DONALDSONCOAL

Part of the Yancoal Australia Group

ABN: 87 073 088 945

YANCOAL 兖煤澳大利亚有限公司

Annual Review

Abel Underground Coal Mine

1 January 2020 – 31 December 2020

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DONALDSON COAL

PTY LTD

ABN: 87 073 088 945

Annual Review

for the

Abel Underground Coal Mine

1 January 2020 – 31 December 2020

Compiled for:

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Ref No. 737/24b

March 2021

DONALDSONCOAL
Part of the Yancoal Australia Group

TITLE BLOCK

Name of Operation	Abel Underground Coal Mine
Name of Operator	Donaldson Coal Pty Ltd
Development consent / project approval #	05_0136
Name of holder of development consent / project approval	Donaldson Coal Pty Ltd
Mining Lease #	ML1618 and ML 1653
Name of holder of mining lease	Donaldson Coal Pty Ltd
Water licence #	20WA218986 and WAL41525
Name of holder of water licence	Donaldson Coal Pty Ltd
MOP/RMP start date	02/05/2016
MOP/RMP end date	01/05/2022
Annual Review start date	01/01/2020
Annual Review end date	31/12/2020

I, Phillip Brown, certify that to the best of my knowledge this report is a true and accurate record of the compliance status of the Abel Underground Coal Mine for the period 1 January 2020 to 31 December 2020 and that I am authorised to make this statement of behalf of Donaldson Coal Pty Ltd.

Note.

a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: Section 192G (Intention to defraud by false or misleading statement – maximum penalty 5 years imprisonment); Section 307A, 307B and 307C (false or misleading application/information/documents – maximum penalty 2 years imprisonment or $22,000, or both).

Name of authorised reporting officer	Phillip Brown
Title of authorised reporting officer	Environment and Community Relations Superintendent
Signature of authorised reporting officer	
Date	29 March 2021

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APPENDICES

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TABLES

1. STATEMENT OF COMPLIANCE

The compliance status of relevant approvals was reviewed for the reporting period and is summarised in **Table 1.1**. It was determined that there was one administrative non-compliance during the reporting period. The non-compliance recorded during the reporting period has been ranked according to the risk matrix included in **Table 1.2**.

Table 1.1
Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	Yes / No
Project Approval 05_0136	No
Mining Lease 1618	Yes
Mining Lease 1653	Yes
Water Supply Works Approval 20WA218986 and Water Access Licence 41525	Not Determined[1]
1. Updated licence with conditions not yet received.	

Table 1.2
Non-compliances

Relevant Approval	Cond #	Condition Description (summary)	Compliance Status	Comment	Where Addressed in Annual Review
PA 05_0136	2/11a	Ensure that all new buildings and structures, and any alterations or additions are constructed in accordance with the relevant requirements of the BCA.	Non-compliant	Construction Certificates have been received for buildings within the surface infrastructure area but not Occupation Certificates. Certifying body inspected once and requested changes. Changes have been made and the Certifying body requested to reinspect. Occupation certificates yet to be issued.	Section 11

Compliance Status Key

Risk level	Colour code	Description
High	*Non-compliant*	*Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence.*
Medium	*Non-compliant*	*Non-compliance with:* *potential for serious environmental consequences, but is unlikely to occur; or* *potential for moderate environmental consequences, but is likely to occur.*
Low	*Non-compliant*	*Non-compliance with:* *potential for moderate environmental consequences, but is unlikely to occur; or* *potential for low environmental consequences, but is likely to occur.*
Administrative non-compliance	*Non-compliant*	*Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions).*

2. INTRODUCTION

2.1 OVERVIEW OF OPERATIONS

The Abel Underground Coal Mine (the "mine") is located approximately 23km northwest of Newcastle, New South Wales (see **Figure 2.1**). Following the grant of Project Approval 05_0136 in June 2007, the Company undertook construction and mining activities until the mine was placed in care and maintenance from 2 May 2016. Activities undertaken to date include the following.

i) Construction of surface infrastructure and facilities, including the administration offices, amenities, service and storage facilities and car parking area, within the surface infrastructure area.

ii) Initial mine construction involving the formation of three mining portals and underground roadways and construction of the ventilation, conveying and coal stockpiling systems.

iii) Coal recovery using bord and pillar methods including first and second workings.

iv) Processing of recovered coal at the Bloomfield Colliery CHPP and transportation via the Bloomfield Rail Loop and Spur and subsequently via the Main Northern Railway.

Several of the earlier activities relating to the mine, involving the formation of the box cut within which the surface facilities and ROM stockpiles are located, were undertaken as part of the approved Donaldson Open Cut Coal Mine.

2.2 SCOPE AND FORMAT

This Annual Review for the Abel Underground Coal Mine has been compiled by R.W. Corkery & Co. Pty Limited (RWC) on behalf of Donaldson Coal Pty Ltd (the "Company"). Donaldson Coal Pty Ltd became part of Yancoal Australia Limited in July 2012.

This is the fifth Annual Review submitted for the mine, following nine Annual Environmental Management Reports, and is applicable for the period 1 January to 31 December 2020 ("the reporting period"). The information presented within this Annual Review has been compiled based on information and advice provided by the Company.

This Annual Review generally follows the format and content requirements identified in the Department of Planning and Environment's (DPE) *Annual Review Guideline* dated October 2015 and meets the requirements of Condition 4, Schedule 6 of PA 05_0136.

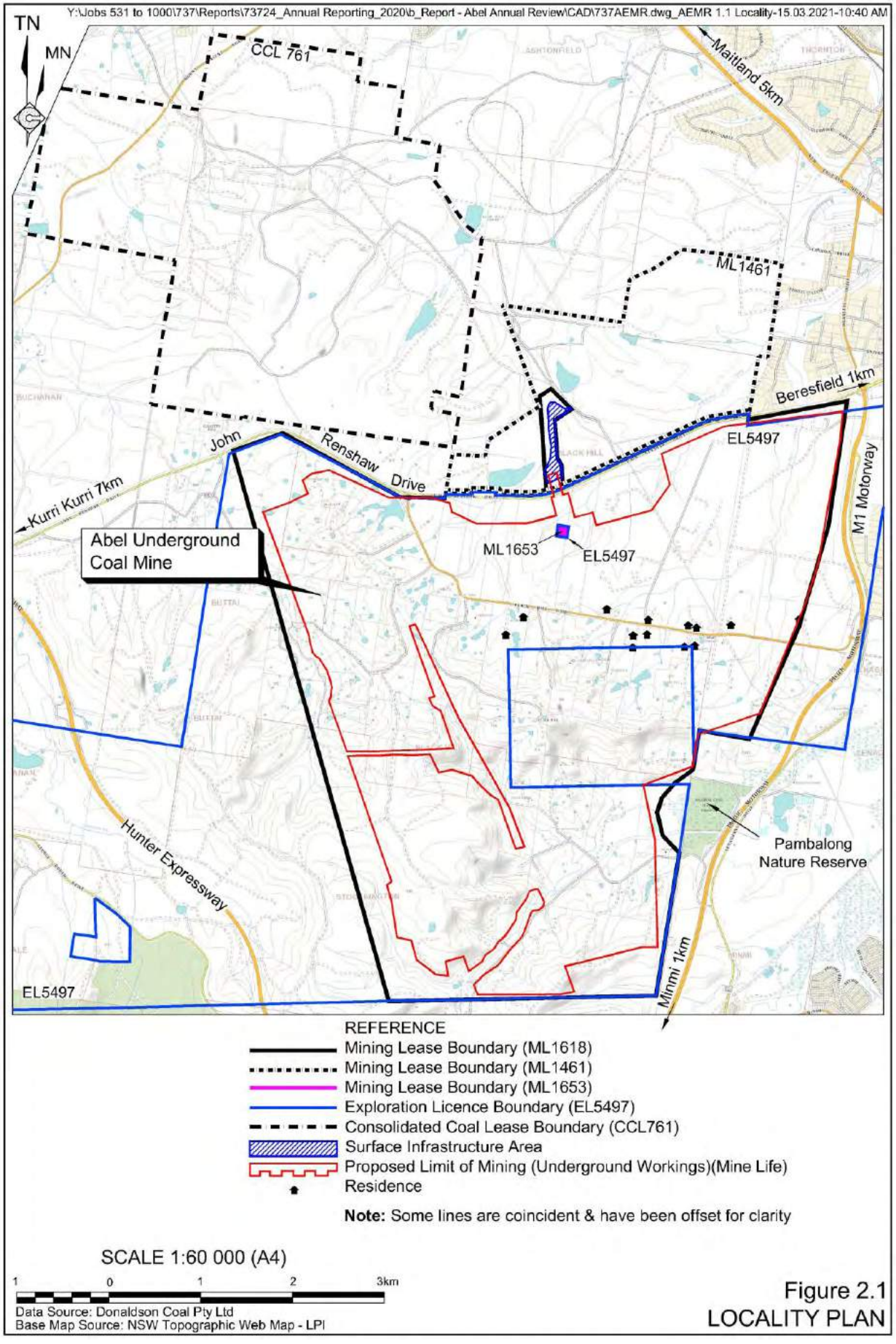


Figure 2.1
LOCALITY PLAN

2.3 KEY PERSONNEL CONTACT DETAILS

The Manager, Mining Engineering, Mr William Farnworth is the primary mine contact (Tel: 02 4993 7356). Mr Farnworth is currently the Manager Mining Engineering for legislative purposes and as such, is responsible for the environmental management of the mine and ensuring compliance with all relevant legislative obligations. Mr Phillip Brown (Tel: 02 6570 9219) is the nominated Environment & Community Relations Superintendent and is also responsible for the environmental management of the mine. The contact details for the mine office are as follows.

Postal Address:	Donaldson Coal Pty Ltd	Tel: 02 4015 1100
	PO Box 2216 GREENHILLS NSW 2323	Fax: 02 4015 1159
Email:	donaldson@doncoal.com.au	
Physical Address:	Abel Underground Coal Mine	
	1132 John Renshaw Drive BLACKHILL NSW 2322	

A 24-hour Environmental Hotline (Tel: 1800 111 271) is maintained by the Company. Details of calls taken on this number are forwarded to the Environment and Community Relations Superintendent for further actioning, if required.

3. APPROVALS

The Company has operated the approved activities at the mine under the approvals listed in **Table 3.1**.

Table 3.1
Abel Underground Coal Mine – Consents, Leases and Licences

Consent/Lease/Licence	Issue Date	Expiry Date	Details / Comments
Project Approval 05_0136	7 June 2007	31 December 2030	Granted by the (then) Minister for Planning and last modified on 04 December 2013.
Mining Lease ML 1618*	15 May 2008	15 May 2029	Granted by the Minister for Primary Industries. Incorporates 2 755ha of surface area.
Mining Lease ML 1653*	21 January 2011	21 January 2032	Granted by the Minister for Primary Industries. Incorporates 0.25ha of surface area. Issued construction of ventilation shaft.
Environment Protection Licence No. 12856	9 July 2008 (licence version date (21 December 2011)	Not applicable	Issued by the (then) Department of Environment and Climate Change (EPA).
Water Supply Works Approval 20WA218986	01/07/2016	30/06/2029	Bore Licence 20BL171935 was issued for the interception and inflow of groundwater due to the underground mining operations. Following commencement of the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016* in July 2016 20BL171935 was converted to a water supply works approval and water access licence with an allocation of 500ML/year.
Water Access Licence (WAL) 41525	01/07/2016	Continuing	
* See **Figure 2.1**			

It is noted that this Annual Review has been prepared to fulfil the annual reporting requirements of Project Approval 05_0136, ML 1618, ML 1653, and WAL 41525. A separate Annual Return has continued to be submitted to the NSW EPA in accordance with the requirements of Environment Protection Licence (EPL) 12856. It is noted that an application to consolidate and rationalise EPL 12856, for the Abel Mine, and EPL 11080, for the Donaldson Open Cut Coal Mine, is currently being processed by the EPA and is expected to be finalised during the next reporting period.

The Company also holds Exploration Licence 5497 (see **Figure 2.1**) incorporating a 4687ha surface area. Exploration Licence 5497 was originally granted on 22 July 1998 and has a current expiry date of 22 July 2022.

4. OPERATIONS SUMMARY

4.1 MINING OPERATIONS

Coal mining activities were suspended on 2 May 2016 when the site was placed into care and maintenance. No coal mining is planned during the next reporting period. **Table 4.1** presents a summary of the production statistics.

Table 4.1
Production Summary

Material	Approved limit (specify source)	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Waste Rock / Overburden (m^3)	None specified	0	0	0
ROM Coal / Ore (t)	6 100 000 (PA 05_0136 Cond 2/6)	0	0	0
Coarse Reject (t)	None specified	0	0	0
Fine Reject (Tailings) (t)	None specified	0	0	0
Saleable Product (t)	None specified	0	0	0

4.2 OTHER OPERATIONS DURING THE REPORTING PERIOD

No exploration, land preparation, construction or processing activities were undertaken during the reporting period.

Environmental monitoring activities continued throughout the reporting period including surface water, groundwater, flora and fauna and subsidence monitoring. Results of this monitoring is summarised in Sections 6 and 7.

The Abel Underground Coal Mine Mining Operation Plan (MOP) was amended (Amendment B) during the reporting period to incorporate the *Abel Underground Mine and Donaldson Open Cut Mine – Closure Strategy for the West and Square Pits* (Donaldson Coal Pty Ltd, 2020) and other relevant updates to reflect the Closure Strategy where necessary.

4.3 NEXT REPORTING PERIOD

The activities proposed for 2021 will principally involve continued monitoring and, if required, maintenance activities. The following provides a summary of the planned activities.

Exploration

The Company is considering further exploration but currently does not intend to undertake any drilling within ML 1618 or ML 1653 during the 2021 reporting period. In the event that drilling is undertaken, the appropriate approvals will be sought and the drilling reported as part of the next Annual Review and within the annual exploration report.

Mining

No mining is currently planned to be undertaken during the 2021 reporting period.

Rehabilitation

No specific rehabilitation activities are currently planned for the 2021 reporting period as all existing disturbance areas are associated with active surface infrastructure. However, work will continue to be undertaken in development of the closure strategy and reflected in the new or amended Mining Operations Plan (MOP). Any rehabilitation works undertaken will relate to rehabilitation of any subsidence impacts or to ongoing maintenance, principally erosion and sediment control.

Mining Operations Plan

A new or amended Mining Operations Plan (MOP), or a Rehabilitation Management Plan, will be prepared and submitted to replace the current MOP which expires 1 May 2022[1].

Monitoring

The following monitoring will be undertaken during the next reporting period.

- Air Quality – ongoing deposited dust (until approval of variation of EPL 12856), and PM_{10} monitoring will continue to be undertaken.
- Surface water – ongoing surface water quality at a range of routine monitoring sites located within Blue Gum Creek, Viney Creek, Buttai Creek, Four Mile Creek and a number of local water storages. This monitoring will be undertaken as part of the integrated monitoring with the Bloomfield, Donaldson and Tasman Extended Mines.
- Groundwater – ongoing groundwater quality and level monitoring will be undertaken as part of the integrated network of monitoring bores for the Bloomfield, Donaldson and Tasman Mines. Measurement of the quality and volume of inflow water to the underground workings will also continue to be undertaken.
- Noise – Bi-annual noise monitoring will continue whilst the mine remains on care and maintenance.
- Flora and Fauna – flora and fauna surveys and reporting will continue to be undertaken in accordance with approved Flora and Fauna Management Plan. It is noted that, whilst the mine is on care and maintenance, the Pambalong Nature Reserve, dam monitoring and sub-tropical rainforest monitoring will be deferred pending the recommencement of mining.
- Meteorological – the on-site meteorological station at the Abel Mine will be maintained and data collated.
- Subsidence monitoring will continue to be undertaken in accordance with the approved subsidence monitoring programs.

Community Consultation and Liaison

The community consultative committee will continue to be convened during the next reporting period. It is expected that meetings will be held six-monthly unless otherwise agreed with the committee. The 24hr environmental hotline will be maintained and a register retained of any complaints received.

[1] An extension to the MOP term from 1 May 2021 to 1 May 2022 was granted on 22 February 2021, i.e. beyond the current reporting period.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The 2019 Annual Review was submitted to the Resources Regulator and the Department of Planning, Industry and Environment (DPIE) compliance unit on 31 March 2020. Feedback was received from the DPIE compliance unit dated 18 May 2020. The Annual Review was considered to generally satisfy the conditions of the approval. Therefore, no actions were required to be undertaken from the previous Annual Review.

6. ENVIRONMENTAL PERFORMANCE

6.1 SUMMARY OF ENVIRONMENTAL PERFORMANCE

A summary of environmental performance for the principal environmental aspects is provided in **Table 6.1**. Further detail regarding specific environmental aspects is also provided in the following subsections. It is noted that a range of monitoring activities are integrated with the Donaldson Open Cut Coal Mine and Bloomfield Colliery, as outlined within the Integrated Environmental Monitoring Program. The following subsections present results specific to the Abel Mine with data relevant to other operations presented in their respective Annual Reviews.

