulage of materials from quarry to processing plant, processing and stockpiling, overburden stripping and other stage preparatory works, all site construction activities, rehabilitation works, general plant and maintenance. Processing, crushing and screening and product transfer to stockpiles</i>	<i>Monday - Friday</i>	<i>7.00 am - 5.30 pm</i>
	<i>Saturday</i>	<i>7.00 am - 1.00 pm</i>

Table 2: Operating Hours of the Development

6. The following activities may be carried out at the premises outside the hours specified in Table 2:
- the delivery of materials as requested by police or other authorities for safety reasons;*
 - emergency work to avoid the loss of lives, property and/or to prevent environmental harm;*
 - workshop activities and other maintenance work inaudible at the nearest affected receiver."*

5 EQUIPMENT

In order to assist in assessing the noise emissions from the Quarry Extension Area activities, the equipment operating during the 2019 noise survey was recorded and is presented **Table 1**.

Table 1 Quarry Extension Area (Stages 5 & 6 Extraction Area Operations) Equipment Fleet - July 2019

Equipment Type	Fleet
Excavator Komatsu 1100	1
Dump trucks - 4 off CAT 773 (50t) and 1 off CAT 777 (100t)	5
Water truck	1
Dozer CAT D11	1
FEL CAT 992C	1
CAT 345 Excavator & Hammer	1
CAT 350 Excavator & Bucket	1
Blasthole Drill Rig	2
Komatsu PC800 Excavator & Hammer	1
Komatsu PC300 Excavator & Hammer	1

6 INSTRUMENTATION AND MEASUREMENT PARAMETERS

6.1 Operator-Attended Surveys and Unattended Logging

All acoustic instrumentation employed throughout the monitoring programme was designed to comply with the requirements of AS IEC 61672.1-2004 “*Electroacoustics - Sound Level Meters*” and carried current NATA or manufacturer calibration certificates.

All instrumentation was programmed to continuously record statistical noise level indices in 15-minute intervals, which included the LA1, LA10, LA90 and the LAeq.

Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding the acceptable variation of ± 0.5 dBA (in accordance with AS 1055).

Table 2 Acoustic Instrumentation

Description	Type or Class	Serial Number
Brüel & Kjær 2260i Precision Sound Level Meter	Type 1	2414604
Brüel & Kjær Type 4231 Sound Level Calibrator	Type 1	3019046
Svan 957 Noise Logger (Quarry Pit)	Type 1	20667
Svan 957 Noise Logger (Processing Plant)	Type 1	27580
Svan 957 Noise Logger (Dunster Residence)	Type 1	20674
Svan 957 Noise Logger (Greenmeadows)	Type 1	23423

6.2 Meteorological Station and Conditions during Noise Survey

Cleary Bros currently operates an on-site meteorological monitoring station. 15 minute and 24 hour average wind speeds, wind direction, air temperature, relative humidity, solar radiation and rainfall are monitored. These measurements allow the identification of periods when wind speeds of up to 0.5 m/s at 10 m above ground level were experienced (refer to **Section 3**).

In addition, hand held instrumentation was used to quantify the wind speed and direction at each operator-attended monitoring location.

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the noise source. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transportation sources.

Wind effects need to be considered when wind is a feature of the area under consideration. Where wind blows from the source to the receiver at speeds up to 3 m/s for more than 30% of the time in any season, then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

It was established in 2002 that there is no prevailing wind for this site, as defined in the Environment Protection Authority's (EPA's) *Noise Policy for Industry* (NPfI).

7 NOISE MONITORING RESULTS

7.1 Unattended Continuous Noise Monitoring

In response to the DPIE's concern about the lack of supporting evidence to justify compliance with the noise limits for the Albion Park Quarry, two unattended continuous noise loggers were installed at strategic positions within the quarry in order to capture the contributions from Albion Park Quarry. The loggers were installed in the Processing Plant Area near the crusher as well as in the Quarry Extraction Area on 24 July 2019 for a period of 8 days.

The weather conditions would have had a minimal effect on the measured noise level at the two unattended monitoring locations (Processing Plant and Quarry Extension Areas) because of the close proximity of the noise loggers to the Albion Park Quarry operations.

The median value of the LA1 and LA10 quarry operations noise levels have been used to quantify the "maximum" and "average maximum" levels respectively. The LAeq is the equivalent continuous noise level which is equal in energy to the fluctuating level over the 15 minute interval.

In order to derive the statistical noise levels for various daily time periods, the data was processed for the periods 0700 hours to 1800 hours (daytime), 1800 hours to 2200 hours (evening) and 2200 hours to 0700 hours (night-time). The calculated statistical ambient noise levels at each monitoring location are presented in **Table 3**.

The measured ambient noise levels are predominantly the contributed noise emissions from the Albion Park Quarry operations alone. The noise loggers calculate the statistical noise indices and do not "record" the actual noise. The results from the noise loggers situated at the Processing Plant and Quarry Extension Areas are presented in **Appendix B** together with the prevailing wind speed and direction. The graphs indicate clearly the periods when the Albion Park Quarry was operating.

Table 3 Unattended Statistical Ambient Noise Level Summary (July 2019)

Logger Location	Daytime (dBA)				Evening (dBA)				Night-time (dBA)			
	LAeq	LA1	LA10	LA90	LAeq	LA1	LA10	LA90	LAeq	LA1	LA10	LA90
Processing Plant	67	77	70	54	61	67	62	47	62	63	60	31
Quarry Extension Area	66	74	69	35	36	49	41	25	40	46	38	25

7.1.1 Noise Impact Assessment

The two unattended monitoring locations were incorporated into the existing quarry noise model, which was developed in 2002 and used to prepare the Noise and Blasting Impact Assessment for the quarry. These two locations have been used as reference points enabling a comparison to be made between the predicted noise levels at the two reference locations and the noise levels modelled at the residences. This “relationship” was subsequently used to calculate the daily fluctuating quarry noise contributions at the respective residences.

As discussed, the 2017 Modified Consent Condition noise limits apply under calm conditions only (ie wind speeds up to 0.5 m/s at 10 m height). Accordingly, the analysis of the noise logger results together with the modelling results enables the contribution of the Albion Park Quarry to be calculated for calm (ie no wind) conditions. The calculated calm scenario quarry noise levels are summarised in **Table 4**. Review of the results in **Table 4** indicates that the Albion Park Quarry complies with the 2017 Modified Consent Conditions presented in **Section 3**.

Table 4 Calculated Noise Contribution of the Albion Park Quarry for No Wind (Calm) LAeq (dBA)

Residences	Noise Contribution of the Albion Park Quarry at Residences When No Wind (dBA)
“The Hill” Residence (Dunster)	31
“The Cottage” Residence	33
Greenmeadows Residential Estate	41

In order to give an indication of the quarry noise level contributions at the nominated receiver locations when the wind speed is greater than 0.5 m/s, the noise level contributions were calculated based on the analysis of the noise logger results in conjunction with noise modelling.

Appendix B presents the LAeq noise level monitored at the Albion Park Quarry together with the wind direction and the calculated contribution from the Albion Park Quarry at each receiver, calculated as a function of the wind direction at a wind speed of 5 m/s. It must be noted that the noise charts in **Appendix B** only give an indication of the quarry noise contribution at the receivers. As previously stated, compliance with the Consent noise limits is not required under wind conditions other than calm.

At Greenmeadows Residential Estate, it should be noted that the noise model does not include the effect of the barrier located in front of the Estate. Accordingly, the contribution of the Albion Park Quarry at Greenmeadows Residential Estate is estimated to be lower than the level presented.

7.2 Discussion of the Noise Survey Results

The prevailing weather conditions during the operator attended noise surveys were outside those nominated in the Development Consent, notwithstanding that the operator attending the noise monitoring checked to ensure that the weather conditions prior to departure from Sydney were acceptable. Consequently, compliance with the applicable daytime intrusive quarry noise criteria at the nominated receiver locations could not be substantiated directly during the testing.

In order to assist in determining compliance, two noise loggers were installed at strategic locations within the quarry in order to measure the noise from the Albion Park Quarry operations only. These locations were subsequently incorporated into the existing noise model.

A comparison was conducted between the noise levels predicted by the noise model at the two reference locations with those predicted at the residences in order to determine the correlation between the two locations.

The result was that the calculated Albion Park Quarry noise level contributions at the nearby residences comply with the Consent Conditions under the nominated meteorological conditions.