Table 6.1
Environmental performance

Aspect	Approval criteria / EIS prediction	Performance during the reporting period	Trend/key management implications	Implemented/proposed management actions
Noise	No exceedance of applicable noise criteria.	No exceedances and no complaints.	Implies management measures are currently adequate.	No additional management action required.
Blasting	No exceedance of applicable blast criteria.	No blasts undertaken. No complaints.	Implies management measures are currently adequate.	No additional management action required.
Air Quality	No exceedances of applicable air quality criteria.	No exceedances and no complaints.	Implies management measures are currently adequate.	No additional management action required.
Biodiversity	No significant impacts upon flora, fauna species, populations, communities or habitat.	No impacts upon flora, fauna species, populations, communities or habitat were recorded. No effect upon Pambalong Nature Reserve or Sub-tropical rainforest.	Implies current mining design and safeguards are currently adequate.	No additional management action required.
Heritage	Management in accordance with approved Aboriginal Heritage Management Plan.	No heritage items undermined during the reporting period. No subsidence impacts.	Implies no specific management actions were necessary.	No additional management action required.
Subsidence	Subsidence management in accordance with approved Subsidence Management Plan / Extraction Plan.	No notifiable events occurred.	Implies management measures are currently adequate and predictions sufficiently accurate.	No additional management action required.

6.2 METEOROLOGICAL MONITORING

An automated weather station, installed for the Donaldson Mine, has been approved by the (then) Department of Planning as also meeting the requirements for the Abel Mine. The weather station records wind speed and direction, temperature, rainfall and solar radiation. This station was subsequently relocated in March 2015 to adjacent the Helipad near the Abel surface facilities (see **Figure 6.1**). A summary of the rainfall data since commencement of the Abel Mine in 2007 is presented in **Table 6.2**.

Total rainfall during the 2020 calendar year was 1115.2mm, representing an annual rainfall over 14% higher than the average annual rainfall of 975.5mm.

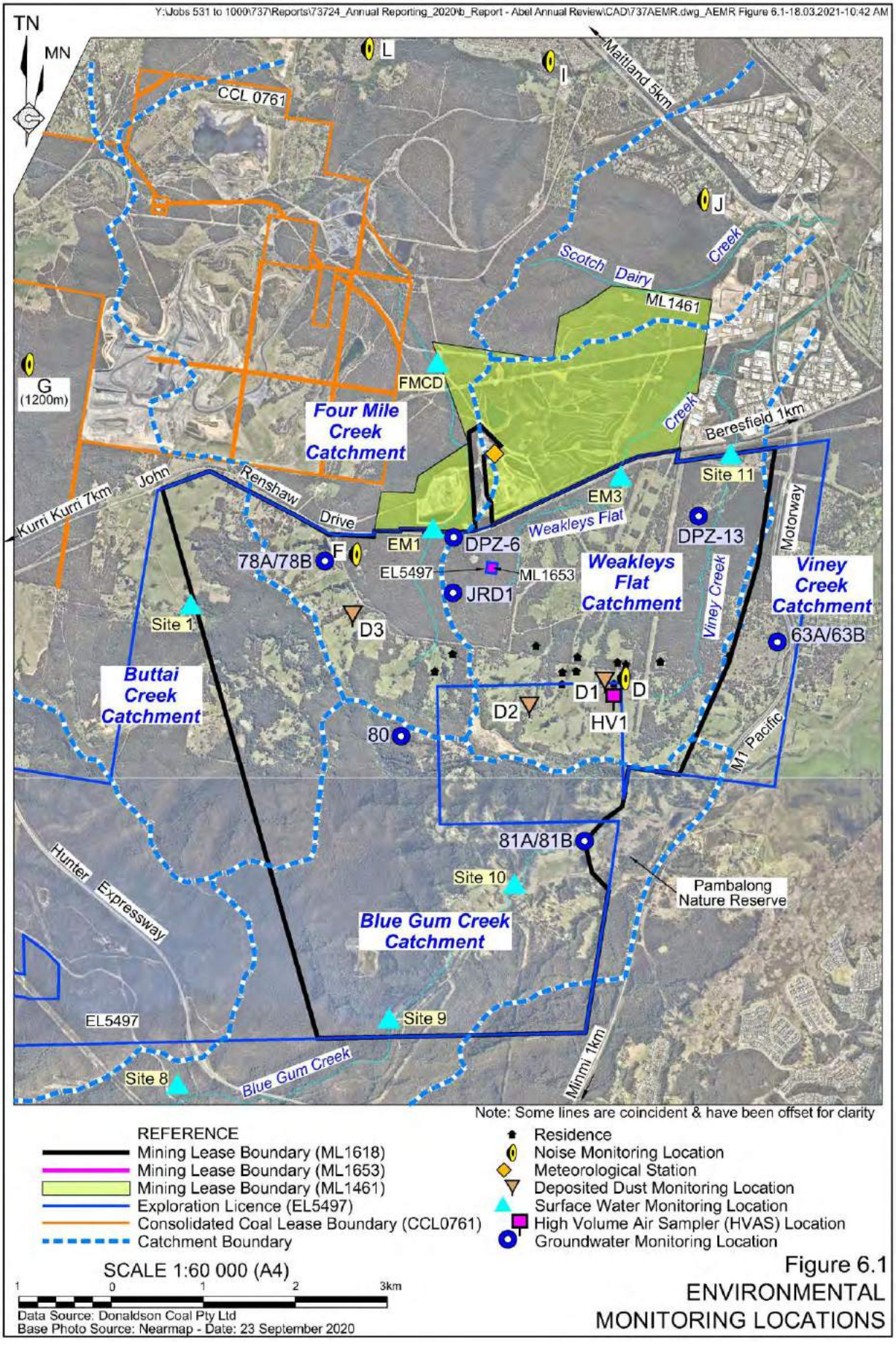

Y:\Jobs 531 to 1000\737\Reports\73724_Annual Reporting_2020\b_Report - Abel Annual Review\CAD\737AEMR.dwg_AEMR Figure 6.1-18.03.2021-10:42 AM
TN
MN
CCL 0761
L
I
Maitland 5km
J
Scotch Dairy Creek
ML1461
G (1200m)
FMCD
Four Mile Creek Catchment
Creek
Beresfield 1km
Site 11
EM3
John Renshaw Drive
Kurri Kurri 7km
Weakleys Flat
EM1
DPZ-6
DPZ-13
Motorway
78A/78B
F
EL5497
ML1653
JRD1
Weakleys Flat Catchment
Viney Creek
Viney Creek Catchment
Site 1
D3
63A/63B
Buttai Creek Catchment
D1
D
D2
HV1
80
M1 Pacific
81A/81B
Hunter Expressway
Site 10
Pambalong Nature Reserve
Blue Gum Creek Catchment
EL5497
Site 9
Minmi 1km
Site 8
Blue Gum Creek
Note: Some lines are coincident & have been offset for clarity
REFERENCE
Mining Lease Boundary (ML1618)
Mining Lease Boundary (ML1653)
Mining Lease Boundary (ML1461)
Exploration Licence (EL5497)
Consolidated Coal Lease Boundary (CCL0761)
Catchment Boundary
Residence
Noise Monitoring Location
Meteorological Station
Deposited Dust Monitoring Location
Surface Water Monitoring Location
High Volume Air Sampler (HVAS) Location
Groundwater Monitoring Location
SCALE 1:60 000 (A4)
1 0 1 2 3km
Data Source: Donaldson Coal Pty Ltd
Base Photo Source: Nearmap - Date: 23 September 2020
Figure 6.1
ENVIRONMENTAL MONITORING LOCATIONS

Table 6.2
Monthly Rainfall Records – 2007 to 2020

Period	Average Monthly Rainfall (mm)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
2007	13.4	87.6	102.4	85.6	60	253	16.5	79.6	28.3	35	163.8	49.5	974.7
2008	153.4	191.8	46	237.6	2.2	122.9	30	28.5	195.3	62.2	73.3	62.6	1205.8
2009	11.3	340.7	136.5	189	143.8	75.7	32.1	1.8	29.2	59.8	51.4	62	1133.3
2010	89	52.1	83.9	37.1	89.4	112.8	65.3	38.5	26	80.6	171.1	55.9	901.7
2011	25.6	34.5	65.6	138	98.8	152.2	128.7	48.9	103.2	100	171.9	75.9	1143.2
2012	96.1	207	137.6	114.7	11.8	172.3	53.8	26.6	18.7	5.7	47.9	47.9	944.1
2013	166.7	226.6	97.9	89.4	60.9	96.5	11.2	9.7	21.2	49.5	261.8	2.6	1094
2014	15.6	108.3	112.8	99.3	44.3	31.4	24.6	104	42.4	55	38.4	133.4	809.5
2015	167	48	73.3	412	89.4	44.6	17.9	30.6	56.8	59	69.8	103.8	1172.2
2016	430.8	26	78	31.8	13.4	113	44.2	74.2	60	43.8	33.2	58.6	1007
2017	66.9	71.7	150.4	94.5	12.7	128.5	3.2	6	12.6	77.7	66.8	41.6	732.6
2018	6.6	120	191.4	52.8	7	107.4	4.2	21.4	55.4	109	92.6	91.8	859.6
2019	17.2	32.8	158	27	19.4	97.4	26	66.6	69.4	22	28.2	0	564
2020	**55.2**	**214.8**	**106.4**	**52**	**45.4**	**80.2**	**166.6**	**41**	**35.6**	**146.6**	**53**	**118.4**	**1115.2**
Average	93.9	125.9	110.0	118.6	49.9	113.4	44.6	41.2	53.9	64.7	94.5	64.6	975.5

Note: Results relevant to this reporting period are in **bold**.

6.3 NOISE

Environmental Management

The principal noise control prior to the site entering care and maintenance was the continued use of low modulated frequency reversing alarms on mobile equipment used on the surface. As mobile equipment usage during care and maintenance was minimal, this remains the principal noise management measure.

Environmental Performance

Quarterly noise monitoring applicable to the Abel Mine commenced in December 2008 as an extension of the monitoring survey previously undertaken for the Donaldson Open Cut Coal Mine. Following the results of previous monitoring, the frequency of noise monitoring for the mine was reduced from quarterly to bi-annually for the current and future Annual Reports.

Bi-annual attended and unattended noise monitoring was undertaken during the reporting period at six monitoring locations relevant to the Abel Mine (see **Figure 6.1**) for half-yearly periods ending June (H1) and December (H2) 2020. Monitoring results are presented in **Table 6.3** and copies of the monitoring reports are presented within **Appendix 1**.

Operations at the Able Mine and Bloomfield CHPP were audible at monitoring locations I and L during day periods during H1 but remained well below the applicable noise criteria. Noise monitoring concluded that operations were inaudible at all monitoring locations during H2. Notably, all monitoring events were undertaken whilst the Abel Mine was under care and maintenance and therefore not audibly contributing to received noise. Further discussion regarding the Bloomfield CHPP is provided in their respective annual reporting.

Table 6.3
Summary of Attended Noise Monitoring Results – 2020

Location	Time	Noise Criteria	Attended Monitoring[1]		Noise generated by Abel Mine
			H1	H2	
D Black Hill School, Black Hill	Day ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Evening ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Night ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Night ($L_{A1(1min)}$)	45	NA	NA	Operations inaudible at all times
F Black Hill Rd, Black Hill	Day ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Evening ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Night ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Night ($L_{A1(1min)}$)	45	NA	NA	Operations inaudible at all times
G Buchanan Rd, Buchanan	Day ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Evening ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Night ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Night ($L_{A1(1min)}$)	45	NA	NA	Operations inaudible at all times
I Lord Howe Drive, Ashtonfield	Day ($L_{A\ eq\ (15\ min)}$)	36	33	NA	CHPP operations 32-35 L_{Amax} dBA.
	Evening ($L_{A\ eq\ (15\ min)}$)	36	NA	NA	Operations inaudible at all times
	Night ($L_{A\ eq\ (15\ min)}$)	36	NA	NA	Operations inaudible at all times
	Night ($L_{A1(1min)}$)	45	NA	NA	Operations inaudible at all times
J Parish Drive, Thornton	Day ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Evening ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Night ($L_{A\ eq\ (15\ min)}$)	35	NA	NA	Operations inaudible at all times
	Night ($L_{A1(1min)}$)	45	NA	NA	Operations inaudible at all times
L 7 Kilshanny Av, Ashtonfield	Day ($L_{A\ eq\ (15\ min)}$)	40	36	NA	CHPP operations 34-43 L_{Amax} dBA.
	Evening ($L_{A\ eq\ (15\ min)}$)	40	NA	NA	Operations inaudible at all times
	Night ($L_{A\ eq\ (15\ min)}$)	40	NA	NA	Operations inaudible at all times
	Night ($L_{A1(1min)}$)	47	NA	NA	Operations inaudible at all times

NA – Not able to be calculated as operations inaudible at all times.

CHPP – Bloomfield Coal Handling Processing Plant.

Note 1: Estimated Abel Contribution ($LAeq_{(15min)}$ dBA).

Source: SLR Consulting Australia Pty Ltd (2021).

Whilst PA 05_0136 provides for cumulative noise criteria, no cumulative effects are considered to have occurred given that the Abel operations were either inaudible or compliant at all times, the Donaldson Coal Mine is also on care and maintenance, and noise from the Bloomfield CHPP was either inaudible or well below the relevant criteria.

Reportable Incidents

No reportable incidents were recorded during the reporting period.

Further Improvements

Other than ongoing plant maintenance and noise monitoring (both attended and unattended), no additional management measures are planned during the next reporting period. Given the results of previous noise monitoring, the placement of the Abel Mine into care and maintenance, and the approval of the Noise Management Plan – Care and Maintenance (Version 5 – 3 June 2019), it is intended that noise monitoring will continue to occur at reduced six-monthly frequencies during the next reporting period as required by the Noise Management Plan. The suitability of bi-annual noise monitoring will be reviewed in the event that noise complaints are received during the next reporting period.

6.4 BLASTING

No blasts were undertaken during the reporting period.

6.5 AIR QUALITY

Environmental Management

As the Abel Mine is on care and maintenance the principal air quality management measure during the reporting period was maintenance of mobile equipment and on-site vehicles to reduce greenhouse and particulate emissions.

Environmental Performance

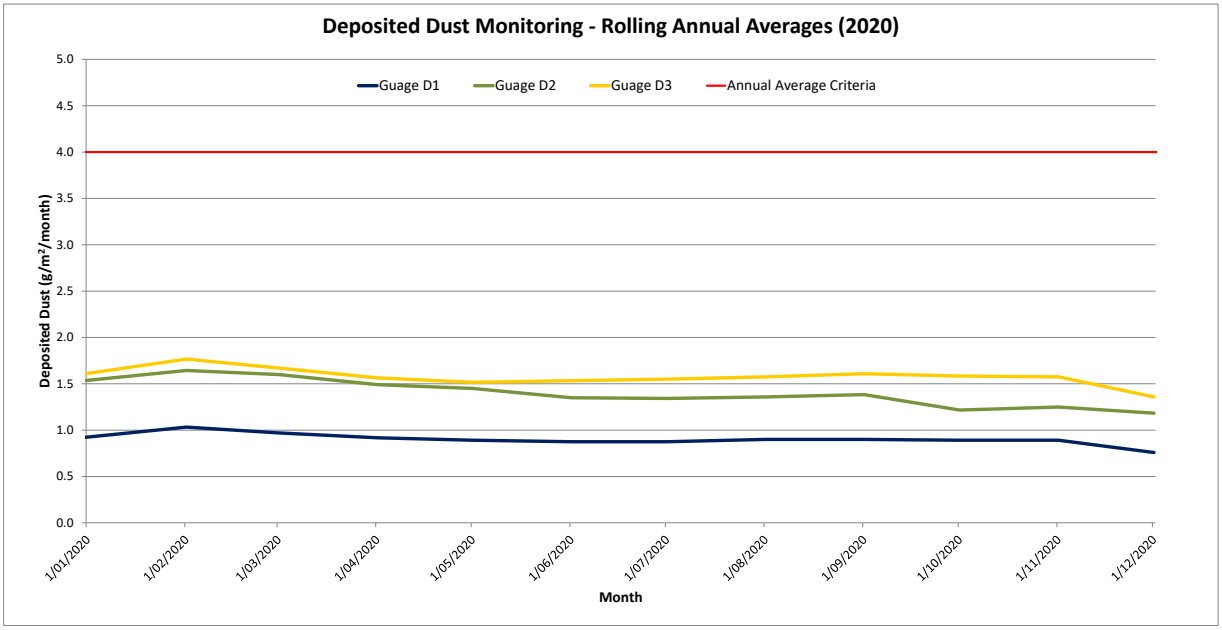
Monthly deposited dust monitoring was undertaken by the Company at a total of three locations surrounding and relevant to the Abel Mine. Total Suspended Particulates (TSP) and Particulate Matter <10µm (PM_{10}) monitoring was also undertaken at the existing High Volume Air Sampling (HVAS) station located approximately 2 300m southeast of the surface infrastructure area at Blackhill (located at Site D1). Monitoring locations are shown on **Figure 6.1** and results are summarised in **Table 6.4** and **Figures 6.2**, **6.3** and **6.4**.