APPENDIX A

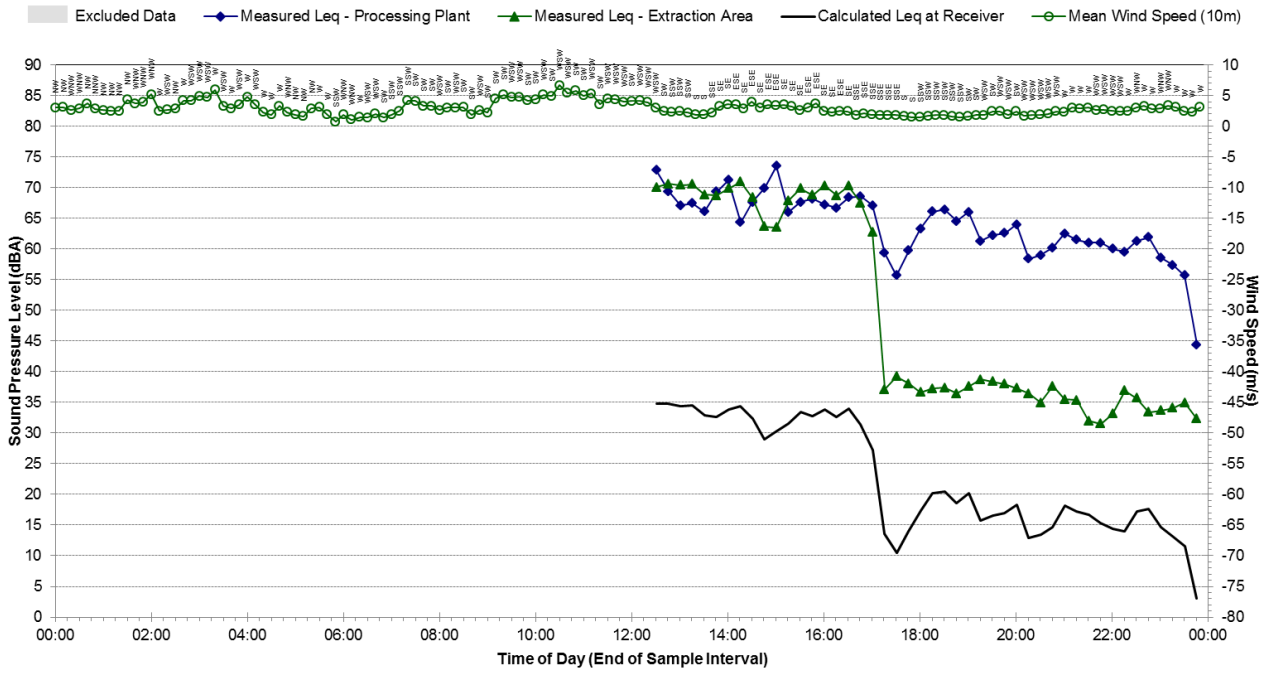
SITE MAP AND MONITORING LOCATIONS



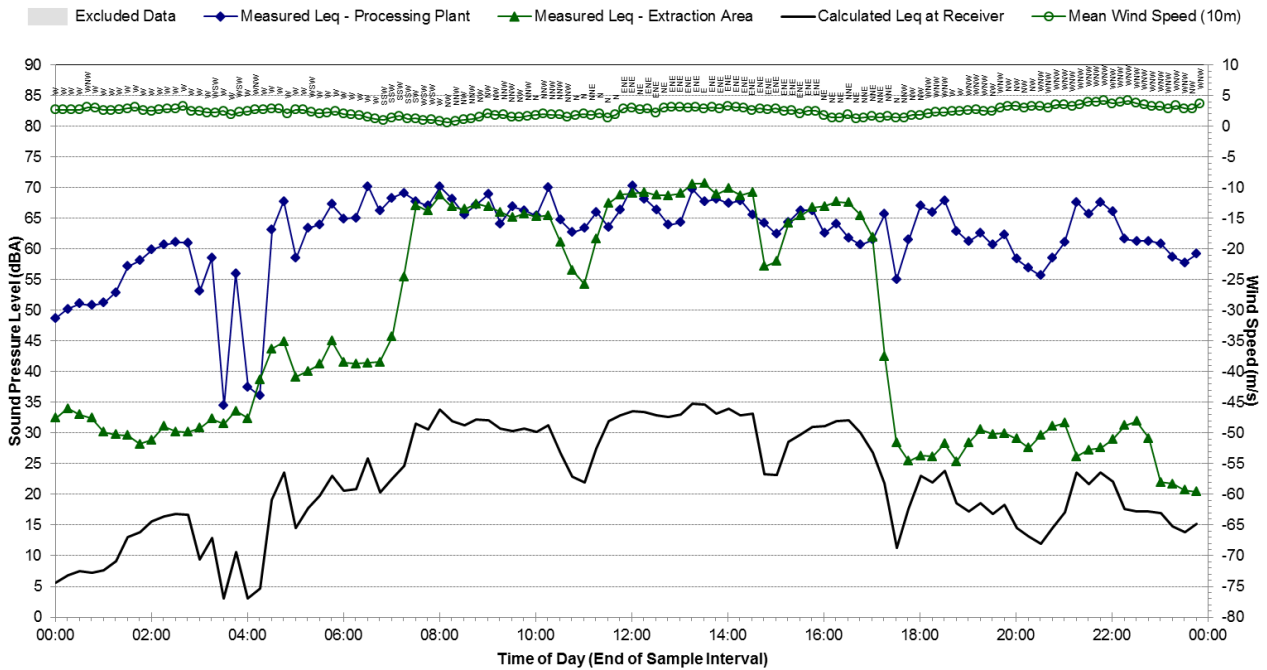
APPENDIX B1

CONTRIBUTION OF ALBION PARK QUARRY - "THE HILL" - RESIDENCE (DUNSTER)

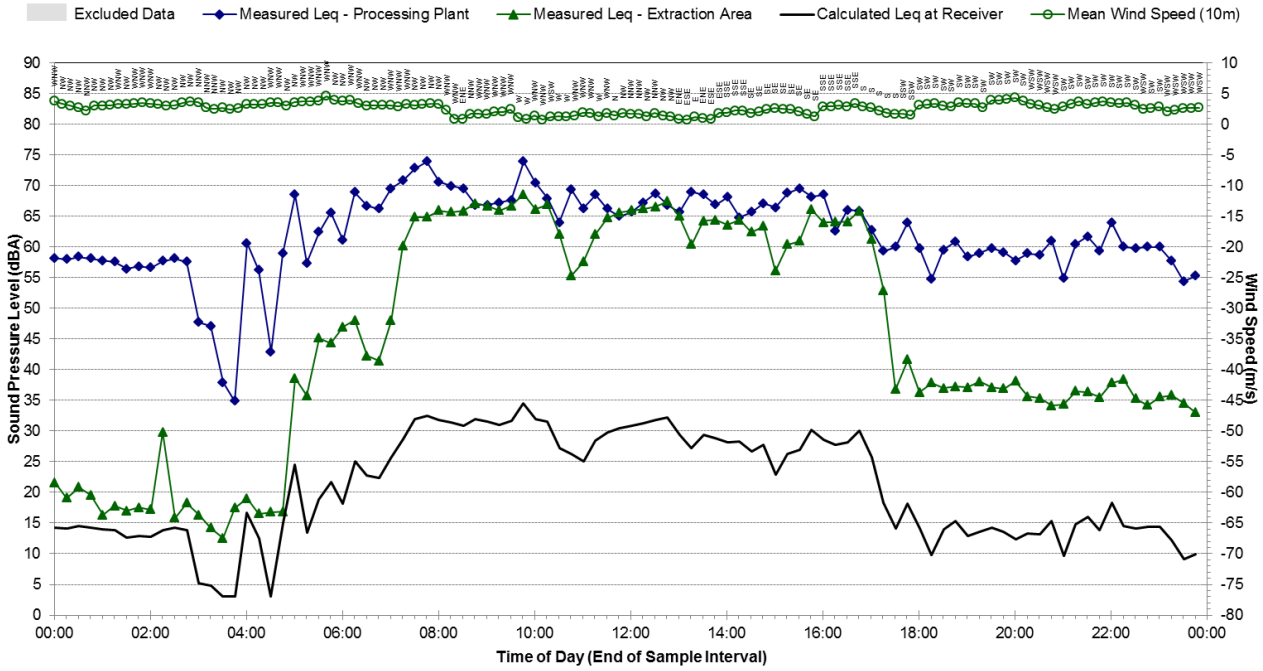
Statistical Ambient Noise Levels The Hill - Wednesday, 24 July 2019



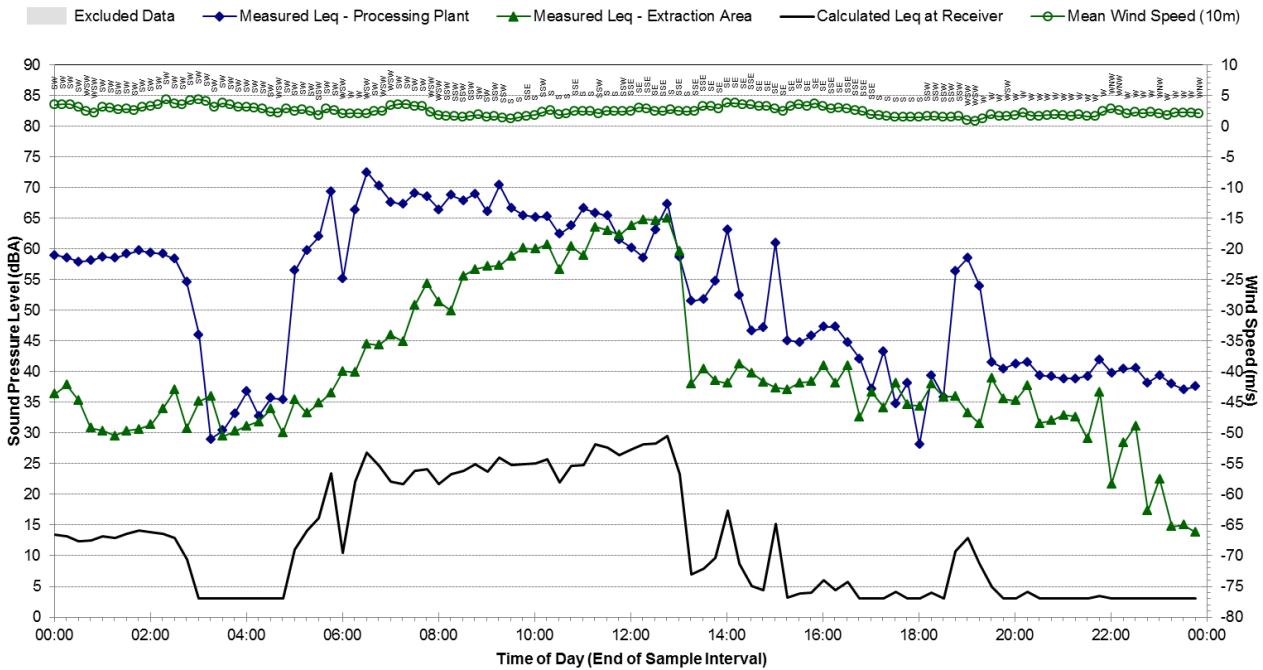
Statistical Ambient Noise Levels The Hill - Thursday, 25 July 2019



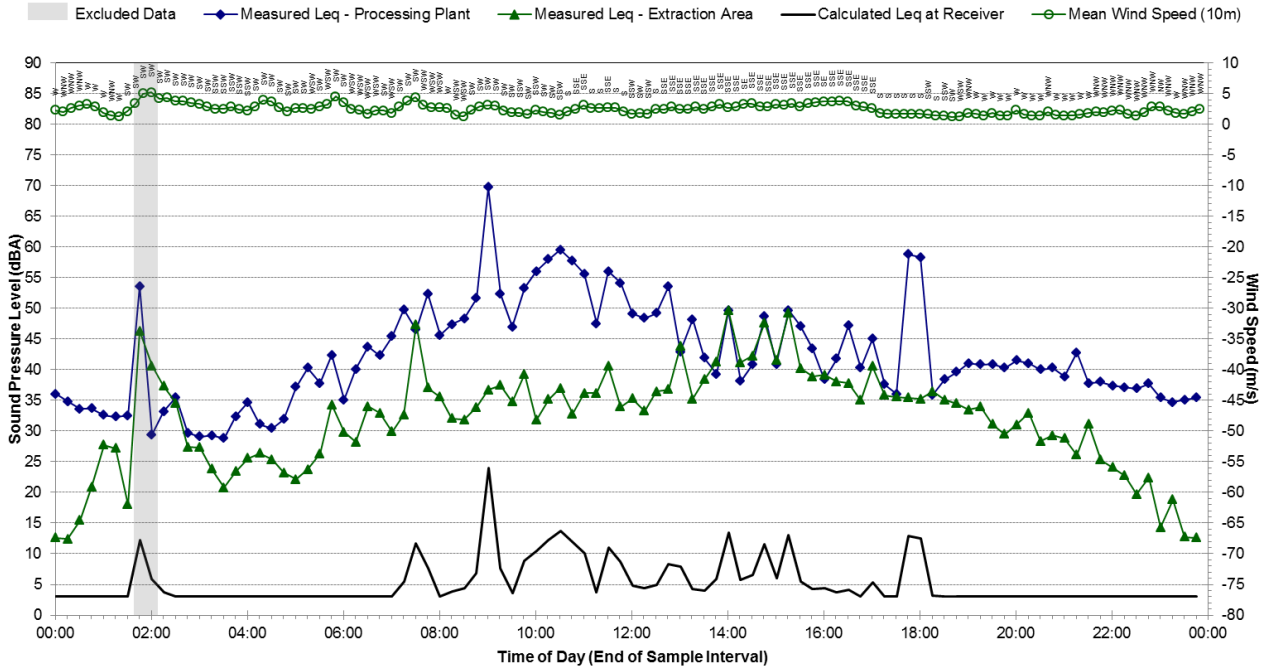
Statistical Ambient Noise Levels The Hill - Friday, 26 July 2019



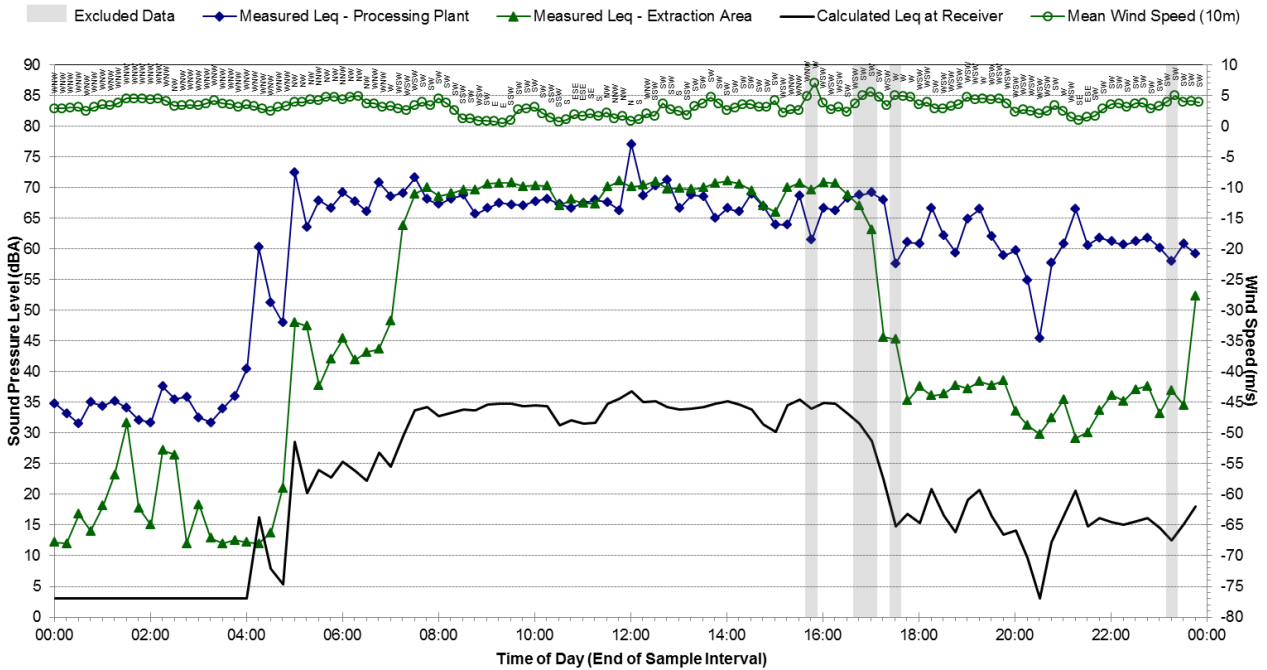
Statistical Ambient Noise Levels The Hill - Saturday, 27 July 2019



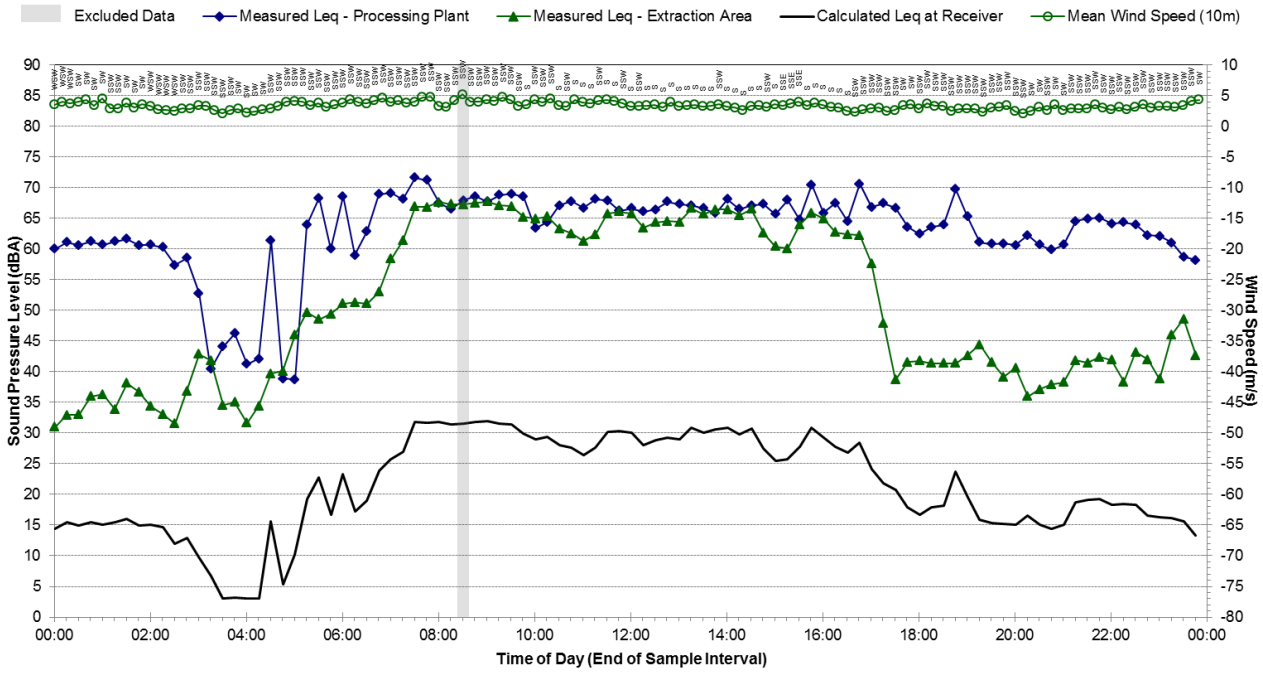
Statistical Ambient Noise Levels The Hill - Sunday, 28 July 2019



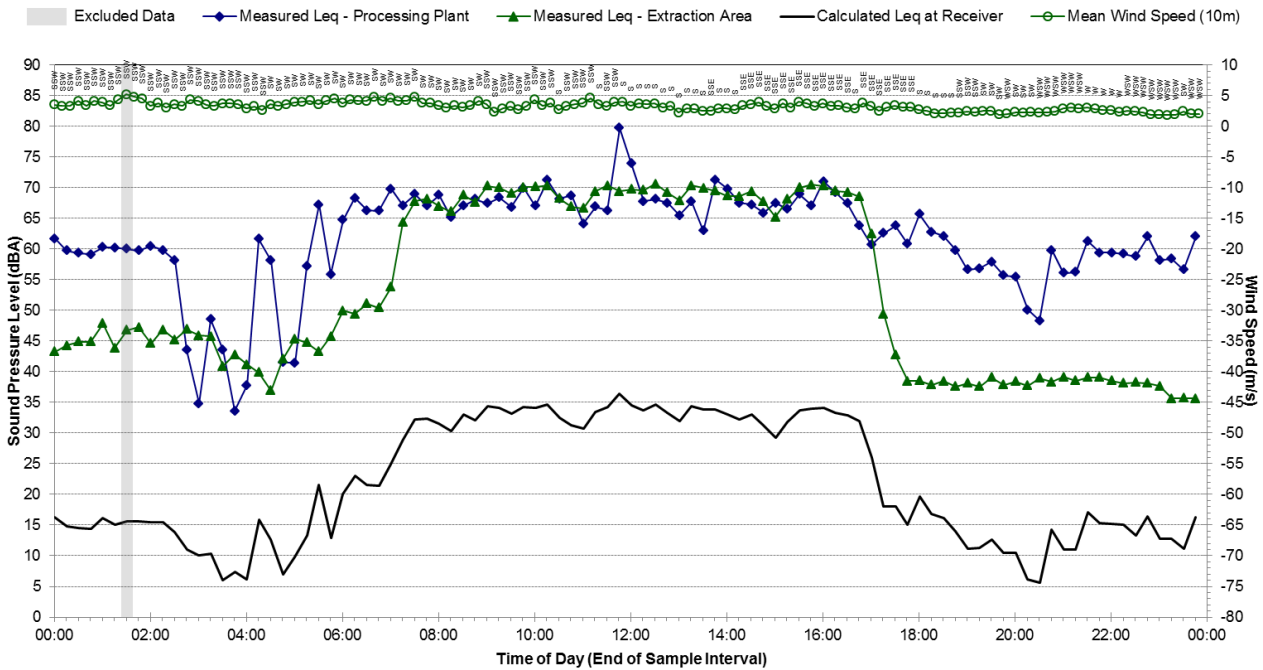
Statistical Ambient Noise Levels The Hill - Monday, 29 July 2019