Deposited Dust

The highest monthly dust deposition measurement was 3.7g/m^2/month (insoluble solids) at D3 during January 2020 (see **Table 6.4**). This is consistent with the previous dust deposition measurement of 3.6g/m^2/month recorded during December 2019. These elevated results are likely to reflect regional drought conditions and bushfires during this period.

The annual average monthly deposition rates for the reporting period were between 0.8g/m^2/month and 1.4g/m^2/month which is significantly below the cumulative criteria of 4g/m^2/month and compliant with the incremental criteria of an increase of 2g/m^2/month, indicating good air quality with respect to dust deposition.

Since commencement of the Abel operations, the rolling annual average deposited dust levels have remained low although spikes are evident due to local events, particularly at sites D2 and D3. However, when accounting for such events, no specific trends are evident and deposited dust levels remain significantly below the annual average criteria.



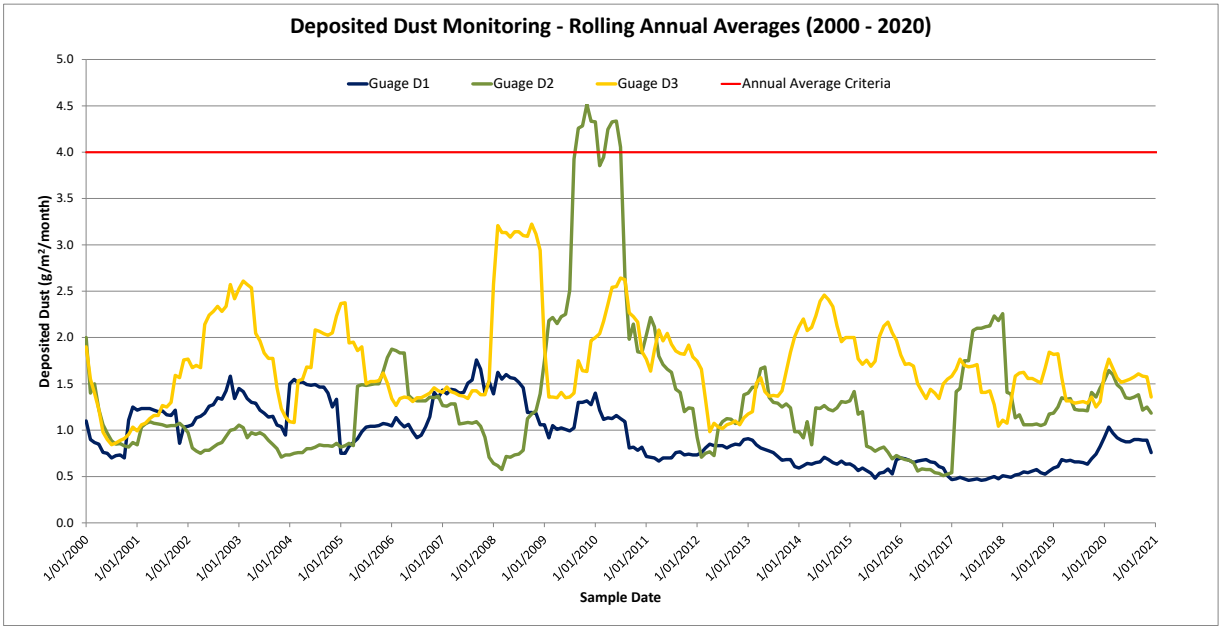
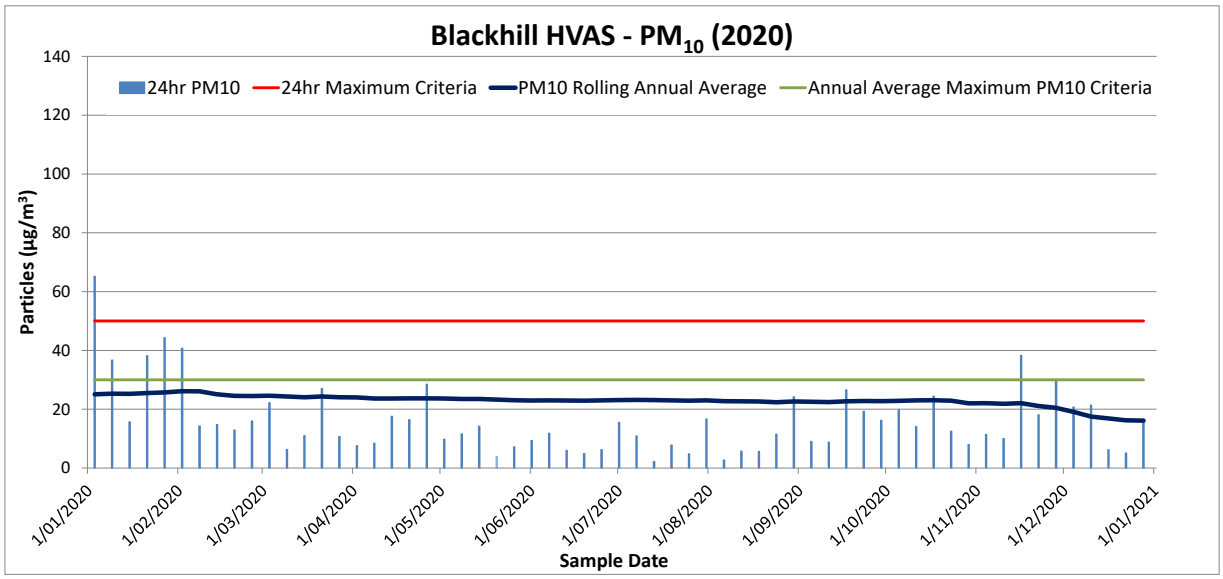


Figure 6.2 Deposited Dust Monitoring Results

Suspended Particulates – PM_{10} and TSP

The suspended particulate monitoring results indicate that the 50µg/m^3 24-hour *National Environment Protection Measures* (NEPM) goal was exceeded on one occasion during the reporting period. The highest 24-hour average PM_{10} concentration during the reporting period, measured on 3 January 2020, was 65.2µg/m^3. This result represents a continuation of previously recorded high PM_{10} levels between 29 October 2019 and the beginning of the current reporting period, and is consistent with similar or higher PM_{10} levels recorded at the DPIE monitoring stations at Wallsend, Beresfield and Newcastle during this period. High PM_{10} levels during late

2019 and early 2020 are likely attributable to bushfires during this period. As no exploration, land preparation, construction or processing works were undertaken during the reporting period, the Abel Mine would have had minimal contribution to the recorded levels. This exceedance is therefore not considered a non-compliance with the relevant criteria under EPL 12856 and PA 05_0136.



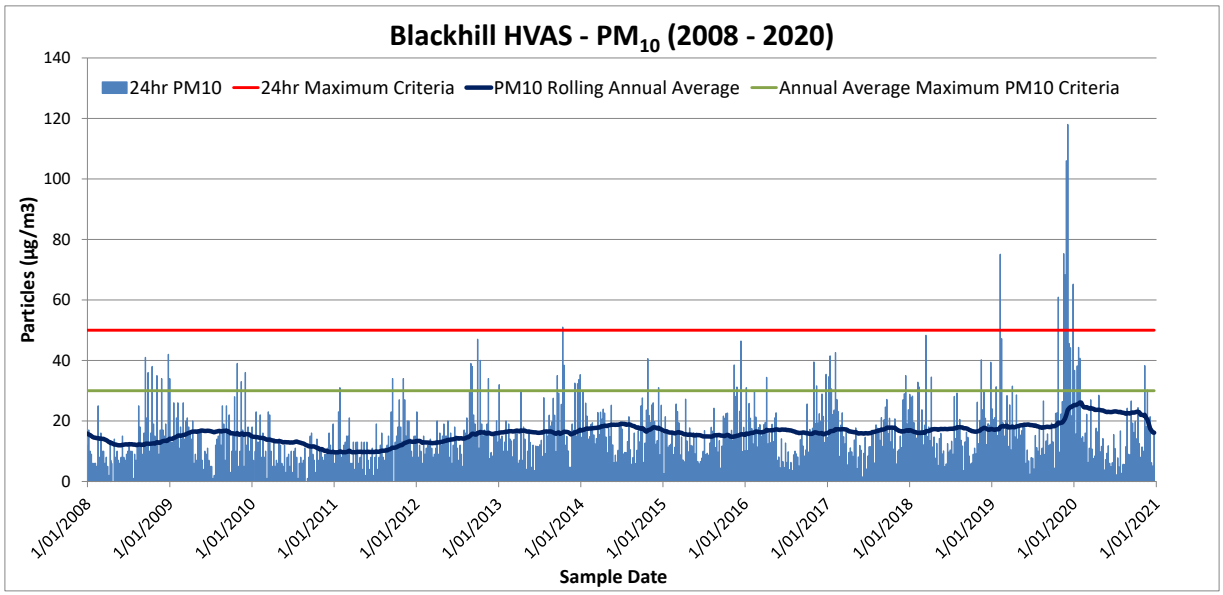
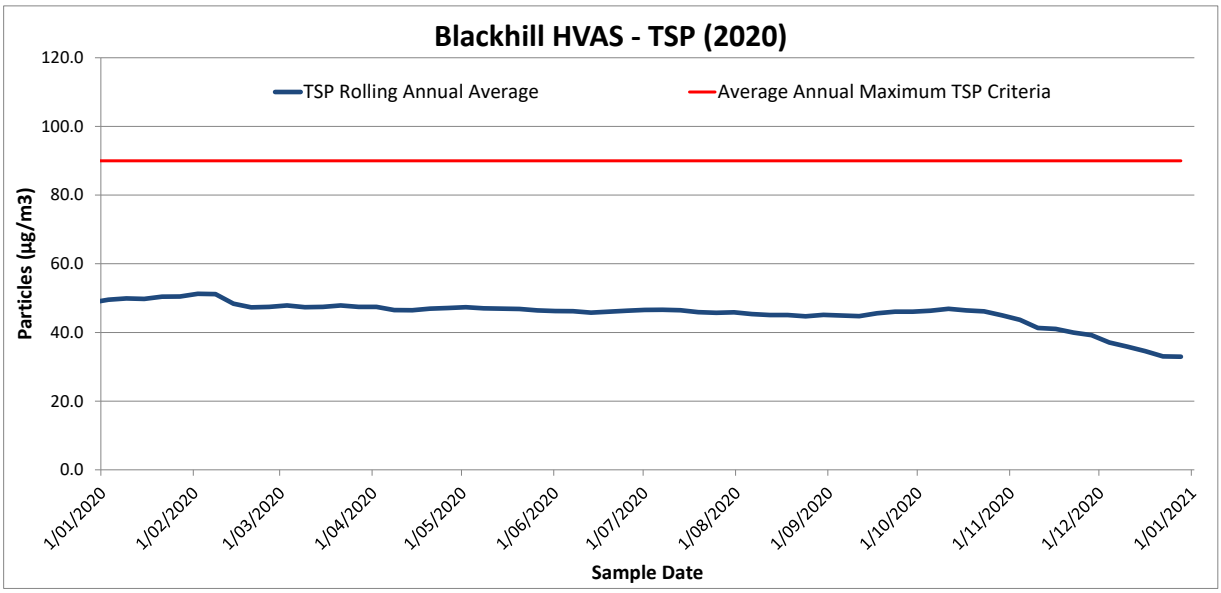


Figure 6.3 PM_{10} Monitoring Results



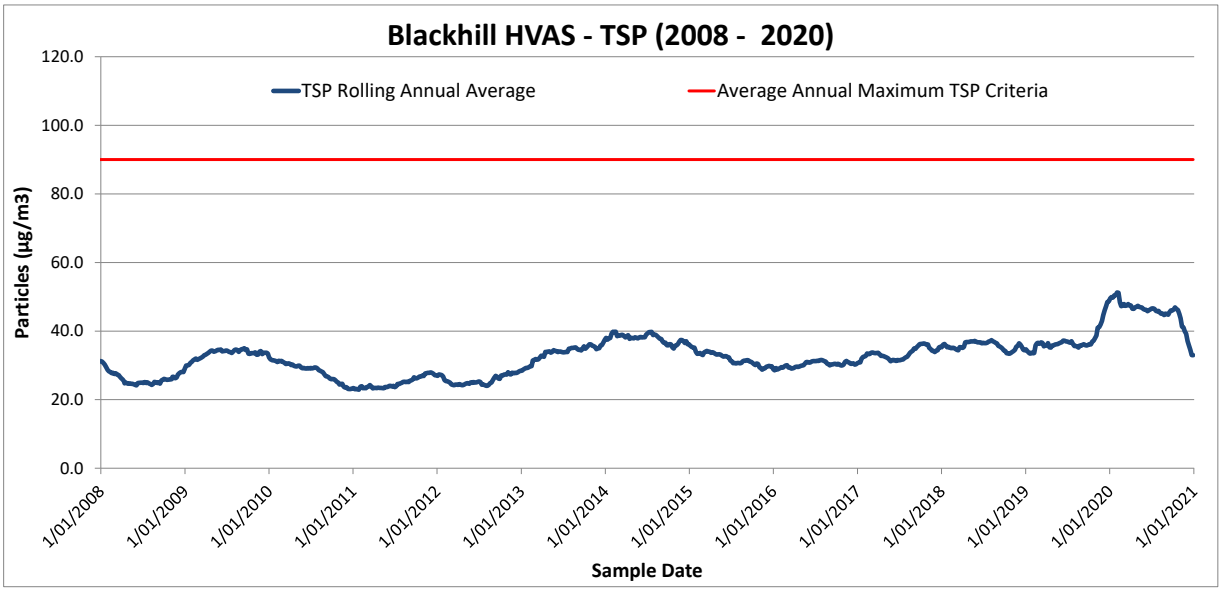


Figure 6.4 TSP Monitoring Results

The annual average PM_{10} concentration for Blackhill was 16.1µg/m^3 for the 12 months to 31 December 2020 whilst the annual average TSP concentration was 33µg/m^3, both below the annual average criteria of 30µg/m^3 and 90µg/m^3 respectively. Notwithstanding, these annual average values are consistent with the long term (from 6 January 2008) PM_{10} and TSP averages of 16.0µg/m^3 and 32.7µg/m^3 respectively (**Figures 6.3** and **6.4**).

Other than an annual trend of lower 24-hour average PM_{10} during the winter months and higher 24-hour averages during the summer months, no other long-term PM_{10} trends and no TSP trends are currently apparent.

Table 6.4
Deposited Dust Monitoring Results – 2020^

Month	Monthly Dust Deposition Rate (g/m^2/month)					
	D1		D2		D3	
	Insoluble	Ash	Insoluble	Ash	Insoluble	Ash
January	1.4	1.1	1.6	1.4	3.7	2.3
February	1.9	1.5	2.5	1.7	3	1.7
March	0.4	0.1	1.2	0.5	0.8	0.4
April	0.4	0.3	0.4	0.3	0.5	0.5
May	0.6	0.2	1	0.3	1	0.4
June	0.3	0.2	0.5	0.2	0.9	0.5
July	0.3	0.2	0.3	0.3	0.6	0.4
August	0.7	0.4	0.7	0.4	1	0.7
September	0.5	0.3	0.9	0.4	1	0.5
October	0.9	0.5	0.9	0.5	1.2	0.7
November	1.2	0.7	1.8	1	1.6	1.1
December	0.5	0.2	2.4	0.9	1	0.5
Monthly Minimum	0.3	0.1	0.3	0.2	0.5	0.4
Monthly Maximum	1.9	1.5	2.5	1.7	3.7	2.3
Average	0.8	0.5	1.2	0.7	1.4	0.8
^ Historical data included in **Appendix 2**						
Source: Donaldson Coal Pty Ltd.						

Reportable Incidents

No reportable incidents relating to air pollution occurred during the reporting period.

Further Improvements

No other improvements relating to air pollution are planned or considered necessary.

6.6 BIODIVERSITY

Environmental Management

No underground mining occurred during the reporting period and no mining has previously been undertaken within areas that would lead to subsidence under or near the Pambalong Nature Reserve or under sub-tropical rainforest. Hence, no specific flora or fauna management measures have been required to date above these areas.

Environmental Performance

In accordance with the Flora and Fauna Management Plan (Version 4 – dated 3 June 2019), presented as Appendix 3 of the Rehabilitation Management Plan – Care and Maintenance (Version 2 – dated 3 June 2019), the monitoring of the Pambalong Nature Reserve, dam monitoring and management survey and monitoring of the sub-tropical rainforest was not required during the reporting period. Additionally, aquatic monitoring of macroinvertebrate assemblages in Blue Gum Creek was not undertaken during the reporting period following a

review of the need for this monitoring as recommended by Niche Environment and Heritage. Monitoring of flora and fauna present in these areas will recommence following the recommencement of mining operations.

Reportable Incidents

No reportable incidents were recorded during the reporting period.

Further Improvements

In accordance with the Flora and Fauna Management Plan, monitoring of dams, sub-tropical rainforest and the Pambalong Nature Reserve will now not be undertaken until the recommencement of mining activities. Additionally, macroinvertebrate sampling will not be undertaken until the recommencement of mining activities.