Statistical Ambient Noise Levels The Hill - Tuesday, 30 July 2019

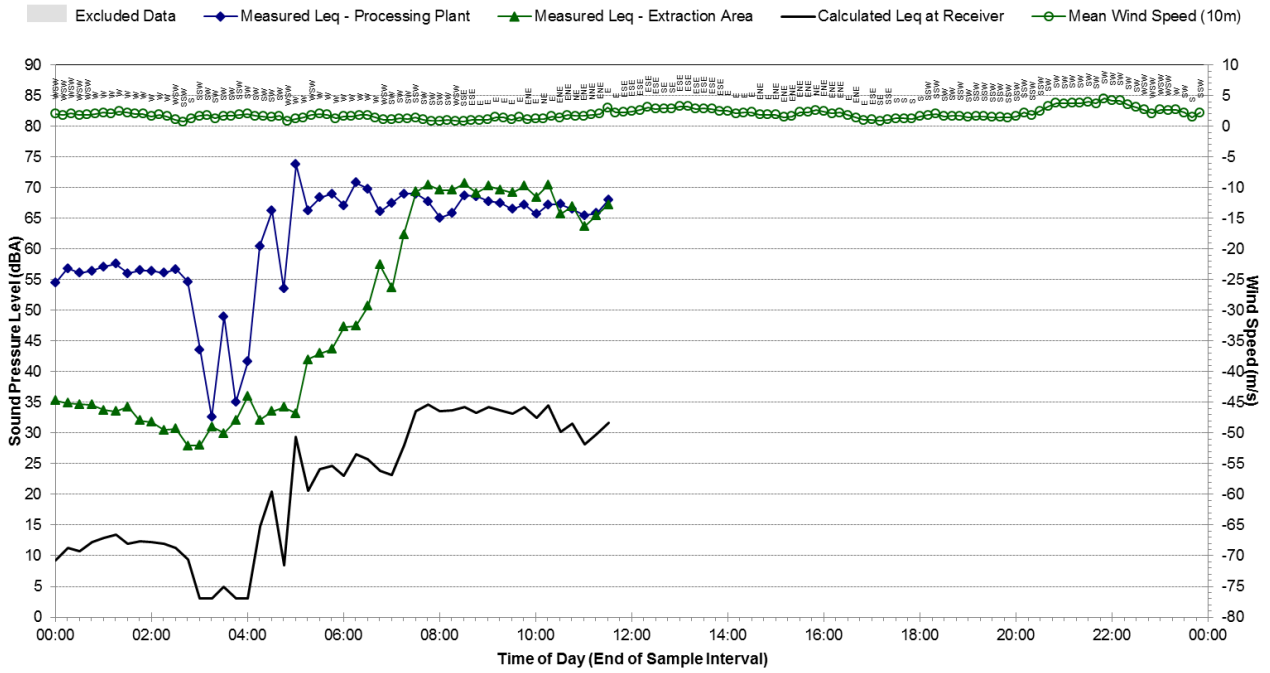


Statistical Ambient Noise Levels The Hill - Wednesday, 31 July 2019



Statistical Ambient Noise Levels

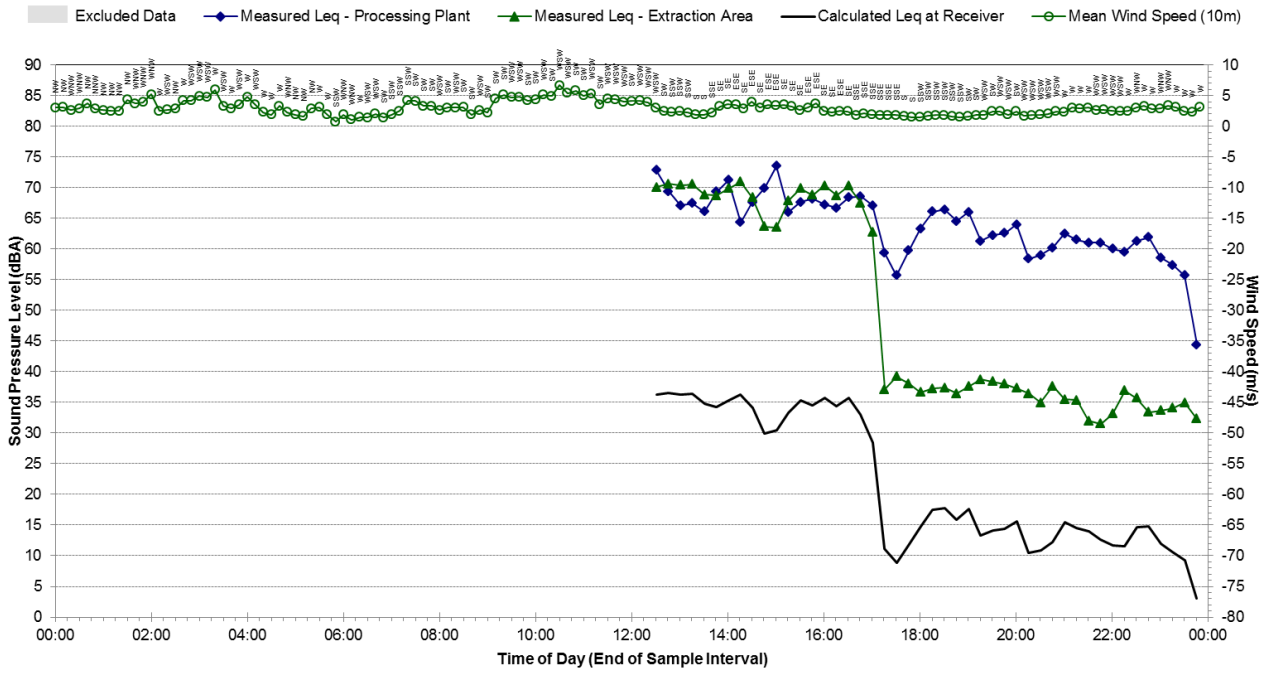
The Hill - Thursday, 1 August 2019



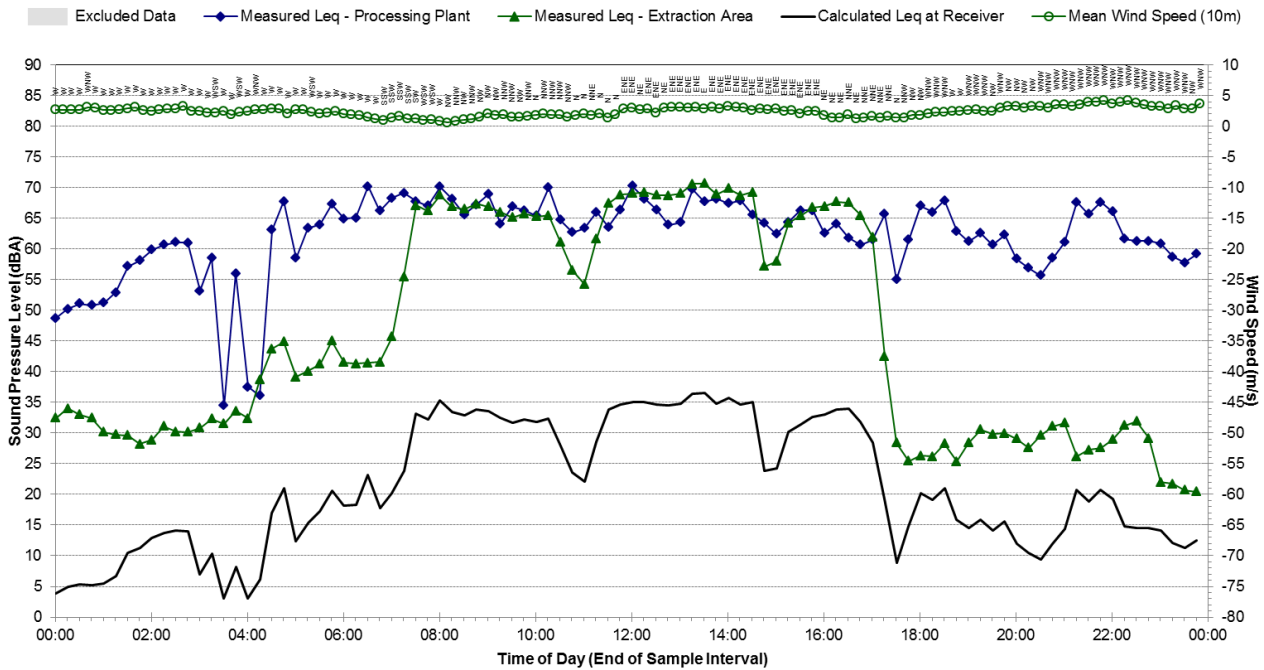
APPENDIX B2

CONTRIBUTION OF ALBION PARK QUARRY - "THE COTTAGE" RESIDENCE

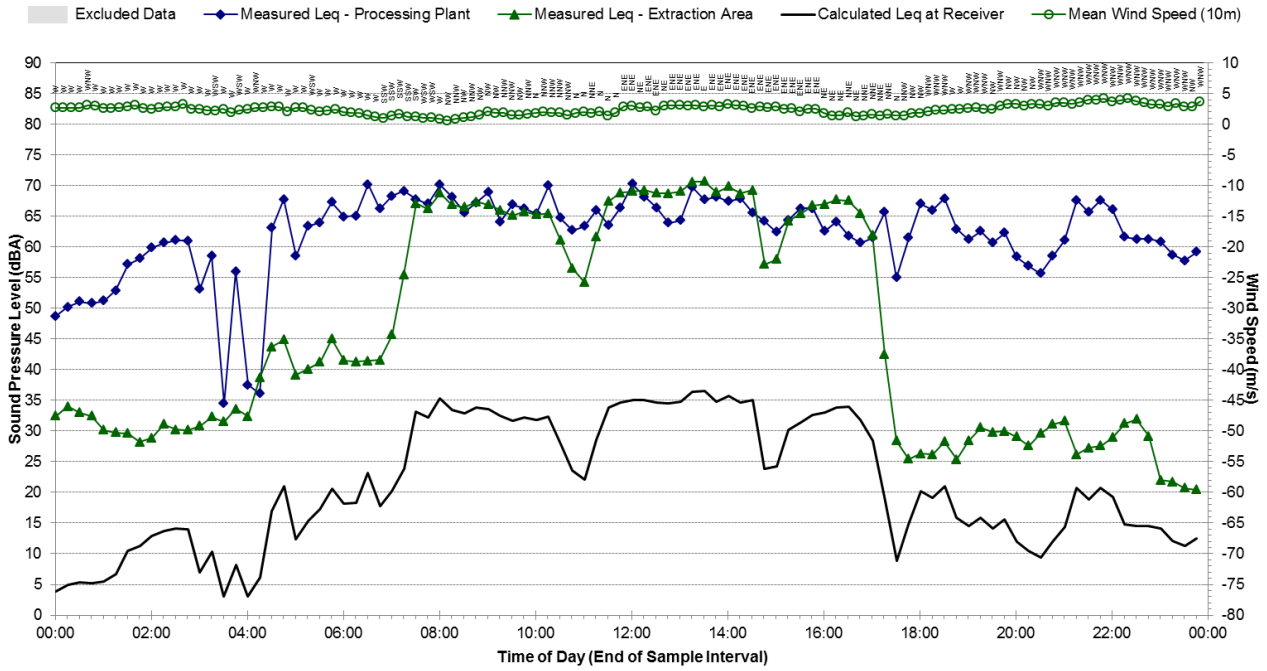
Statistical Ambient Noise Levels The Cottage - Wednesday, 24 July 2019