Prior to the recommencement of mining operations, relevant dams will be reassessed for frog habitat to account for changes such as eutrophication from stock, fertiliser applications or other farming practices as opposed to changes resulting from mining.

6.7 HERITAGE

In accordance with the June 2019 *Abel Underground Mine: Aboriginal Heritage Management Plan* (Donaldson Coal, 2019), annual reporting will be undertaken through the Annual Reviews with a 5 yearly report documenting the results of monitoring undertaken in accordance with the plan to be prepared and provided to either the Mindaribba or Awabakal Local Aboriginal Land Councils (LALCs) (as applicable to the area monitored), DPIE and OEH. Given that no mining was undertaken during the 2020 reporting period, no specific monitoring was completed. The first of the 5 yearly reports is planned following the recommencement of mining operations.

6.8 SUBSIDENCE

Environmental Management

Four Subsidence Management Plan (SMP) / Extraction Plans have been prepared for the mine to date. As part of each SMP/Extraction Plan, subsidence monitoring programs have been prepared together with required environmental and public safety management plans. Copies of all relevant SMP / Extraction Plan assessment reports and management plans are available on the Company's website.

Environmental Performance and Further Improvements

No mining occurred during the reporting period and no further quantitative monitoring of previous undermined panels occurred. However, photographic monitoring and visual inspections continued during the reporting period. A summary of the outcomes of this monitoring and any actions taken is outlined as follows.

- No further impacts to Blackhill Road were observed and the infrastructure remained within a safe and serviceable condition.

- All subsidence impacts on the Hunter Water Corporation Waterline, Ausgrid Powerlines and TransGrid Transmission Towers were within predicted levels with no subsidence impacts or management actions required during the reporting period.
- There have been no other observed and/or reported subsidence impacts, incidents, service difficulties or community complaints during the reporting period that would require notification under the SMP/Extraction Plan approvals or plans.

A comparison of previously surveyed subsidence levels against predicted levels for all panels within which extraction has been completed to date is provided within the annual Subsidence Management Report (see **Appendix 3**). A summary of subsidence impacts against the performance measures outlined in PA 05_0136 *Schedule 3 Condition 1* is also provided in **Table 6.6**.

Table 6.5
Review of Subsidence Impact Performance Measures

Performance Measure	Status
Table 2: Subsidence Impact Performance Measures ***Water Resources*** • Hexham Swamp; • Blue Gum Creek and Alluvium; and • Long Gully. — • Negligible environmental consequences, including: – *negligible* reduction in the quantity of water entering the swamp or the creeks (ie baseflow or environmental flows); – *negligible* reduction in the quality of water entering the swamp or the creeks; and – *negligible* reduction in creek bed or bank stability. • No connective cracking between the surface and the mine. • All other watercourses in the mining area. — • No greater environmental consequences than predicted in the EA and EA (MOD 3).	Mining to date has occurred substantially north of these features. Groundwater level monitoring has also not recorded any drawdown of surficial aquifers (see Section 7.3). Subsidence monitoring has not recorded any impacts upon other watercourses.
Land • Cliffs. — • Minor environmental consequences (that is, occasional rockfalls, displacement of or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 3% of the total face area of cliffs within the mining area). • Minor cliffs • Rock face features; and • Steep slopes. — • Minor environmental consequences (that is, occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 5% of the total face area of each such type of feature within the mining area). • Pambalong Nature Reserve. — • Negligible environmental consequences.	Mining has not yet occurred under any major cliff areas. Subsidence monitoring has not recorded any rock falls or other impacts. No impacts upon Pambalong Nature Reserve have been recorded.
Biodiversity • Threatened species; and • Endangered ecological communities (including unspecified Lowland Rainforest EEC). — • Negligible environmental consequences.	No mining related impacts have been recorded to date (see Section 6.6).
Heritage Sites • Aboriginal heritage sites. — • No greater subsidence impacts or environmental consequences than predicted in the EA and EA (MOD 3). • Historic heritage. — • No greater subsidence impacts or environmental consequences than predicted in the EA and EA (MOD 3).	No impacts upon Aboriginal or historical heritage have been recorded to date.
Mine workings • First workings under an approved Extraction Plan beneath any feature where performance measures in this table require negligible subsidence impacts, negligible environmental consequences. — • To remain long-term stable and non-subsiding. • Second workings. — • To be carried out only in accordance with an approved Extraction Plan.	Subsidence control zones and second workings have been implemented in accordance with the approved Subsidence Management Plans.

During the next reporting period monitoring will be continued in accordance with the approved or any new SMP/Extraction Plans.

6.9 WASTE MANAGEMENT

In accordance with *Schedule 3 Condition 25* of PA 05_0136, a summary of waste management during the reporting period is provided as follows.

Wastes generated on site during the reporting period included the following.

- Hazardous (Recycled) - lead acid batteries and oil.
- Non-Hazardous (Recycled) – paper and cardboard, confidential documents, scrap steel.
- Hazardous (Disposal) – medical and sanitary waste, oily rags.
- Non-Hazardous (Disposal) – mixed solid waste.

Waste oil was stored within 205L drums, 1 000L IBCs or the waste oil tank within the oil store before being removed from site, along with used oil filters and oily rags, by J R Richards & Sons. A purpose built bunded storage container is also utilised to ensure adequate bunded storage is available. Used tyres are removed from site during servicing by Marathon Tyres Pty Ltd for repair or disposal.

Paper, cardboard, steel, aluminium and any other recyclable material was stored separately in 1.5m^3 and 3.0m^3 skip bins for recycling. Paper, cardboard and general waste material continued to be collected by J R Richards & Sons on a weekly basis whilst scrap metal was also collected by J R Richards & Sons on an as-needs basis. The scrap steel/drum crusher continued to be used.

All general wastes were stored in skip bins and removed by J R Richards & Sons.

The approximate volume of each waste stream generated during the reporting period is presented in **Table 6.7** together with the proportion of waste recycled. The proportion of waste recycled increased from 12.88% in 2019 to 34.24% in 2020, largely due to an increase in the volume of scrap steel generated and subsequently recycled. As is expected, the total volume of wastes has also continued to decrease since the mine entered care and maintenance.

As part of the Company's Environmental Management Strategy, it is a requirement for contractors and employees to minimise waste generation wherever possible and to dispose of all waste in a satisfactory matter. Whilst waste volumes during care and maintenance will remain relatively low, waste volumes will continue to be monitored into the future and opportunities to minimise waste or increase recycling implemented, where appropriate.

Table 6.6
Approximate Waste Volumes 2016 to 2020

Waste Class	Waste Stream	Total Volume (kg)				
		2016	2017	2018	2019	2020
Hazardous (Recycled)	Effluent	43 500	0	0	0	0
	Lead Acid Batteries	0	0	220	0	0
	Empty Drums	0	88	0	16	74
	Waste Oil & Oil Filters	6 046	2 900	800	1 100	1 400
	Oily Water (Off Site)	0	0	0	0	970
	% of Total Waste	20.55%	6.31%	1.11%	5.17%	4.13%
Non-Hazardous (Recycled)	Paper and Cardboard	1 960	1 170	545	1 200	1 205
	Confidential Documents	0	0	420	466	228
	Scrap Steel	116 560	14 100	66 271	0	16 380
	Timber	4 560	0	0	0	0
	% of Total Waste	51.05%	32.24%	73.19%	7.72%	30.11%
Hazardous (Disposal)	Medical and Sanitary Waste	359	138	161	238	112
	Oily Rags	408	258	54	72	0
	% of Total Waste	0.35%	0.84%	0.23%	1.44%	0
Non-Hazardous (Disposal)	Mixed Solid Waste	67 595	28 715	23 390	18 499	38 795
	% of Total Waste	28.04%	60.62%	25.46%	85.68%	65.57%
Total Waste		**241 077**	**47 369**	**91 861**	**21 591**	**59 164**
Recycled Waste		**172 633**	**18 258**	**68 256**	**2 782**	**20 257**
Recycled Waste (%)		**71.61%**	**38.54%**	**74.30%**	**12.88%**	**34.24%**

7. WATER MANAGEMENT

7.1 WATER TAKE

Applicable water licencing held for the Abel Mine operations include Water Supply Works and Use Approval 20WA218986 and Water Access Licence (WAL) 41525, which provide for up to 500ML of water take annually. The Abel Mine is not actively dewatered in advance of mining, rather passive inflows into the mine workings are transferred to completed mine workings or to the surface.

The net groundwater inflow volume has been estimated to be 174.2ML for the current water year 01 July 2019 to 30 June 2020, well within the 500ML allocation. No take of water from the overlying alluvial aquifers has occurred to date.

No compensatory water has been required to be supplied throughout the life of the mine.

7.2 SURFACE WATER

Environmental Management

As part of the Water Management Plan, Abel Mine transfers water off site to the Big Kahuna Dam and then to Bloomfield CHPP, as required. During the reporting period, a total of 182.1ML was transferred from the Abel Mine to the Big Kahuna Dam (consisting of groundwater inflows to the underground working and surface flows from the Square Pit, West Pit and Surface Infrastructure Area) and a total of 454.2ML was transferred from the Big Kahuna Dam to the Bloomfield CHPP.

Surface water monitoring sites specified for the Abel Mine are aimed at detecting indirect impacts such as from underground mining activities and activities in the surface infrastructure area. The mine's Water Management Plan (version dated June 2019) was updated during the reporting period and specifies surface water monitoring be undertaken at the following monitoring locations (see **Figure 6.1**).

- EM1 (previously referred to as Four Mile Creek Upstream or FMCU): monitoring commenced in July 2000 and mining in the Four Mile Creek Catchment commenced in July 2013.
- EM3: monitoring commenced in July 2000 and mining in the Weakleys Flat Creek Catchment commenced in July 2010.
- Site 1: monitoring commenced in June 2007 and mining has not been undertaken in the Buttai Creek Catchment.
- Site 9[2]: monitoring commenced in June 2007 and mining has not been undertaken in the Blue Gum Creek Catchment.
- Site 10: monitoring commenced in June 2007 and mining has not been undertaken in the Blue Gum Creek Catchment.

[2] Site 9 has been inaccessible since January 2011 due to a road closure. Surrogate monitoring is undertaken at Site 8, located upstream of Site 9 and within the Blue Gum Creek Catchment (see **Figure 6.1**).

- Site 11: monitoring commenced in June 2007 and mining in the Viney Creek Catchment commenced in July 2010.

Where more than two years' worth of monitoring data is available for individual monitoring locations, site specific trigger vales based on the 20th and 80th percentile values have been developed as recommended in the ANZECC *Guidelines for Fresh and Marine Water Quality 2000*. These values represent anticipated value ranges rather than limits and are expected to prompt data reviews and further investigation into potential mine-related impacts where recorded values fall outside of the expected range.

Additional assessment would be undertaken in the event that significant changes in water quality are recorded, these changes are attributable to land use effects and they are recorded in a catchment where mining has occurred. Additionally, the Water Management Plan specifies that an exceedance of the upper trigger value for EC for three consecutive months represents a trigger for further assessment of metal concentrations (iron, aluminium and manganese).

Environmental Performance

Surface water monitoring data for the reporting period is summarised in **Table 7.1** and presented graphically in **Figure 7.1**. Surface water monitoring data recorded since 2008 is presented in **Figure 7.2** and the data set is provided in **Appendix 2**.

Table 7.1
Summary of Water Quality Monitoring Results – 2020[1]

Location[1]	pH		EC (µS/cm)		TSS (mg/L)	
	Range (Mean)	Trigger	Range (Mean)	Trigger	Range (Mean)	Trigger
Upstream of Underground Workings						
1	6.62 – 7.3 (7.01)	6.6 – 7.1	**172.3** – 583 (**368.2**)	498 – 1 060	5 – **46** (21.8)	28
8	**6.29** – 6.94 (6.53)	6.5 – 8.5[2]	235.8 – 585.8 (454.1)	125 to 2 200[2]	6 – **522** (**82.4**)	50[3]
10	**6.82** - 7.43 (7.20)	7.0 – 7.5	**359** – 1 300 (**750.5**)	798 – 1 496	5 – **29** (11.6)	28
Downstream of Underground Workings						
11	**6.55** - **9.28** (7.26)	6.8 – 7.1	**527** – 1 416 (**881.40**)	920 – 1 704	7 – **76** (**21.6**)	18
EM1	6.62 - 7.31 (6.87)	6.5 – 7.1	**161.2** – 350 (283.4)	235 - 580	7 – 22 (13.4)	34
EM3	**6.47** – 8.97 (7.32)	6.5 – 8.5[2]	9.5 – 247.5 (178.8)	125 to 2 200[2]	5 – **155** (21.0)	50[3]

Bold Red text = exceedance of trigger value.
Note 1: See **Figure 6.1**.
Note 2: ANZECC – Aquatic Ecosystems – Lowland Rivers in NSW
Note 3: Standard Industry Criterion.

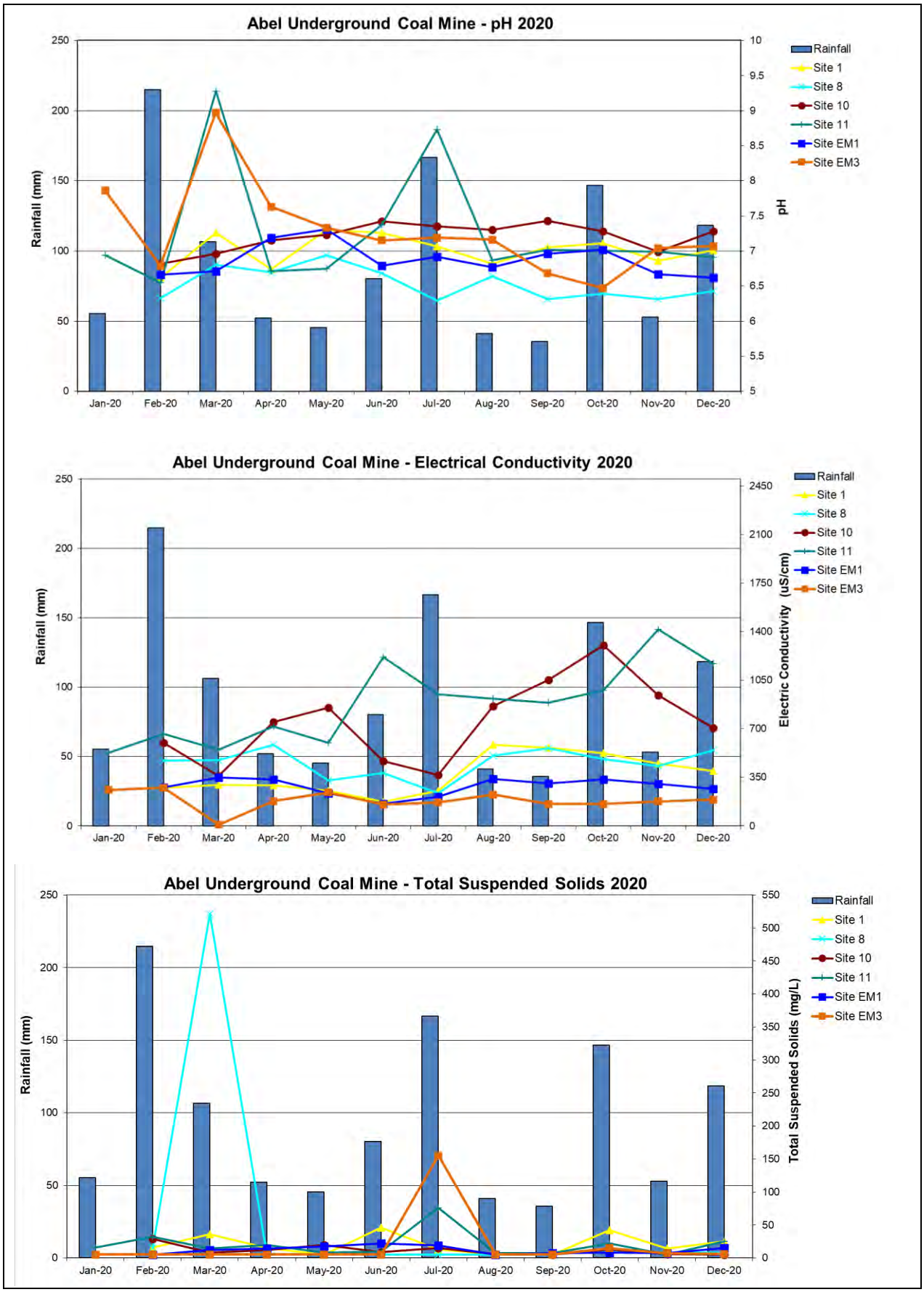


Figure 7.1 Surface Water Quality Monitoring Results – 2020

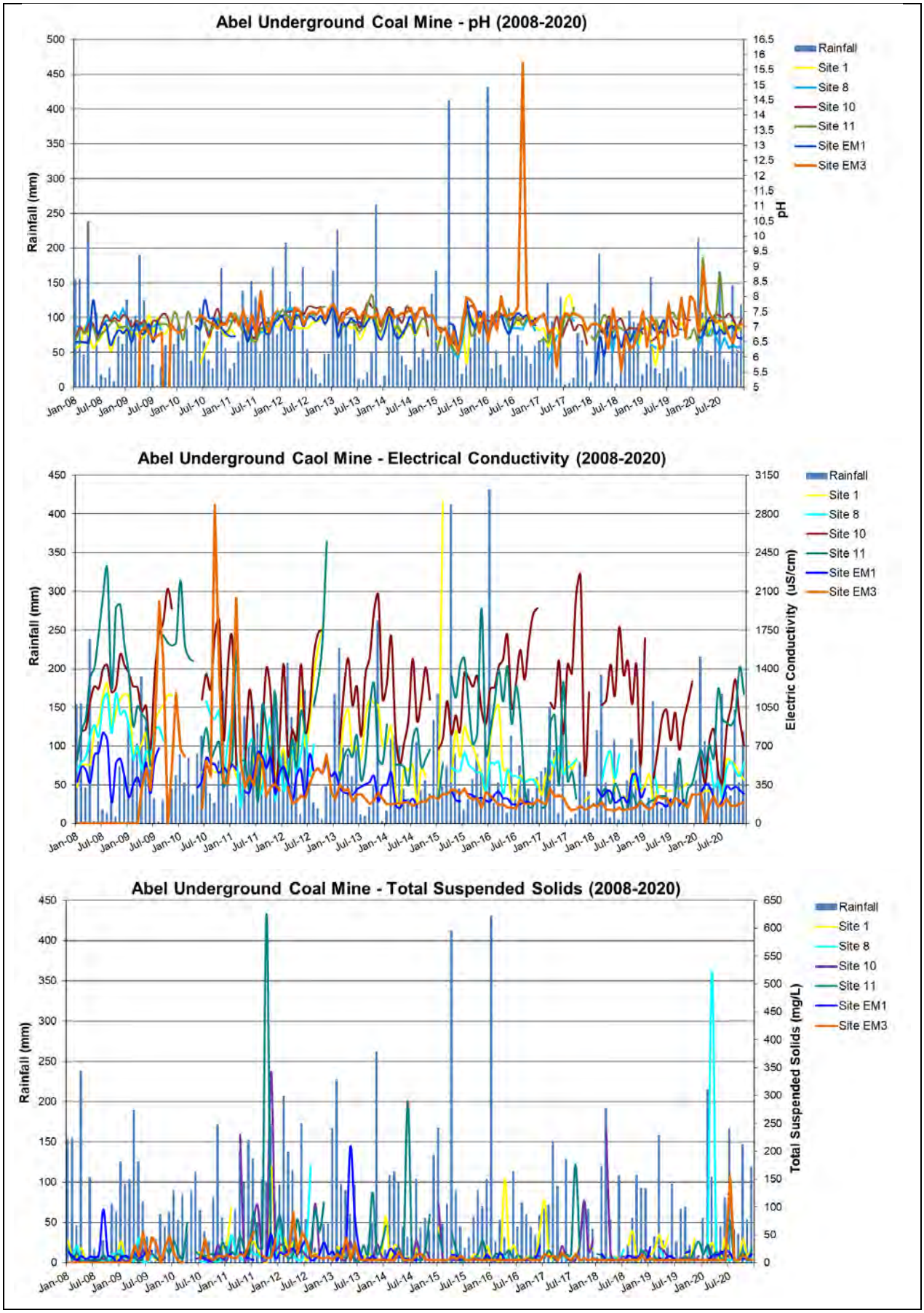


Figure 7.2 Surface Water Quality Monitoring Results – 2008 to 2020

pH

Recorded pH values during the reporting period exceeded the lower trigger values at Site 8, Site 10, Site 11 and Site EM3 and the upper trigger value at Site 11 during the reporting period. It is noted that, as the site-specific trigger values developed in the Water management Plan are based on the 20th and 80th percentile values for each site (where sufficient data is available), it is expected that these values will occasionally be exceeded. It is also clear that, where site-specific trigger values have been developed, the acceptable pH value range is typically narrow (e.g. a range equivalent to 0.3 units for Site 11) and the upper value is low relative to the ANZECC trigger value for lowland rivers in NSW (8.5).

At all sites, pH values were within historical ranges, however, it is noted that pH values recorded at Site 11 in March (9.28) and July (8.73) were significantly higher than the upper site-specific trigger value (7.1). High pH values may reflect localised algal blooms within Viney Creek, with the presence of vegetation and green water noted during sampling at this location in March 2020. The high pH results recorded at Site 11 were not sustained across consecutive sampling rounds during the reporting period.

Site 8 also displayed a sustained period of lower than average pH values during the reporting period, although these were within the historical pH range recorded at this monitoring location. Long-term monitoring records show a history of short-term declines in pH at Site 8, although the decline recorded during the reporting period is unusual due to its persistence over multiple sampling rounds (i.e. pH values consistently below 6.5 between September 2020 and December 2020). These low pH values were all recorded during periods of no flow or low flow recorded at Site 8.

No other long term trends in pH are apparent (**Figure 7.2**) and, given that no operational activities occurred at either the Abel Mine or the Donaldson Open Cut Mine, it is not considered that the mine contributed to the anomalous pH values recorded during the reporting period.

Electrical Conductivity

The electrical conductivity (EC) ranged between 9.5µS/cm and 1 416µS/cm at all monitoring sites during the reporting period. No exceedances of the relevant upper trigger values were recorded during the reporting period, although lower trigger values were exceeded at Site 1, Site 10, Site 11 and Site EM1 during the reporting period. The trigger for additional investigations (i.e. EC results above the upper trigger value for three consecutive months) was not activated during the reporting period.

Based on the monitoring data, EC does not appear to be strongly correlated with monthly rainfall, no significant difference is apparent between upstream and downstream monitoring locations, and no long-term trends in EC are apparent (**Figure 7.2**).

Total Suspended Solids

The relevant upper total suspended solids (TSS) trigger values were exceeded at Site 1, Site 8, Site 10, Site 11 and Site EM3 during the reporting period. TSS levels recorded at Site 8 in March 2020 (522mg/L) and Site EM3 in July 2020 (155mg/L) exceeded both the relevant upper trigger levels as well as the historical TSS ranges recorded for these monitoring locations.

Given that each recorded instance of elevated TSS levels did not persist across multiple sampling rounds, it is considered likely that short-term, localised conditions rather than mine activities contributed to these levels. No long-term trends are apparent in the TSS monitoring data and spikes in TSS are not strongly correlated with monthly rainfall. Baseline monitoring for both upstream and downstream monitoring sites have previously recorded significantly elevated TSS results which are considered to form part of the natural variation within these creek systems.

The Environmental Assessment (Donaldson Coal, 2006) predicted no significant impacts upon surface water as a result of the mine activities. The monitoring results to date support that assessment.

Reportable Incidents

No reportable incidents occurred during the reporting period.

Further Improvements

No other surface water control measures are planned or considered necessary. During the next reporting period, the frequency of surface water monitoring is proposed to be reduced to six-monthly in accordance with the monitoring frequency for care and maintenance periods specified in the updated Water Management Plan. This reduction in the frequency of surface water monitoring would only be implemented following confirmation of a variation to EPL 12856.

7.3 GROUNDWATER

Environmental Management

Monthly monitoring of regional groundwater levels and groundwater quality was undertaken, where possible, throughout the reporting period in accordance with the Water Management Plan and Integrated Environmental Monitoring Program.

Environmental Performance

Groundwater Levels

A graphical summary of groundwater level monitoring results relevant to the Abel Underground Coal Mine is provided in **Figure 7.3** and an interpretation of these results is provided as follows.

Monitoring indicates that there is little evidence of any drawdown response in the alluvium or regolith groundwater. In particular Piezometers 81A and 81B are located adjacent the Pambalong Nature Reserve (see **Figure 6.1**). Monitoring results from 81A (single vibrating wire transducer placed within the Lower Donaldson Seam) showed a drawdown response to mining the Donaldson Seam within the Abel Mine. However, Piezometer 81B is screened within overlying shallow Permian strata with water levels remaining stable or increasing during the reporting period. The lack of response in the shallow piezometer indicates minimal mining impact on the Pambalong Nature Reserve.

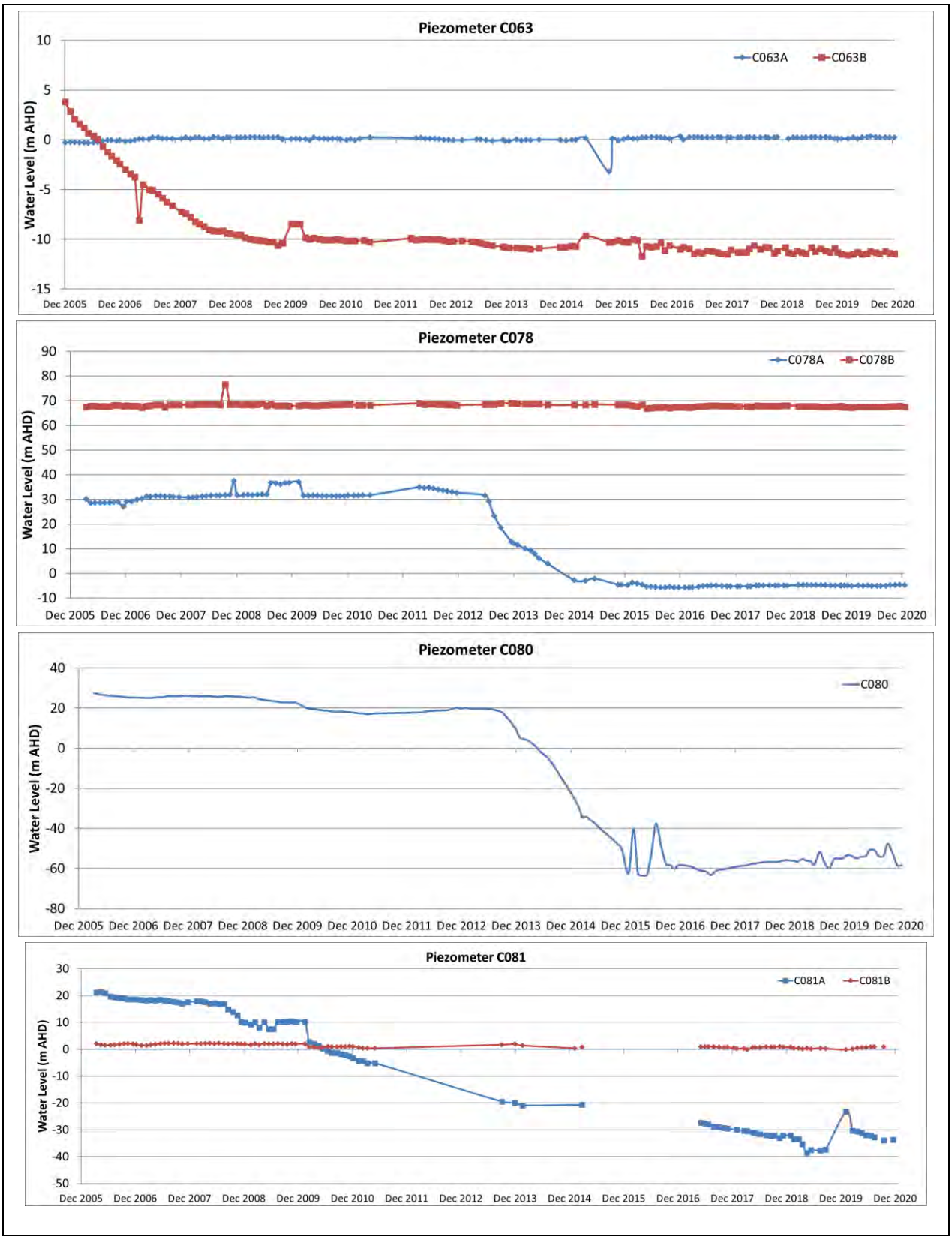


Figure 7.3 Groundwater Level Results – All Data

Piezometers 63A and 63B are located to the east of the Abel Mine adjacent to the F3 Freeway and near the Hexham Swamp (see **Figure 6.1**). It appears that the shallow Piezometer 63B has failed or the bore has collapsed and therefore this piezometer no longer provides useful data. However, Piezometer 63A is screened in the Lower Donaldson Seam and remains operational. Monitoring results from Piezometer 63A remained consistent throughout the reporting period indicating minimal impact from previous mining activities.

Similarly, monitoring results from 78A (standpipe piezometer within the Donaldson Seam) indicated minimal impact until the start of secondary extraction in Panel 23 in June 2013. Drawdown rates stabilised during 2016 and have since remained steady. As for the other nested piezometers, 78B located within the overlaying regolith indicates minimal drawdown response and remained consistent during the reporting period.

Piezometer 80 is screened in the Donaldson Seam and located to the south of the mining activities completed to date. An expected drawdown commenced during secondary extraction in Panel 23 June 2013. The decline has steadied since the cessation of mining activities with a steady but modest recovery since mid-2017, although variability in this recovery continued during the reporting period.

The results indicate that groundwater pressure reduction within the Lower Donaldson Seam resulting from mining has occurred as anticipated and is insulated from shallow and surficial groundwater systems in this area. This is consistent with the predictions within the Environmental Assessment.

Groundwater Inflows

As reported for 2015, between August 2013 and October 2015 inflow volumes could not be accurately estimated as a significant portion of mine water was accumulating in isolated in-mine storages. From 1 October 2015 water began reporting from the overflow of the storage areas. Based on a total in-mine storage volume of 459ML, it is calculated that average groundwater inflow ranged from 120ML/year to 240ML/year during that time.

During the 2019/2020 water year, groundwater inflows are estimated at 174.2ML. Since the mine was placed on care and maintenance, water has continued to be pumped from the underground workings, however, there have been smaller volumes of inflow and declining outflows. Groundwater model predictions for this stage of mining were for between 800ML and 1 000ML/year. Therefore, the actual inflow rates remain well below the predicted maximum rate.

Groundwater Quality

Groundwater quality monitoring results are presented in **Appendix 2**. A summary of three representative bores located within the Abel underground mine area is presented in **Table 7.2** and **Figure 7.3** with the full graphical presentation since 2008 presented in **Figure 7.4**.

These bores record pH values ranging from slightly acidic to near neutral (5.77-7.35) and EC values ranging between 120.3µS/cm and 2 710µS/cm.

Whilst some variations have occurred in pH, monitoring has generally recorded consistent pH values over time with all pH results within previously recorded baseline ranges (**Figure 7.5**).

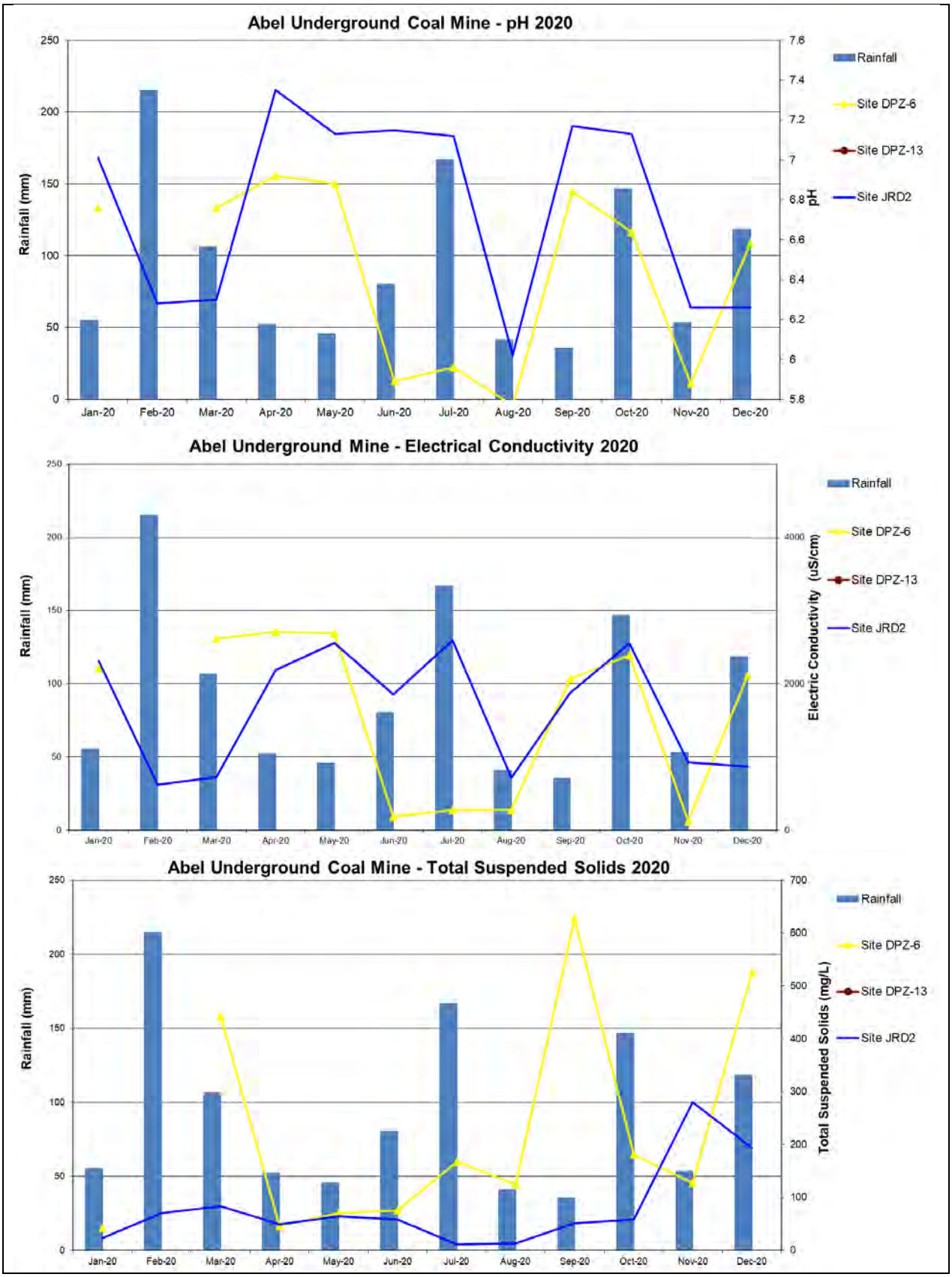


Figure 7.4 Groundwater Quality Monitoring Results – 2020

Table 7.2
Summary of Groundwater Quality Monitoring Results – 2020

Sampling Site#	pH	EC (µS/cm)
DPZ – 6	5.77 - 6.92 (6.40)	120.3 – 2 710 (1 605)
DPZ – 13*	No Access	No Access
JRD2	6.02 - 7.35 (6.77)	620 – 2 590 (1 648)
( ) = Average	# see **Figure 6.1**	*DPZ – 13 inaccessible during 2020
Source: Donaldson Coal Pty Ltd		