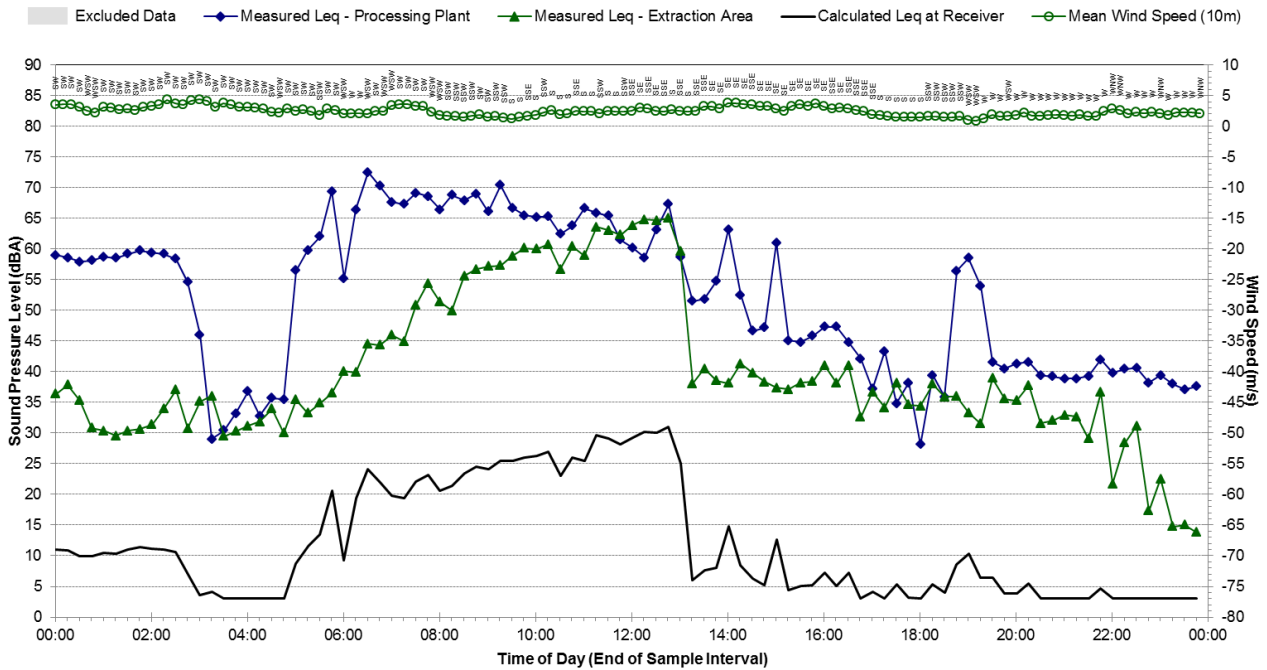
Statistical Ambient Noise Levels The Cottage - Thursday, 25 July 2019



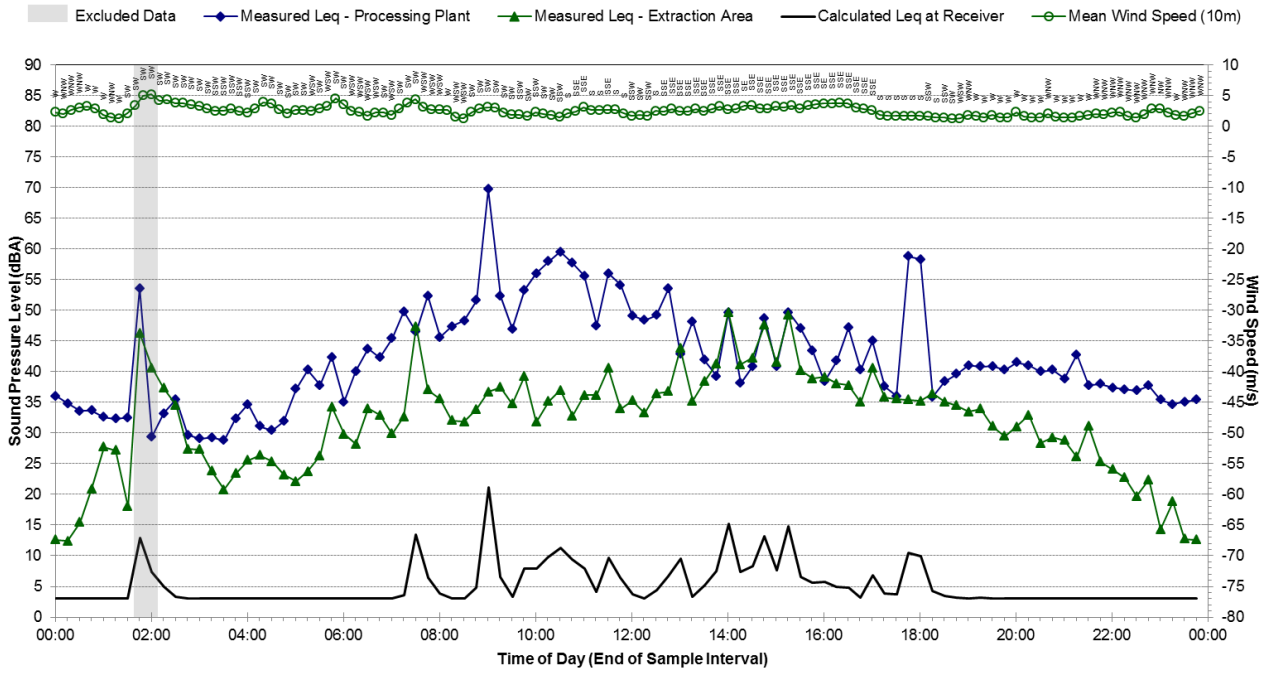
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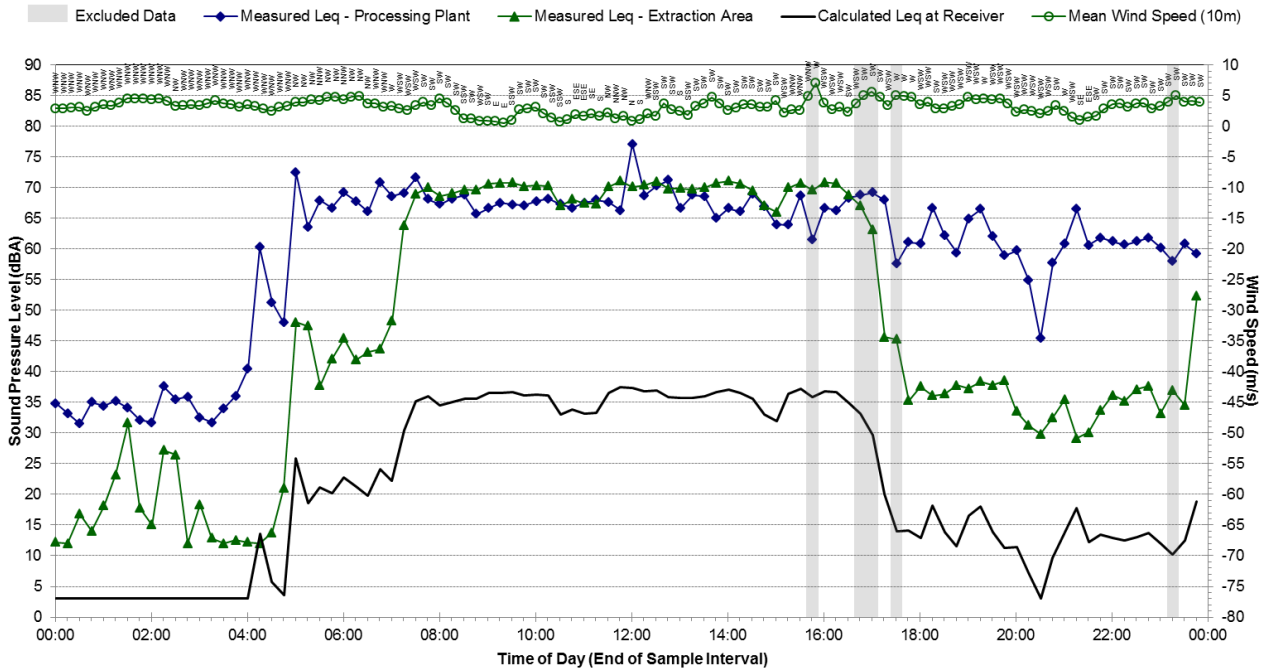
Statistical Ambient Noise Levels The Cottage - Saturday, 27 July 2019



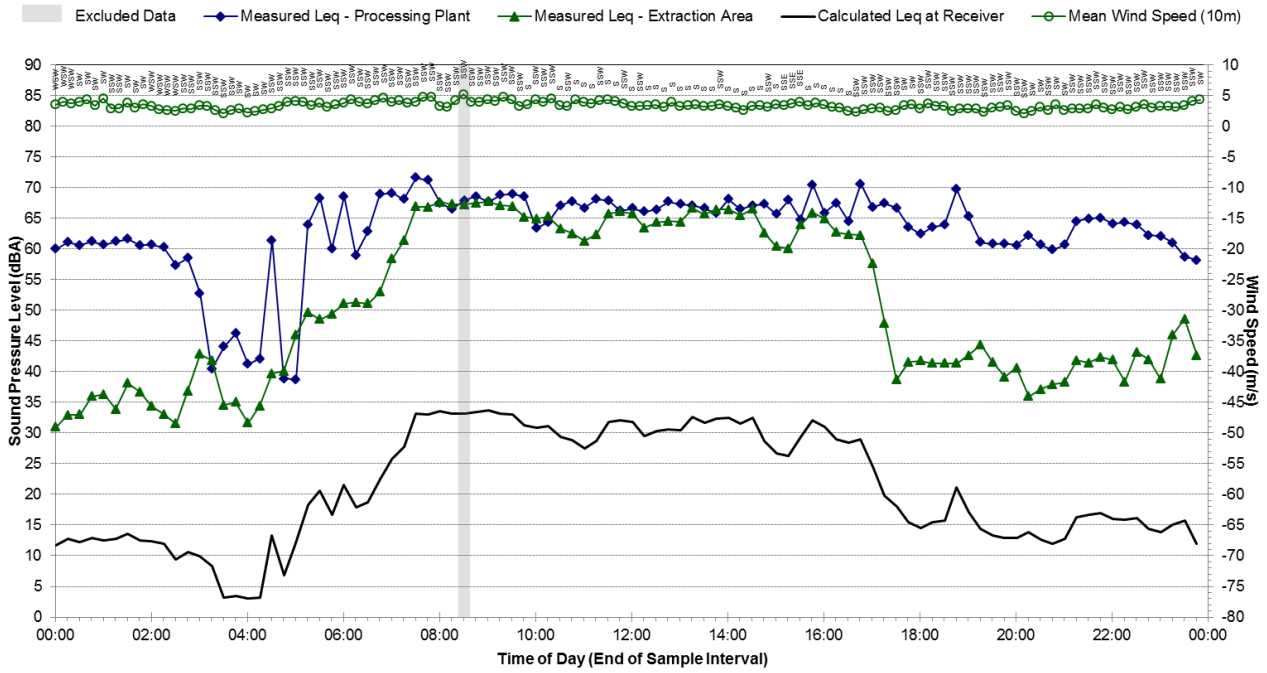
Statistical Ambient Noise Levels The Cottage - Sunday, 28 July 2019



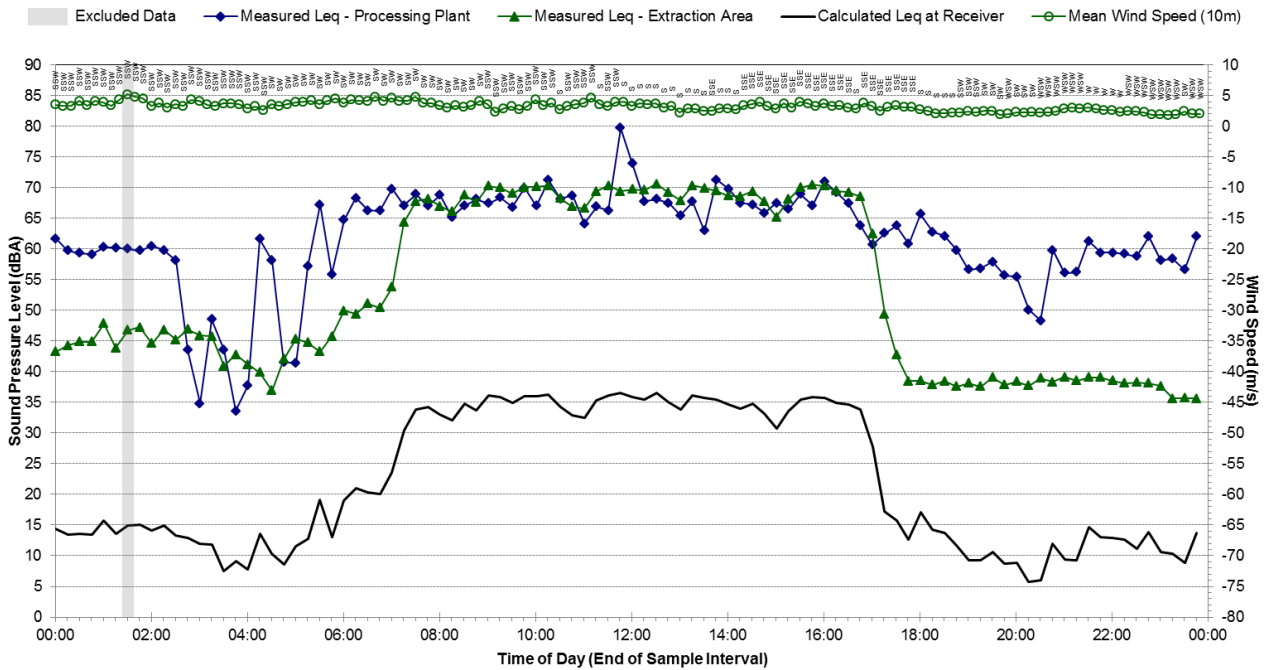
Statistical Ambient Noise Levels The Cottage - Monday, 29 July 2019