A downward trend in EC has previously been observed at bore DPZ13 (**Figure 7.5**) starting in 2010 / 2011, which may be due to enhanced recharge following drawdowns in the coal measures as a result of mining. Landholder access was unable to be obtained to enable sampling from DPZ-13 during the reporting period to confirm whether this trend had continued or plateaued. Conversely, EC has been relatively consistent within DPZ-6 and JRD2, with monitoring indicating occasional 'outliers' of significantly lower EC. This is likely due to ingress of rainwater temporarily lowering the salinity

For comparison, the Environmental Assessment baseline monitoring reported that the quality of groundwater sampled within the underground mining area of the Abel Mine was variable with total dissolved solids (TDS) ranging from less than 518mg/L to 13 000mg/L, which is approximately equivalent to EC readings of between 865µS/cm and 21 700µS/cm.

Reportable Incidents

No reportable incidents occurred during the reporting period.

Further Improvements

Monitoring will continue in accordance with the current Water Management Plan (WMP).

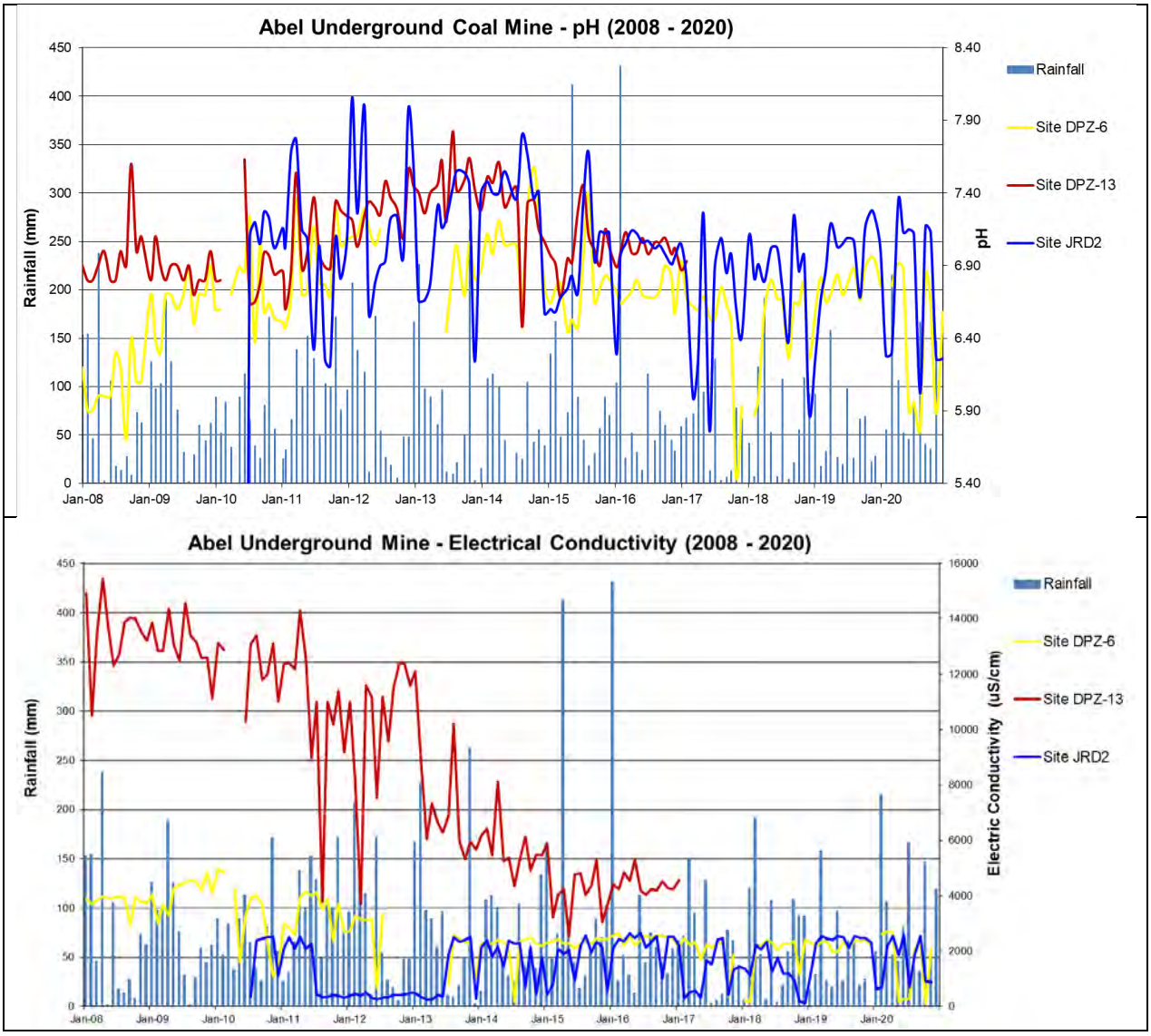


Figure 7.5 Groundwater Quality Monitoring Results – 2008 - 2020

8. REHABILITATION

8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

Figure 8.1 shows the status of rehabilitation and a summary of the areas of rehabilitation is provided in **Table 8.1**.

Table 8.1
Rehabilitation Summary

Mine Area Type	Previous Reporting Period (Actual) Year 10 (ha)	This Reporting Period (Actual) Year 11 (ha)	Next Reporting Period (Forecast) Year 12 (ha)
Total mine footprint	13.15[1]	13.15[1]	13.15[1]
Total active disturbance	13.15[2]	13.15[2]	13.15[2]
Land being prepared for rehabilitation	0	0	0
Land under active rehabilitation	0	0	
Completed rehabilitation	0	0	0

Notes:

1: Includes 0.41ha associated with the extended light vehicle car park, 0.23ha for the downcast ventilation shaft and 0.58ha relating to the upcast ventilation shaft but excludes underground mining areas. Areas that have been temporarily rehabilitated also included.

2: Whilst some areas have been temporarily rehabilitated, all areas within ML1618 surface infrastructure area are considered to be 'active'.

A wild dog and fox baiting program was undertaken by Enright Land Management between October and November 2020 in consultation with surrounding landholders.

Within the surface infrastructure area, no permanent buildings were structurally altered, renovated or removed during the reporting period and, other than regular inspection and maintenance of previously temporarily rehabilitated areas (i.e. batter slopes) and retained vegetation, no specific rehabilitation activities were undertaken. Maintenance activities completed included scheduled equipment maintenance, regular security patrols of boundary fencing to prevent unauthorised access, and ongoing control of weeds (e.g. Pampas Grass) across the entire surface infrastructure area.

No rehabilitation trials or research was undertaken during the reporting period and there were no variations to the rehabilitation activities as outlined within the approved Mining Operations Plan.

There are currently no specific issues affecting the ability to successfully rehabilitate the site and therefore no specific management measures.

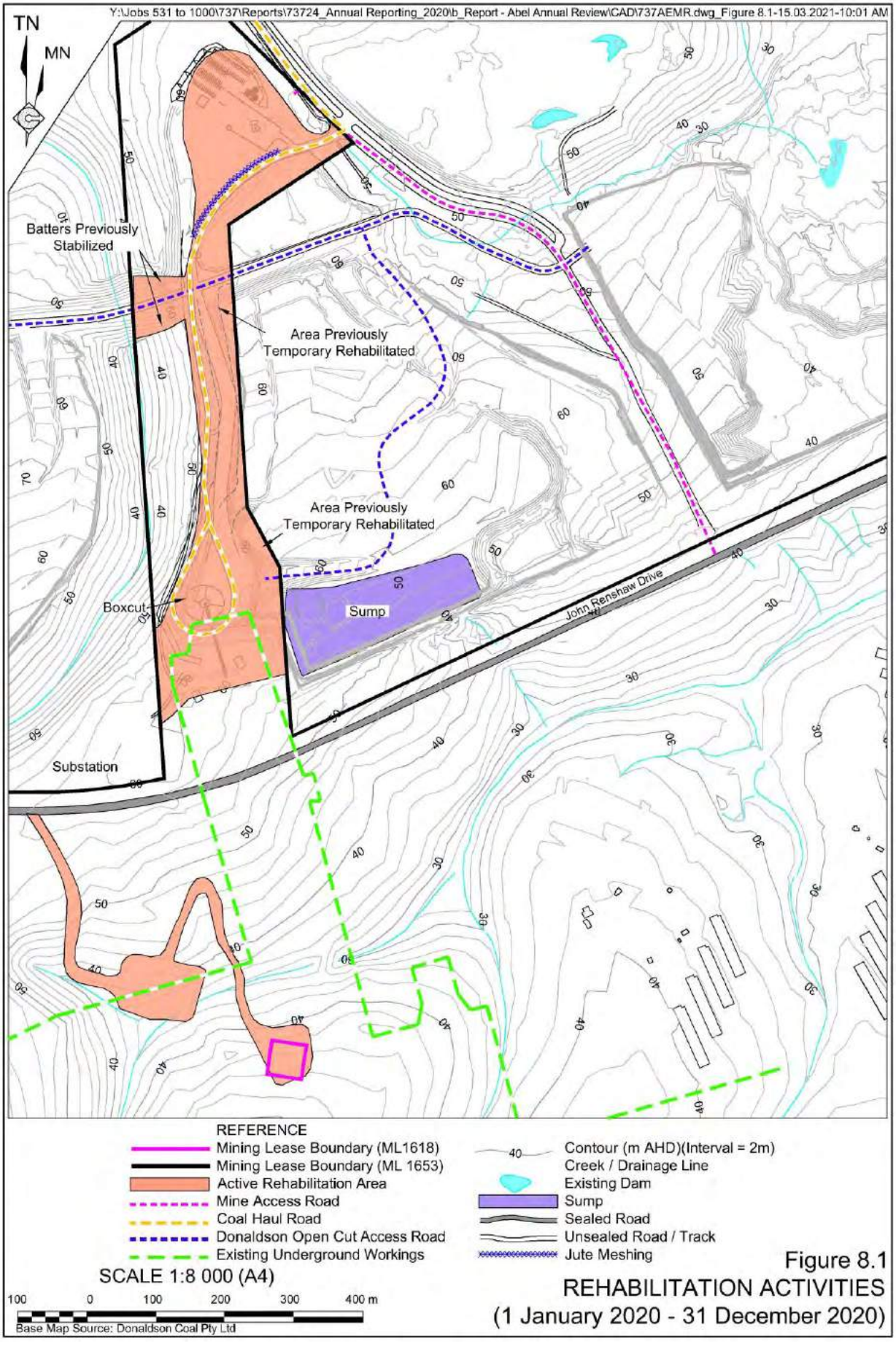


Figure 8.1
REHABILITATION ACTIVITIES
(1 January 2020 - 31 December 2020)

No rehabilitation areas became available for sign off by the Resources Regulator and no final land use objectives were met during the reporting period. As the Abel Mine is an underground operation, the only significant rehabilitation will be during mine decommissioning. As outlined within the approved Mining Operations Plan, during decommissioning the creation of the final landform will involve blasting of the western side of the Abel Box Cut (as part of final landform creation within the West Pit) followed by grading using a dozer to create a maximum slope of 18°. The northern side of the Abel Box Cut will also be blasted and graded to a maximum of 10°, with a permanent vehicle access and egress ramp constructed to allow access to the final void for ongoing monitoring and management.

Surface infrastructure areas located within existing forested areas, such as the substation and ventilation shafts, will be returned to native vegetation. The current post-mining land use goal for the Abel Box Cut is for use as water storage suitable for use in surrounding mining operations.

8.2 ACTIONS FOR THE NEXT REPORTING PERIOD

No specific rehabilitation works are planned during the next reporting period and no major rehabilitation work will be able to be undertaken until the decommissioning of the site. Any surface cracks that appear will be backfilled, compacted, topsoiled and seeded and ongoing repairs to any subsidence damage to public roads will be completed in accordance with the approved subsidence monitoring and management plans. Notably, any further rehabilitation works to Blackhill Road will be completed by the Subsidence Advisory NSW.

Maintenance works, such as erosion and sediment control, and ongoing control of weeds and feral pests will also be undertaken as required.

9. COMMUNITY

9.1 COMMUNITY COMPLAINTS

No complaints were received during the 2020 reporting period. The last complaint was received on 9 October 2017. Since commencement of the Abel Mine, a total of seven complaints have been received which are summarised in **Table 9.1** and presented on the Donaldson website. Given that no further complaints have been received and the Abel Mine is currently under care and maintenance, no specific actions are currently deemed necessary.

Table 9.1
Community Complaints Summary

Location	Date of Complaint	Comments
Blackhill	24/04/2009	Light from Donaldson Open Cut/Abel shining towards house and is very bright. Light was turned down.
EPA	22/06/2015	Complaint about noise from trucks on 5th and 18th June 2015. Advised the EPA officer that there had been no change to truck movements on site and that the recent noise monitoring in May 2015 showed compliance with Licence limits.
Browns Road, Black Hill	17/07/2015	A resident in Brown's Road Black Hill lodged a complaint with the EPA regarding truck noise on 16/07/15 at 20:30hrs. Quebe provided data that trucks were parked up at that time. Advised the EPA officer. No further action.
John Renshaw Drive	3/09/2015	Complaint received regarding sulphur smell for the last month. Complainant told the EPA that it was the mine on John Renshaw Drive that was owned by Ashton company. Advised EPA that there was no odour emanating from site.
Meredith Road Black Hill	1/10/2015	Concerned about subsidence to his property and Meredith Road. Repairs undertaken in accordance with the Property Subsidence Management Plan.
210 Meredith Road Black Hill	2/10/2015	Concerned about subsidence damage to Meredith Road/Blackhill Road. Repairs undertaken in accordance with Property Subsidence Management Plan.
Avalon Drive, Thornton	9/10/2017	Complainant has experienced a "dramatic increase" in coal dust around her property since moving there 4 years ago. Provided response to complainant indicating that this corresponded with the closure and rehabilitation of Donaldson Open Cut. Abel Underground has been placed in Care and Maintenance with no coal mined, processed or transported since mid-2016.
Source: Donaldson Coal		

9.2 COMMUNITY LIAISON

The principal formal community consultation undertaken is the Community Consultative Committee. In accordance with *Schedule 6 Condition 6* of PA 05_0136, the Company has established a Community Consultative Committee for the Abel Mine. During the reporting period, the committee consisted of:

- four representatives of the local community (Mr Alan Brown, Mr Allan Jennings, Mr Terry Lewin, Mr Brad Ure);

- a representative from Bloomfield Colliery (Mr Greg Lamb); and
- three representatives from the Company (Mr William (Bill) Farnworth, Mr James Benson and Mr Phillip Brown).

The committee was chaired by Mrs Margaret MacDonald-Hill, an independent chairperson appointed as the independent Chair by the Secretary, DPIE.

The committee held a total of two meetings during the reporting period (16 March and 14 September 2020). The meetings have continued to provide an opportunity for the Company to keep the community up to date with activities undertaken and programmed at the Abel Mine and for community members to table issues relating to the Abel Mine for the Company's consideration. It is noted that the Company provided presentations during each meeting to provide updates on the mine development / care and maintenance, environmental monitoring, subsidence management, planning, and other relevant matters.

Copies of minutes and presentations are available on the Donaldson Coal Website at www.doncoal.com.au.