Statistical Ambient Noise Levels The Cottage - Tuesday, 30 July 2019

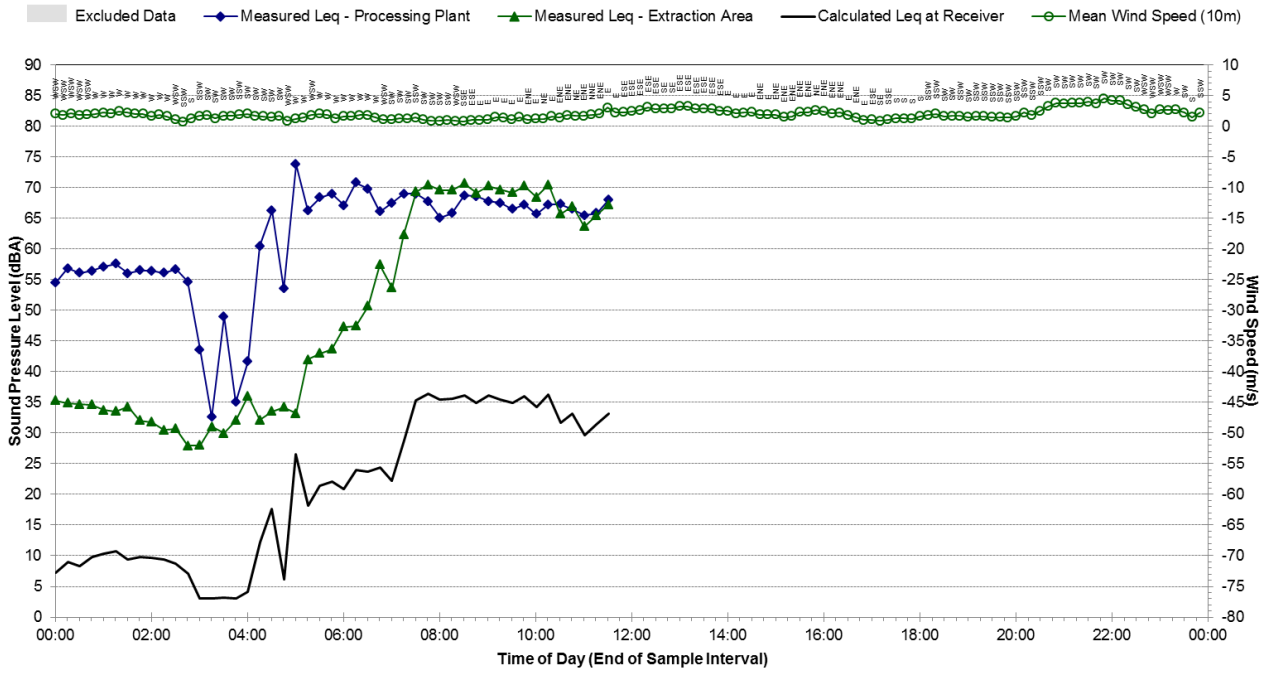


Statistical Ambient Noise Levels The Cottage - Wednesday, 31 July 2019



Statistical Ambient Noise Levels

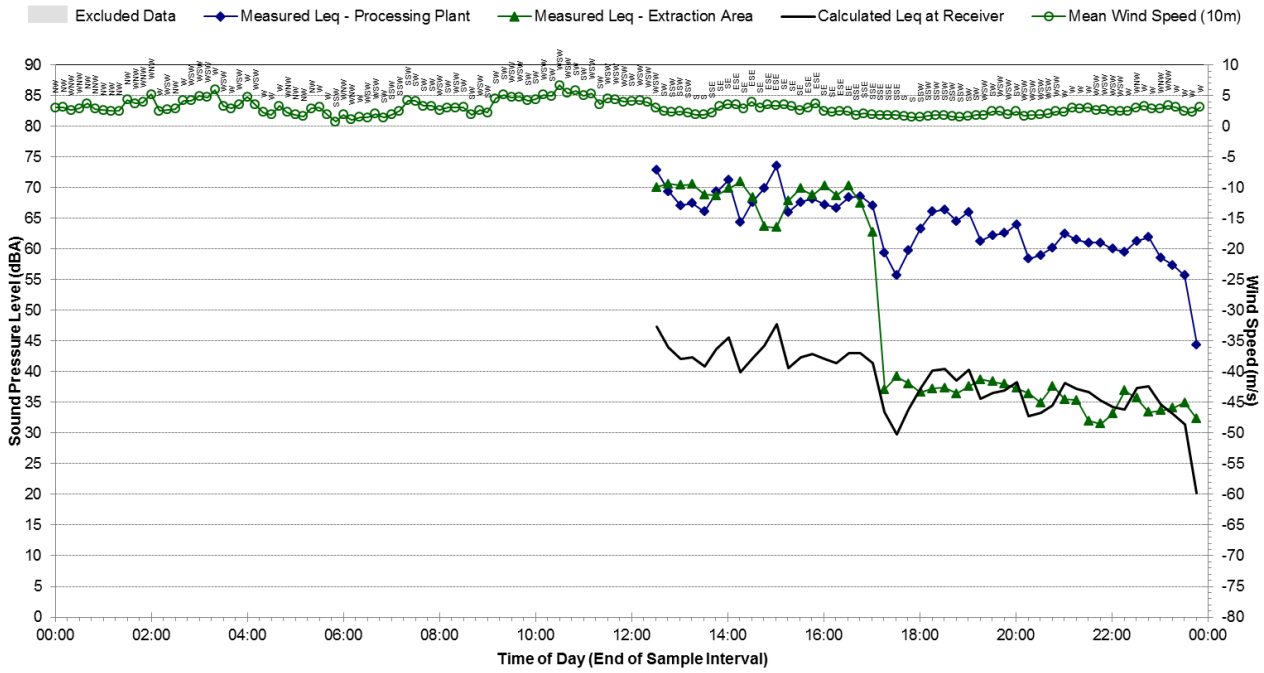
The Cottage - Thursday, 1 August 2019



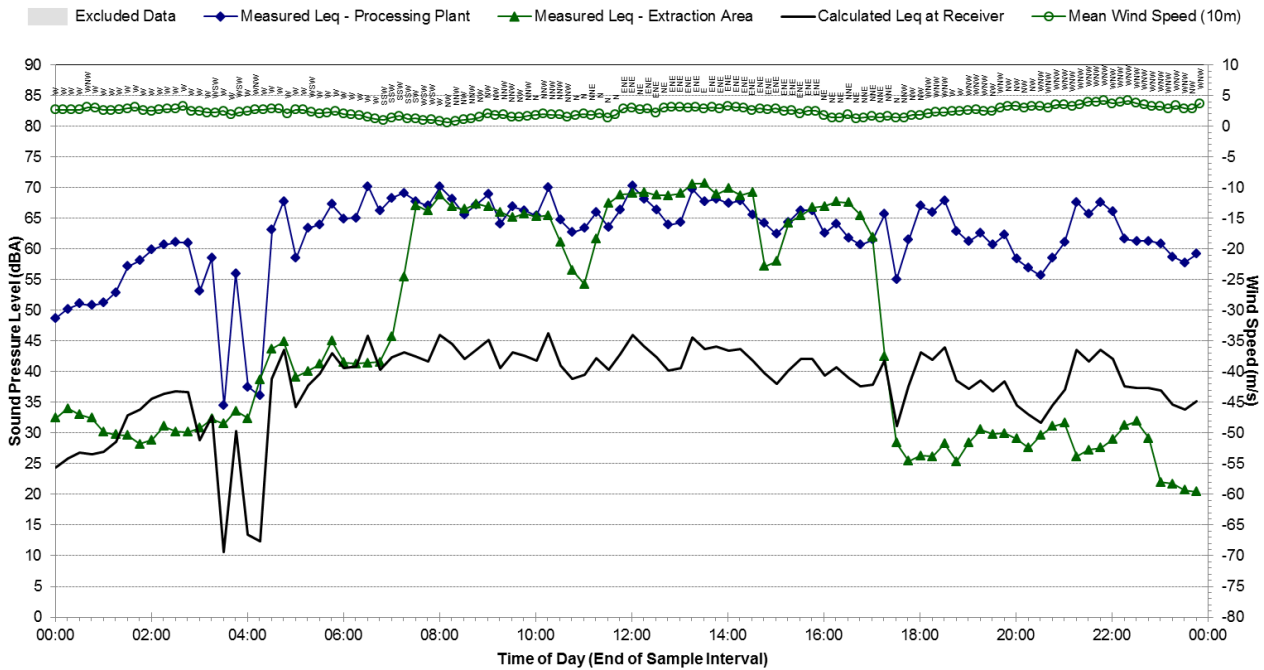
APPENDIX B3

CONTRIBUTION OF ALBION PARK QUARRY - GREENMEADOWS RESIDENCE ESTATE

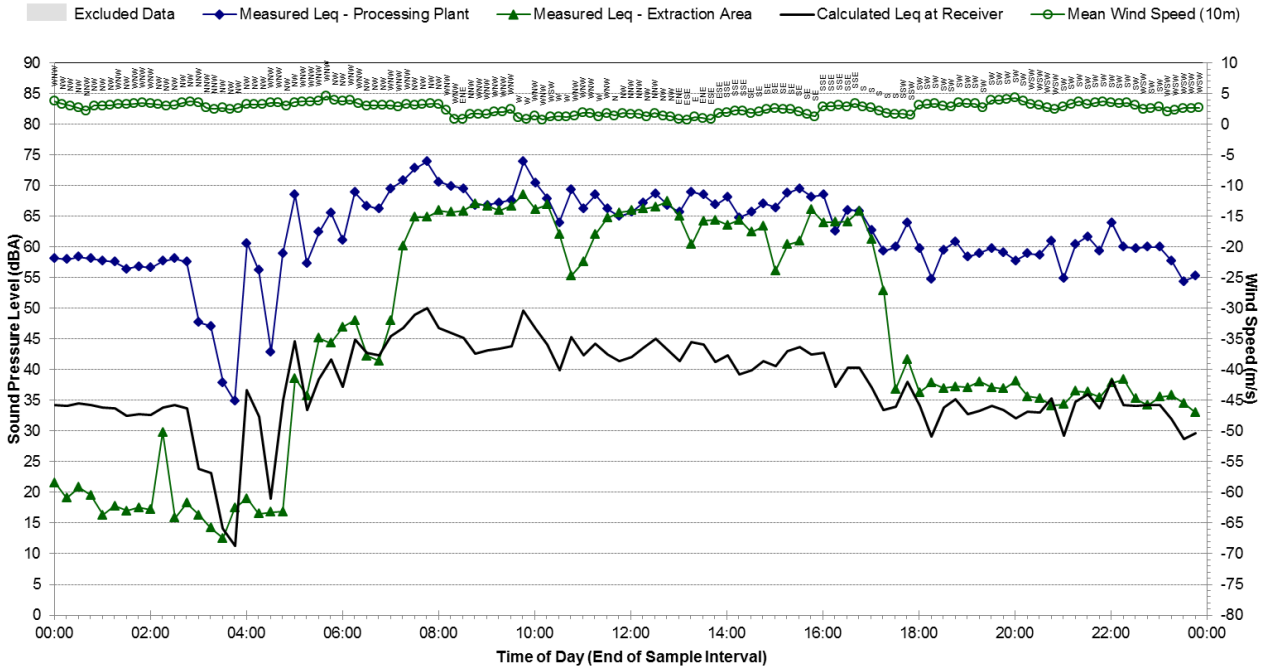
Statistical Ambient Noise Levels Greenmeadows - Wednesday, 24 July 2019



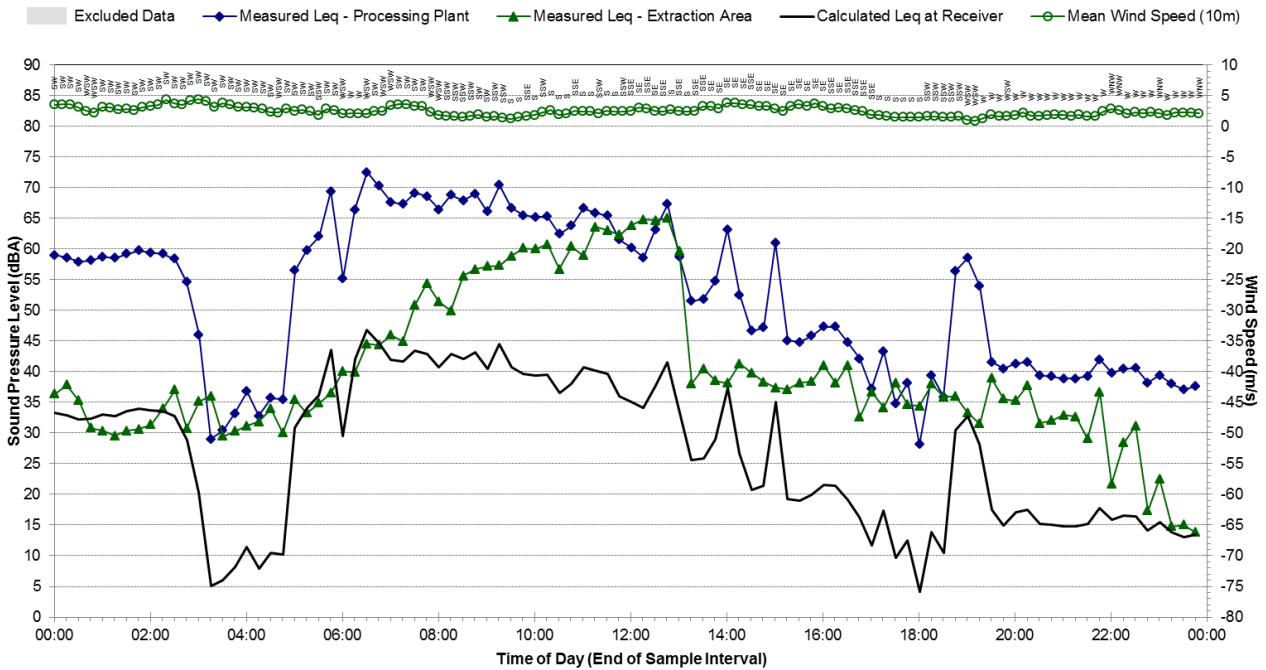
Statistical Ambient Noise Levels Greenmeadows - Thursday, 25 July 2019



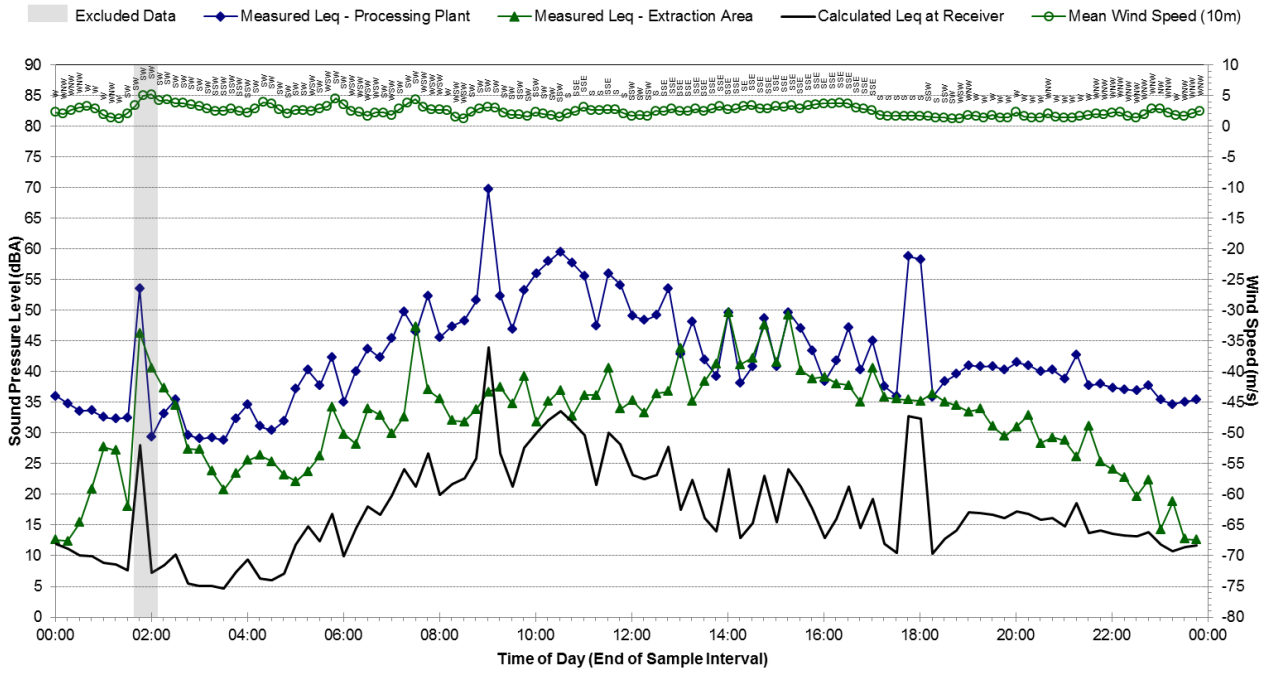
Statistical Ambient Noise Levels Greenmeadows - Friday, 26 July 2019



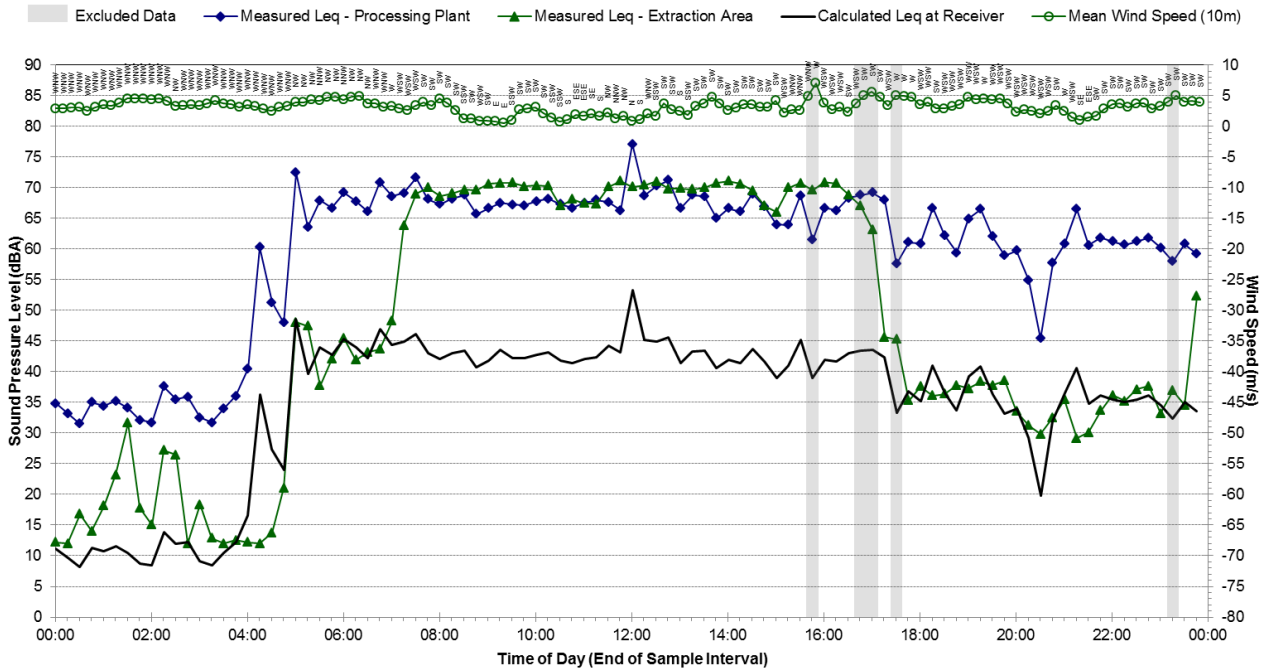
Statistical Ambient Noise Levels Greenmeadows - Saturday, 27 July 2019



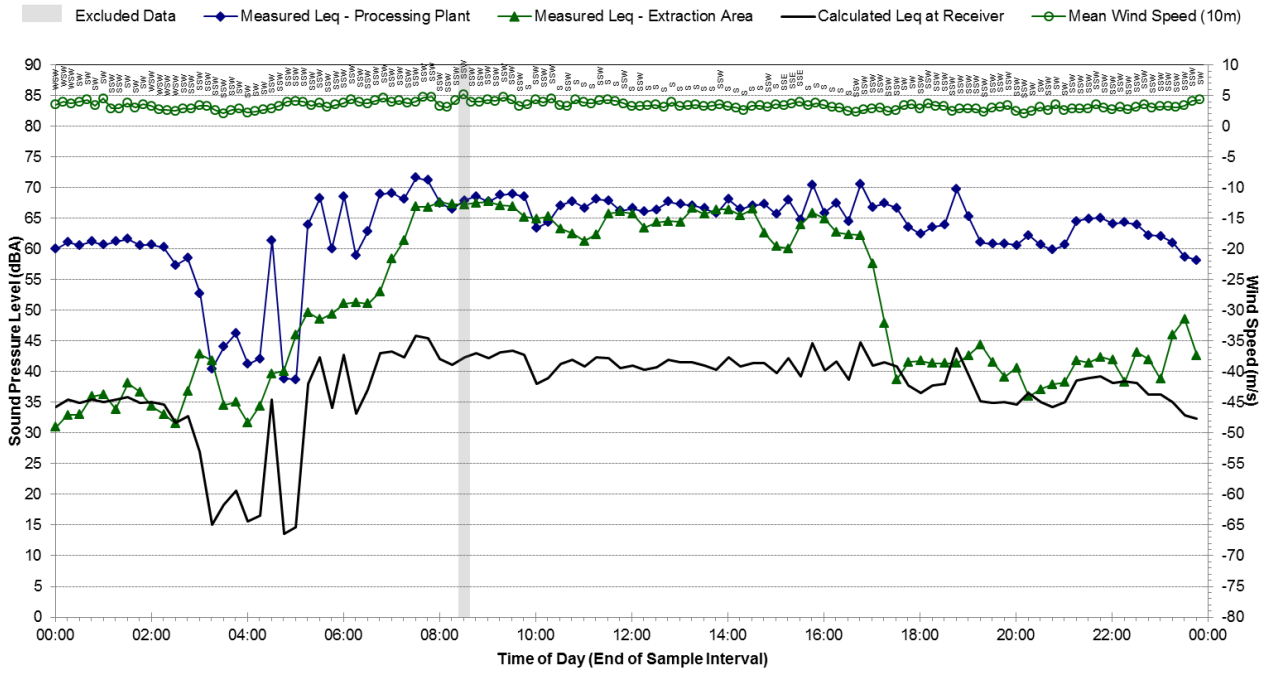
Statistical Ambient Noise Levels Greenmeadows - Sunday, 28 July 2019



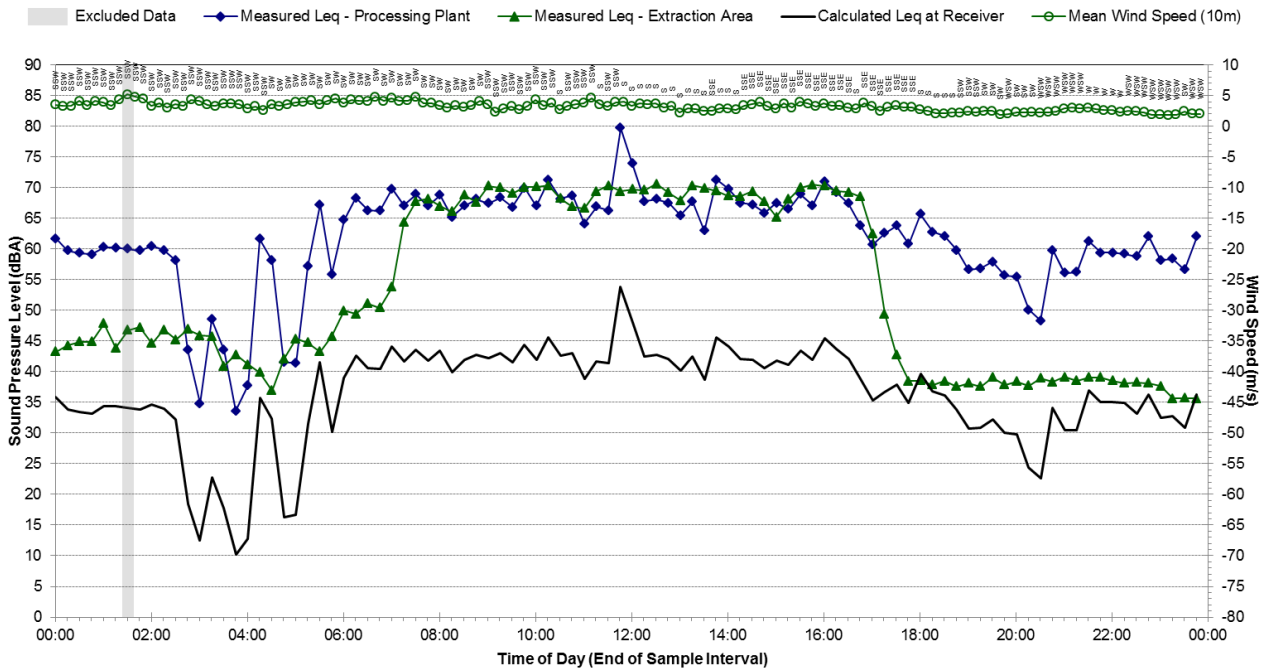
Statistical Ambient Noise Levels Greenmeadows - Monday, 29 July 2019



Statistical Ambient Noise Levels Greenmeadows - Tuesday, 30 July 2019

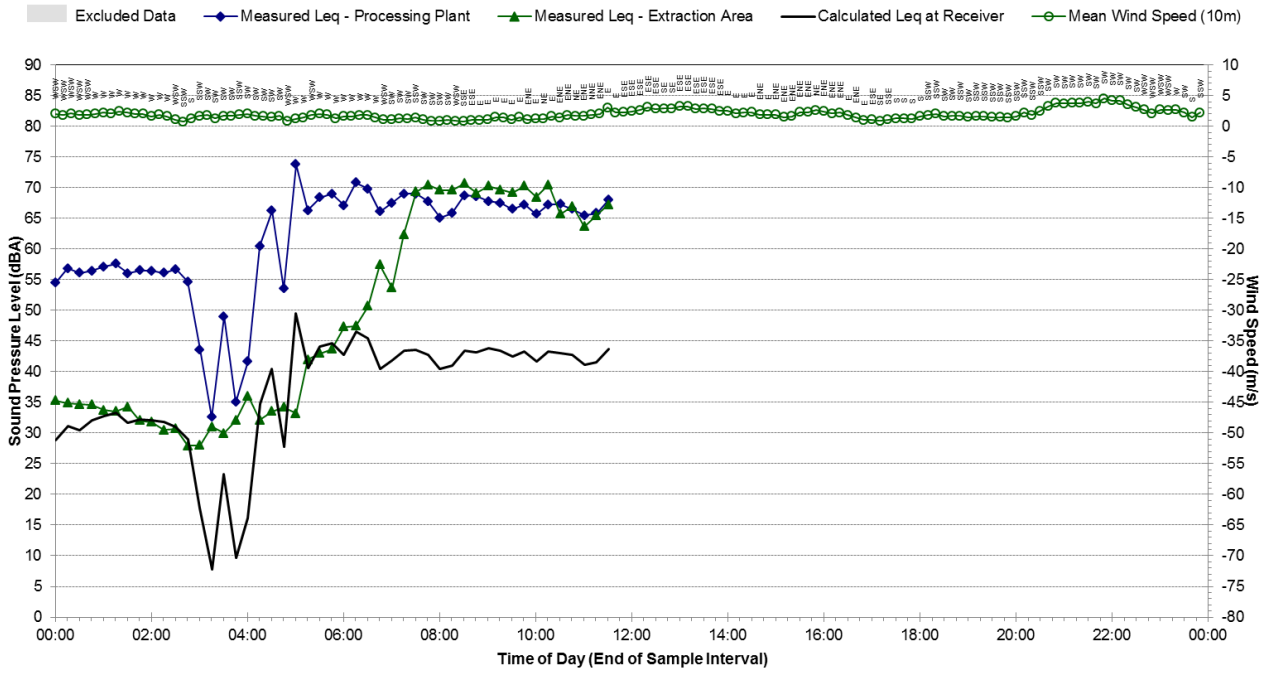


Statistical Ambient Noise Levels Greenmeadows - Wednesday, 31 July 2019



Statistical Ambient Noise Levels

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