10. INDEPENDENT AUDIT

The last independent environmental audit of the mine was undertaken in December 2018, in accordance with *Schedule 5 Condition 5* of PA 05_0136 for the period 20 March 2015 to 20 December 2018. The independent audit report was finalised in February 2019 and confirmed that the areas inspected were generally satisfactory and that mining has occurred generally in accordance with the approved mine plan. The audit identified a total of six (6) non-compliances against PA 05_0136 for the audit period, of which all have been subsequently rectified. No non-compliances were recorded against ML1683.

A range of recommendations were provided within the audit and a response plan prepared. A status review of these responses is provided in **Table 10.1** and will continue to be updated as part of the Annual Review for the next reporting period.

The next independent environmental audit is due 2021.

Table 10.1
Independent Audit Action Response Plan Status

Ref	Description	Donaldson Response	Timeline	Status Update
Section 4	Annual groundwater reporting in the Abel Mine Annual Review should include graphical presentations of water level data to indicate trends. These should continue to be included in Annual Review's during care and maintenance phase for bores approved in the revised WMP	The Abel Annual Review will continue to provide graphical representation of relevant groundwater bores within the relevant section of the document.	31 March 2020	Graphical summaries were presented in the 2018 Annual Review and are presented in Section 7.3 of this Annual Review.
PA 05_0136 Compliance Recommendations				
Various	Work with relevant regulators to resolve where possible all of the non-compliances.	Accept recommendation and continue to work with regulators to resolve non-compliances.	As and when required	Compliance status update provided in Sections 1 and 11 of this Annual Review.
Sch 3 Cond 1	Blue Gum Creek and Long Gully – Water Quality Recommend for future Trigger Level EC exceedances, assessment of metals (Fe, Al and Mn) are used to assess whether change in EC is mining induced. Trigger values for metals should also be included for Site 10 in Table 3.7 of the WMP. Further consideration of this trigger level in the revised WMP should be undertaken in consultation with a relevant water specialist and relevant regulators in consideration of distance to active mining. Pambalong Nature Reserve – Groundwater Levels Recommend monthly monitoring at Piezometer C081B or in accordance with approved WMP. Further consideration of this trigger level in the revised WMP should be undertaken in consultation with a relevant groundwater specialist and relevant regulators in consideration of distance to active mining. Recommend the following updates to the WMP: • Revision of Piezometer Monitoring Sites for Pambalong Nature Reserve to ensure the piezometer relevant to the feature; and • Clarify Trigger Level 1 and 2 for Groundwater levels for the Pambalong Nature Reserve.	The Water Management Plan will be reviewed and updated in 2019. This update will include a review of trigger actions that determine if a change in water quality is mining induced. Abel Coal Mine will update the Water Management Plan in 2019 and review comments provided by the audit team. A water specialist will, where relevant, incorporate comments into the updated management plan.	30 April 2019	The Water Management Plan was reviewed and updated during the 2019 reporting period with DPIE approval received 04 June 2019.

Table 10.1 (Cont'd)
Independent Audit Action Response Plan Status

Ref	Description	Donaldson Response	Timeline	Status Update
PA 05_0136 Compliance Recommendations (Cont'd)				
Sch 4 Cond 10b)	Recommend dust gauges re-sited (if not being removed from program).	A dust gauge audit will be conducted to identify any non-complying dust gauges with corrective actions put in place to ensure compliance. An update to the Air Quality Management Plan will propose the removal of Dust Gauges.	Completed	The Air Quality Management Plan was reviewed and updated with DPIE approval received 04 June 2019. The updated Plan provides for the cessation of deposited dust monitoring during care and maintenance, thereby removing the need to undertake an audit of the gauges. A variation to EPL 12856 was also submitted with comments on the draft variation returned to EPA on 24 January 2020. Deposited dust monitoring will continue until the EPL variation is finalised.
Sch 4 Cond 23	Coal Transport records are consistently made publicly available on website when production recommences.	All coal transport records are up to date to the end of 2018 on the Donaldson Coal Website. This will occur on an annual basis at the start of the new year.	Annually	The 2020 coal transport report is available on the Donaldson Coal website. Further coal transport reports will be uploaded following recommencement of mining.
Sch 4 Cond 24c)	Audit be undertaken to confirm compliance at lighting components which will operate in next period (e.g. CHPP and rail loadout).	On recommencement of mining, including use of the Bloomfield CHPP and Rail Loadout, Abel will recommission currently disused lights for use at night time. At this point, Abel will conduct an audit against AS4282.	When mining recommences	Not yet applicable – mining has not yet recommenced.
PA 05_0136 MOD3 Continual Improvement Recommendations				
Sch 2 Cond 4	Follow up with WaterNSW to resolve Certificate of Title for WAL 41525 being incorrectly labelled to a water source.	WaterNSW will be contacted again in 2021 to follow up on the Abel Certificate of Title for WAL 41525.	Ongoing	Water NSW have been regularly followed up regarding resolution of this. Still awaiting correctly labelled certificate with conditions.
Sch 2 Cond 9	Include a statement in the relevant Annual Review that discusses transportation of product coal produced on the Bloomfield site via the Bloomfield Rail Loop, and Rail Spur and the Main Northern Railway.	Accept recommendation and incorporate statement into the 2018/19 Annual Review.	Annually	Commentary included in Section 2.1 of this Annual Review.

Table 10.1 (Cont'd)
Independent Audit Action Response Plan Status

Ref	Description	Donaldson Response	Timeline	Status Update
PA 05_0136 MOD3 Continual Improvement Recommendations (Cont'd)				
Sch 2 Cond 11	Include a statement in the Annual Review that discusses alterations and additions to building and structures.	Accept recommendation and incorporate statement into the 2018/19 Annual Review.	Annually	Statement included in Section 8.1 of this Annual Review.
Sch 3 Cond 1	• "Minor Cliff" definition be clarified on review of EP/management plans.	• Minor Cliff's will be defined in the next update to the Subsidence Monitoring Program required under the Extraction Plan.	When mining recommences	Not yet applicable – mining has not yet recommenced.
	• Whilst mining, AEMR include PA 05_0136 Table 2 and a tabulated summary of impacts and conclusions.	• The 2018/19 Abel Annual Review and future Annual reviews will include a tabulated summary of impacts and conclusions as outlined in Table 2.	Annually	Tabulated summary included in Section 6.8 of this Annual Review.
	• Labelling of Water Quality Monitoring Sites 9 and 10 in AEMR are consistent with that shown in the WMP.	• Water quality labels of sites 9 and 10 will be reviewed and addressed in the 2018/19 Annual Review.	Completed	The labelling on Figure 6.1 of the 2018 Annual Review (and subsequent Annual Reviews) has been updated.
	• If mining recommences, a clear definition of GDEs in the Hexham Swamp be documented (impacts and monitoring).	• When mining recommences the Water Management Plan (WMP) will require an update. If mining recommences, a definition will be included in the WMP of Groundwater Dependent Ecosystems.	When mining recommences	Not yet applicable – mining has not yet recommenced.
Sch 3 Cond 4p)	Future TARPs include Trigger Levels for Groundwater Drawdown, especially at bores relevant to Pambalong Nature Reserve (excluded from Area 4 EP).	The next update to the Extraction Plan will review the trigger levels for TARPs relating to the Pambalong Nature Reserve.	When mining recommences	Not yet applicable – mining has not yet recommenced.
Sch 3 Cond 6	No written evidence was provided that first working in South Mains were designed to DRG's satisfaction. Recommend a response is sought for any future first workings in accordance with this condition prior to works being undertaken.	On the recommencement of mining, Abel Mine will seek a written response from the relevant authority confirming that first workings are designed to the satisfaction of the DRE	When mining recommences	Not yet applicable – mining has not yet recommenced.
Sch 3 Cond 11	When revising Service Boreholes Management Plan, include mitigation and management measures for visual impacts and compensation for noise, air and visual impacts.	Accept recommendation and incorporate mitigation and management measures into the next update of the Service Boreholes Management Plan.	When mining recommences	Not yet applicable – mining has not yet recommenced.
Sch 4 Cond 1	Remove Location K from PA 05_0136 Table 4 and any other strategy, plan or program.	There is no proposed modification to PA 05_0136 where Location K will be removed. This recommendation will be considered with any future modification.	Noted	No modification currently planned.

Table 10.1 (Cont'd)
Independent Audit Action Response Plan Status

Ref	Description	Donaldson Response	Timeline	Status Update
PA 05_0136 MOD3 Continual Improvement Recommendations (Cont'd)				
Sch 4 Cond 3	Include statement in AEMR that reports on Cumulative Noise Criteria.	Accept recommendation and incorporate into the 2018/19 Annual Review.	Annually	Statement included in Section 6.3 of this Annual Review.
Sch 4 Cond 5c)	Clarify noise mitigation process in NMP under meteorological conditions to which noise limits do not apply.	Accept recommendation and incorporate into the 2019 update of the Noise Management Plan.	Completed	The Noise Management Plan was reviewed and updated during the 2019 reporting period with DPIE approval received 04 June 2019.
Sch 4 Cond 11	Energy efficiency opportunities for the Abel Underground Mine to be identified, assessed and reported through a series of five year assessment cycles in accordance with the Energy Efficiency Opportunities Act 2006 (EEO Act, 2006).	Energy Efficiencies will be identified in the updated 2019 Air Quality Management Plan. Compliance with the Energy Efficiency Opportunities Act 2006 will be managed by Yancoal Corporate who are the 'controlling corporation' as defined by the EEO Act 2006.	Completed	The Air Quality Management Plan was reviewed and updated during the 2019 reporting period with DPIE approval received 04 June 2019. It is noted that the EEO Act 2006 was repealed in 2014.
Sch 4 Cond 16	Recommend clearly labelling column on water transfer amounts on site spreadsheet e.g. "Transfer from Big Kahuna to Lake Kennerson (ML)" and including pumped volumes in Annual Review.	Accept recommendations and update site water spreadsheet and incorporate into 2018/19 Abel Annual Review.	Completed Annually	The spread sheet has been updated as recommended. The volume transferred during this reporting period is reported in Section 7.2 of this Annual Review.
Sch 4 Cond 25b)	Recommend that refresher training provided to any personnel on site to ensure that waste management and waste bins handled correctly (see Plates 7, 8, 10, 14, 15 and 18).	A tool box talk will be provided to all operational personnel onsite in March 2019 to outline the correct handling of waste onsite.	Completed	A waste management presentation was presented to all operational personnel in March 2019.
Sch 4 Cond 25c)	Investigate redundant tank (see Plate 19) and respond accordingly. Confirm source of which pipe below operating sewage system to confirm it is benign.	A review of the future requirements for the redundant tank will be undertaken and actions reported in the 2019/20 Annual Review. The contractor that services the sewerage treatment plant (STP) at Abel has been approached to determine the source of the pipe below the STP.	Completed	Site personnel have inspected and do not believe the pipe is connected to the sewage system. Advice was received from the wastewater treatment contractor confirming that the pipe is not associated with the STP but is rather a stormwater pipe draining from the car park. No further actions required.
Sch 4 Cond 26a)	Bush Fire Response Procedure Section be added to site induction presentation at next review.	The Abel Site Familiarisation Induction currently covers the Emergency Muster Area and what to do in the event of an emergency. It also covers fire equipment onsite.	Noted	No further action required.

Table 10.1 (Cont'd)
Independent Audit Action Response Plan Status

Ref	Description	Donaldson Response	Timeline	Status Update
PA 05_0136 MOD3 Continual Improvement Recommendations (Cont'd)				
Sch 4 Cond 29e)	Complete mine closure plan at least 5 years prior to closure or consent expiry date.	Accept recommendation and complete Mine Closure Plan 5 years prior to closure.	Noted	Currently no further action. Mine is currently in care and maintenance. Consent does not expire until 2030.
Sch 6 Cond 1f)	Recommend adding links to EMS attached documents or including as appendix to EMS.	Accept recommendation and on next update of the EMS, provide a link to the 'Abel Management Plans' page on the Donaldson Coal website.	Next update of the EMS	The Environmental Management Strategy (dated August 2018) has yet to be updated but will be reviewed during the next reporting period.
Sch 6 Cond 2	Condition list made into a table and included in each revised management plan during care and maintenance and demonstrate where each is addressed.	Accept comments and incorporate into future updates of Management Plans.	Completed	The review and update of various management plans was completed and the plans approved 4 June 2019. The updated plans include a summary of relevant requirements and where each is addressed in the plan.
SOCs	Recommended that at next project approval modification (if mining recommences), a full review of the SOCs are undertaken and any commitments which are duplicative of development consent conditions are sought to be removed with a relevant justification.	Accept comment and action in the next modification of Abel Coal.	When mining recommences	Not yet applicable – mining has not yet recommenced.
Management Plans	Most plans required update for care and maintenance status. Detail in table A and B should be considered during this review. The plans would all benefit from clarification of what responsibilities are Bloomfield's (CHPP and rail loadout) and which are care and maintenance activities and as such the responsibility of Abel Mine. Some of the changes will be inconsistent with the SOCs which include significant detail which is more suited to inclusion in the management plans. An appendix should include evidence of consultation with relevant regulators for each plan. Address recommended changes to each plan as listed in Table A of Appendix D. The RMP should include confirmation of where topsoil is stored and confirmation that adequate volumes exist to achieve the nominated final land use.	Abel Coal Mine will update relevant management plans in 2019 and review comments provided by the audit team and where relevant, incorporate comments into the updated management plans. Updated plans will be specific for Care and Maintenance and include a clarification of the responsibility boundaries between Abel and Bloomfield. A summary of management plan status will be included in the Abel 2019/20 Annual Review.	Completed Annually	The review and update of various management plans was completed during the 2019 reporting period, with agency comments addressed and final approval sought from DPIE 4 June 2019. A summary of the management plans is provided in Section 4.2 of this Annual Review.

Table 10.1 (Cont'd)
Independent Audit Action Response Plan Status

Ref	Description	Donaldson Response	Timeline	Status Update
EPL12856				
A1	Recommend that consideration be given to a variation to reduce the 'coal works' scale as mine in care and maintenance status. This assumes that CHPP and rail loadout facilitates are included in Bloomfield's EPL.	Abel will review this recommendation and determine the benefits of a license variation. A variation will be applied for if it is determined there is a benefit in reducing the scale of coal works on the sites license.	Noted	Comments on draft EPL variation returned to EPA 24 January 2020. Awaiting final issue of varied EPL.
P1	Recommend updating this condition when management plans updated. Consideration should be given to seek reduction or removal of depositional dust gauges from program.	A variation to the locations of monitoring sites was submitted to the EPA in 2018. The variation is currently being assessed by the EPA. Further review of locations within site management plans may trigger another variation if required.	Noted	Comments on draft EPL variation returned to EPA 24 January 2020. Awaiting final issue of varied EPL.
L2	Recommend updating noise monitoring locations and meteorological condition limit wording to make consistent with those shown in PA 05_0136 whilst operational.	A review of the noise monitoring locations and meteorological condition limit wording will be conducted with the update to the Noise Management Plan.	Completed (awaiting varied EPL)	The Noise Management has been updated and removes location K from the active monitoring locations. Whilst noise limits are specified within EPL 12856 for additional locations it does not specify that noise must be monitored at every (or any) location. Therefore, there is no inconsistency with the updated Noise Management Plan. Notwithstanding, noise monitoring has been requested to be removed from the EPL. Awaiting final issue of varied EPL.
O4	Seek removal/amendment to condition O4.2 as no sprays are utilised by the septic system.	There is no plan to remove condition O4.2 from the EPL. Abel Coal may utilise sprays in future adjustments to the Sewerage Treatment Plant.	Noted	No further action required.
U1.3-1.5	Recommend requesting U1 removed at next variation as it has been completed	Accept recommendation and incorporate into the next EPL variation.	Noted	Comments on draft EPL variation returned to EPA 24 January 2020 requested removal of this condition. Awaiting final issue of varied EPL.
ML1618				
11	Date of when mine entered Care and Maintenance is reported in the Annual Mining Lease Group Exploration report as being 02 May 2016, this date is not consistent with other reports e.g. the 2017 AEMR states mine entered care and maintenance on 28 April 2016. Recommend updated in next report.	Accept and incorporate into the next Annual Mining Lease Group Exploration report or Annual Review dependent on a review of the agreed date	Completed	The official date the Abel Mine entered care and maintenance has been confirmed as 2 May 2016. This is reflected in the 2018 and subsequent Annual Reviews.

11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

During the reporting period there were no:

- reportable incidents or exceedances; or
- official cautions, warning letters, penalty notices or prosecution proceedings.

One administrative non-compliance was recorded for the reporting period. PA 05_0136 Schedule 2 Condition 11 requires that all new buildings and structures, and any alterations or additions are constructed in accordance with the relevant requirements of the BCA. Whilst Construction Certificates have been received for buildings within the surface infrastructure area, the Occupation Certificates have not yet been received. The certifying body inspected once and requested changes prior to issuing the Occupation Certificate. The requested changes have been made and the certifying body requested to reinspect. However, the certifying body has not yet issued the final certificate. This will continue to be followed up.

12. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

As outlined in Section 4.3, a range of monitoring, including surface water, groundwater, noise and subsidence monitoring, are planned during the next reporting period. This monitoring represents the monitoring approved through the updated management plans for care and maintenance. Notwithstanding, the need for and frequency of monitoring is to be continually reviewed together with corresponding management plans to ensure that an appropriate level of monitoring and management during care and maintenance is undertaken.

Appendices

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Appendix 1

Noise Monitoring Reports

1. Half-yearly Noise Monitoring, Half-year Ending June 2020

2. Half-yearly Noise Monitoring, Half-year Ending December 2020

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DONALDSON AND ABEL COAL MINES

Half-yearly Noise Monitoring
Half-year Ending June 2020

Prepared for:

Donaldson Coal Pty Ltd
PO Box 675
Green Hills 2320

SLR Ref: 630.01053-R01
Version No: -v1.0
February 2021

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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 Donaldson Coal 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.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
630.01053-R01-v1.0	16 February 2021	Shannon Harvey	Martin Davenport	Martin Davenport

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DOCUMENT REFERENCES

TABLES

FIGURES

APPENDICES

1 Introduction

1.1 Background

Donaldson Coal Pty Ltd has commissioned SLR Consulting Australia Pty Ltd (SLR) to conduct half-yearly noise monitoring surveys for the Donaldson Coal Mine and Abel Coal Mine during the June 2020 half in accordance with the *Donaldson Coal Mine and Abel Underground Coal Mine - Noise Management Plan Care and Maintenance* (the NMP) dated 3 June 2019.

1.2 Objectives of this Report

The objectives of the noise monitoring survey for this operating half-year were as follows:

- Measure the ambient noise levels at six focus receptor locations (potentially worst affected) surrounding Donaldson Coal Mine and Abel Coal Mine.
- Qualify all sources of noise within each of the attended surveys, including estimated contribution or maximum level of individual noise sources.
- Assess the noise emissions of Donaldson Coal Mine and Abel Coal Mine with respect to the limits contained in the Development Consent.

1.3 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

2 Development Consent Project Approval

Development consent was obtained by Donaldson Coal Pty Ltd for the Donaldson Mine in October 1999 following a Commission of Inquiry. Development Consent number N97/00147 was issued by the Minister for Urban Affairs pursuant to Section 101 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Project Approval (Application No. 05_0136) granted by the Minister of Planning was obtained by Donaldson Coal Pty Ltd for Abel Coal Mine in 2007.

2.1 Donaldson Coal Mine Development Consent Conditions

The Development Consent nominates hours of operation and mine noise emission goals in the Sections entitled "*Operation of Development, Condition No. 3(1) and 3(2)"*, and *"Noise and Vibrational Noise Limits: Condition No. 15*" as follows:

3.(1) Subject to (2) the approved hours of operation are as follows:

Works	*Period*	*Hours*
Construction, including construction of any bunds	*Monday to Friday* *Saturday*	*7 am to 6 pm* *8 am to 1 pm*
Mining operations, including mining, haulage of waste to dumps and coal processing	*Monday to Friday* *Saturday, Sunday*	*24 hours per day* *7 am to 6 pm*
Road Transportation and stockpiling of coal	*7 days per week*	*24 hours per day*
Rail loading of coal	*7 days per week*	*7 am to 10 pm*
Maintenance of mobile and fixed plant	*7 days per week*	*24 hours per day*
Blasting, not involving closure of John Renshaw Drive	*Monday to Saturday*	*7 am to 5 pm*
Blasting, involving closure of John Renshaw Drive	*Monday to Saturday*	*10 am to 2 pm*

Notes: Restrictions on Public Holidays are the same as Sundays

(2) The Applicant shall submit a report to the Director-General's satisfaction demonstrating the noise limits in Condition 15 can be met while rail loading of coal is occurring during the period from 6 pm to 10 pm. If that report does not demonstrate that the noise limits can be met to the Director-General's satisfaction, then the hours of operation for rail loading of coal shall be restricted to 7 am to 6 pm."

15. *Unless subject to a negotiated agreement in accordance with Condition 23, the Applicant shall ensure that the noise emission from construction or mining operations, when measured or computed at the boundary of any dwelling not owned by the applicant (or within 30 metres of the dwelling, if the boundary is more than 30 metres from the dwelling), shall not exceed the following noise limits:*

Location	*$L_{A10(15minute)}$* Noise Limits (dBA)	
	Daytime	Night-time
Beresfield area (residential)	*45*	*35*
Steggles Poultry Farm	*50*	*40*
Ebenezer Park Area	*46*	*41*
Black Hill Area	*40*	*38*
Buchanan and Louth Park Area	*38*	*36*
Ashtonfield Area	*41*	*35*
Thornton Area	*48*	*40*

Note: Daytime is 7 am to 10 pm Monday-Saturday, and 8 am to 10 pm Sundays and Public Holidays. Night-time is 10 pm to 7 am Monday-Saturday, and 10 pm to 8 am Sundays and Public Holidays.

The noise limits apply for prevailing meteorological conditions (winds up to 3 m/s), except under conditions of temperature inversions."

Other Conditions of Consent relevant to noise are as follows:

18. *The applicant shall survey and investigate noise reduction measures from plant and equipment and set targets for noise reduction in each Annual Environmental Management Report (AEMR), taking into consideration valid noise complaints received in the previous year. The Report shall also include remedial measures.*

19. *The Applicant shall revise the Noise Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, the independent noise expert (Condition 48), EPA, Councils and the Community Consultative Committee.*

2.2 Abel Coal Mine – Project Approval

Approved Operations

The following operations are approved under the Abel Coal Mine Project Approval:

- Extraction of up to 6.1 Mtpa of Run of Mine (ROM) coal from the Abel Underground Coal Mine.
- Transport coal to the existing Bloomfield Coal Handling and Preparation Plant by private haul roads, or by coal conveyor, or by a combination of both methods.
- Operate the Bloomfield Coal Handling Processing Plant (CHPP) to process coal extracted from the Abel Coal Mine and the Bloomfield and Donaldson Coal Mines.
- Transportation of product coal from the Bloomfield site by rail via the Bloomfield rail loading facility.

The Project Approval was modified in June 2010 (05_0136 MOD 1) allowing construction and operation of a downcast ventilation fan. In May 2011 the Project Approval was modified again (05_0136 MOD 2) to allow the construction and operation of an upcast ventilation fan (and associated facilities). In December 2013 the Project Approval was further modified (05_0136 MOD3) to account for the increase in coal extracted including the upgrade of the Bloomfield CHPP.

Consent Conditions

The relevant conditions relating to noise from the Abel Coal Mine approval are reproduced below.

Schedule 4

NOISE

Operational Noise Criteria

1. *The Proponent shall ensure that the noise generated by the Project does not exceed the criteria in Table 4 at any residence on privately-owned land.*

Table 4: Operational Noise Criteria dB(A)

Location	Receiver Area	Day	Evening	Night	
		$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{A1(1minute)}$
Location I	Lord Howe Drive, Ashtonfield	*36*	*36*	*36*	*45*
Location K	Catholic Diocese Land	*37*	*37*	*37*	*45*
Location L	Kilshanny Avenue, Ashtonfield	*40*	*40*	*40*	*47*
All other Locations	All other privately owned Residences	*35*	*35*	*35*	*45*

Notes:

- *To interpret the locations referred to in Table 4, see plan in Appendix 3.*
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 4 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

These noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Construction Noise Criteria

1. *The proponent shall ensure that the noise generated during the construction of the downcast ventilation shaft as described in EA (MOD3) does not exceed the criteria in Table 5.*

Table 5: Construction Noise Criteria dB(A)

Location	Receiver	Day
		$L_{Aeq(15minute)}$
Location R	*281 Lings Road, Buttai*	*50*
Location S	*189 Lings Road, Buttai*	*43*

Notes:

- *The criteria in Table 5 apply only whilst the downcast ventilation shaft is being constructed, and for a maximum of 12 weeks from the commencement of construction.*
- *To interpret the locations referred to in Table 5, see plan in Appendix 3* (attached to this report as **Appendix A**).
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

However, these noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Rail Noise Criteria

1. *The proponent shall ensure that the noise from rail movements on the Bloomfield Rail Spur does not exceed the limits in Table 6 at any residence on privately owned land.*

Table 6: Rail Spur noise criteria dB (A)

Location	*Day*	*Evening*	*Night*
	$L_{Aeq(period)}$		
All privately-owned land	*55*	*45*	*40*

Cumulative Noise Criteria

1. *The proponent shall implement all reasonable and feasible measures to ensure that the noise generated by the project combined with noise generated by other mines does not exceed the criteria in Table 7 at any residence on privately-owned land.*

Table 7: Cumulative noise criteria dB (A)

Location	*Day*	*Evening*	*Night*
	$L_{Aeq(period)}$		
All privately-owned land	*55*	*45*	*40*

Notes: Cumulative noise is to be measured in accordance with the relevant requirements, and exemptions (including meteorological conditions), of the NSW Industrial Noise Policy. Appendix 4 sets out the metrological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

Operating Conditions

1. *The proponent shall:*
    a. *Implement best management practise to minimise the construction, operational, road and rail noise of the project;*
    b. *Operate an on-site noise management system to ensure compliance with the relevant conditions of this approval;*
    c. *Minimise the noise impacts of the project during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 4);*
    d. *Only receive and/or dispatch locomotives and rolling stock either on or from the site that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL (No. 3142);*
    e. *Carry out regular monitoring to determine whether the project is complying with the noise criteria and other relevant conditions of approval, to the satisfaction of the Director-General.*

Noise Management Plan

2. *The proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:*
    a. *Be prepared in consultation with the EPA, and be submitted to the Director-General for approval within 6 months of the date of approval of MOD 3;*
    b. *Describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval; Describe the proposed noise management system in detail; and*
    c. *Include a monitoring program that:*
        - *Uses attended monitoring to evaluate the compliance of the project against the noise criteria in this approval;*
        - *Evaluates and reports on:*
            - *The effectiveness of the on-site noise management system; and*
            - *Compliance against the noise operating conditions; and*

Defines what constitutes a noise incident, and includes protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents. Appendix 4

Noise Compliance Assessment

Applicable Meteorological Conditions

1. *The noise criteria in Tables 4 and 7 are to apply under all metrological conditions except the following:*
    a. *During periods of rain or hail.*
    b. *Average wind speed at microphone height exceeds 5 m/s;*
    c. *Wind speeds greater than 3 m/s measured at 10m above ground level; or*
    d. *Temperature inversion conditions greater than 3°C/100m.*

Determination of metrological conditions

2. *Except for wind speed at microphone height, the data to be used for determining metrological conditions shall be that recorded by the meteorological station located on the site.*

Compliance monitoring

3. *Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.*
4. *Unless otherwise agreed with the director-general, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:*
    a. *Monitoring locations for the collection of representative noise data;*
    b. *Metrological conditions during which collection of noise data is not appropriate;*
    c. *Equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and*
    d. *Modification to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.*

Appendix 5

Statement of Commitments

3. Noise

3.1 Construction Activities

The following noise control measures will be implemented prior to commencement of construction of the Abel Underground Mine or the upgrade of the Bloomfield CHPP.

1. *Maintain all machinery and equipment in working order;*
    a. *No construction activities at the Abel pit top will take place on Sundays or Public Holidays;*
    b. *Where possible locate noisy site equipment behind structures that act as barriers or at the greatest distance from noise sensitive areas; and*
    c. *Orientate equipment so that noise emissions are directed away from noise sensitive areas.*

3.2 Noise Control Measures

a. *The following noise control measures will be implemented prior to the mining of coal from the Abel underground Mine:*
    i. *Orientation of the ventilation fans away from residential receivers and angle the output parallel to the ground.*
    ii. *The sound power level of the front end loader to be used near the portal should not exceed 113 dBA and will be fitted with a noise sensitive reversing alarm.*
b. *The following noise control measures will be implemented prior to the Bloomfield CHPP receiving any ROM coal from Able Underground Mine;*

i. *Noise mitigation works including partial enclosure and noise screening of drives and conveyors of the Bloomfield CHPP to screen residences to the north of the site.*

3.2 Monitoring

The Company will implement a Noise Monitoring Program for the Abel Underground Mine and the Bloomfield CHPP, to the satisfaction of the Director-General. The Noise Monitoring Program shall include a combination of real-time and supplementary attended monitoring measures, and a noise monitoring protocol for evaluating compliance with the noise environmental assessment. This plan will be integrated with the monitoring plans for the Tasman, Donaldson and Bloomfield Mines to provide a single integrated Noise Monitoring Program for all 4 mines.

3.4 Continuous Improvement

The Company shall:

a. *Report on these investigations and implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director General.*

The operator of the Bloomfield CHPP shall:

b. *Investigate ways to reduce the noise generated by the Bloomfield CHPP, including maximum noise levels which may result in sleep disturbance;*

c. *Implement all reasonable and feasible best practice noise mitigation measures on the site; and*

d. *Report on these investigations and the implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director-General.*

3 Noise Monitoring Methodology

3.1 General Requirements

The operational noise monitoring program was conducted with reference to Development Consent N97/00147 (Donaldson Coal Mine), Project Approval 05_0136 (Abel Coal Mine), the NMP and AS 1055-2018 *Acoustics - Description and Measurement of Environmental Noise*.

All acoustic instrumentation employed throughout the monitoring program has been designed to comply with the requirements of AS IEC 61672.1 – 2004 *Electroacoustics—Sound level meters – Specifications*, AS IEC 61672.2-2004, AS IEC 61672.3-2004 and carried current NATA or manufacturer calibration certificates. Certificates for acoustic instrumentation used during the June 2020 half is provided in **Appendix B**.

Instrument calibration was conducted before and after each measurement, with the variation in calibrated levels not exceeding ±0.5 dBA.

3.2 Monitoring Locations

Baseline and preceding operational half-yearly surveys have been conducted at 11 locations surrounding the Donaldson Mine and Abel Coal Mine sites. With the experience of these previous surveys, it was decided to concentrate noise monitoring at six focus locations that represent the potentially most noise affected areas from Donaldson Mine and Abel Coal Mine. The details of the monitoring locations are contained within **Table 1**.

It is relevant to note that Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Furthermore, Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite during the June 2020 noise monitoring period.

Table 1 Monitoring Locations

Noise Monitoring Location	Description
D	Black Hill School, Black Hill
F	Lot 684 Black Hill Road, Black Hill
G	156 Buchannan Road, Buchannan
I	Magnetic Drive, Ashtonfield
J	Parish Drive, Thornton
L	65 Tipperary Dr, Ashtonfield

A map giving the approximate location of the noise monitoring sites is contained within **Appendix C**.

3.3 Unattended Continuous Noise Monitoring

An environmental noise logger was deployed for a minimum of a seven day period between Tuesday 26 May 2020 and Thursday 4 June 2020 at each of the six (6) nominated locations given in **Table 1**.

All unattended monitoring equipment was programmed to continuously record statistical noise level indices in 15 minute intervals including the L_{Amax}, L_{A1}, L_{A10}, L_{A90}, L_{A99}, L_{Amin} and L_{Aeq}. The statistical noise exceedance levels (L_{AN}) are the levels exceeded for N% of the 15 minute interval. The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level. The L_{A10} is the level exceeded for 10% of the time and is usually referred to as the average maximum noise level. The L_{Aeq} is the equivalent continuous sound pressure level and represents the steady sound level which is equal in energy to the fluctuating level over the interval period. The L_{Amax} is the maximum noise level recorded over the interval.

3.4 Operator Attended Noise Monitoring

Operator attended surveys were conducted at each of the six monitoring locations during the daytime, evening and night-time periods, to verify the unattended logging results and to determine the character and contribution of ambient noise sources.

4 Operator Attended Noise Monitoring

4.1 Results of Operator Attended Noise Monitoring

Operator attended noise measurements were commenced on Wednesday 3 June 2020 finishing on Thursday 4 June 2020. Operator attended noise surveys were conducted using a Brüel & Kjær Type 2270 (serial number 2679354).

Ambient noise levels given in the tables include all noise sources such as traffic, insects, birds, and mine operations as well as any other industrial operations.

The tables provide the following information:

- Monitoring location.
- Date and start time.
- Wind velocity (m/s) and Temperature (ºC) at the measurement location.
- Typical maximum (LAmax) and contributed noise levels.

Mine contributions listed in the tables are from the Abel Coal Mine and are stated only when a contribution could be quantified.

Table 2 Location D, Black Hill Public School, Black Hill

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	04/06/2020 09:49 14°C 2.3 m/s S	78	67	55	46	55	Birdsong 45-52 Wind in trees 40-43 Road traffic 78 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	03/06/2020 18:42 13°C 1.7 m/s S	77	62	45	35	50	Road traffic 68-77 Insects 32-37 Bats 43-55 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	03/06/2020 22:28 13°C 2.5 m/s S	56	42	39	35	37	Bats 56 Traffic 33-38 Insects 32-36 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

Table 3 Location F, Lot 684 Black Hill Road, Black Hill

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	04/06/2020 10:10 15°C 1.5 m/s S	79	71	59	46	58	Jet 65 Road traffic 79 Wind in trees 40-43 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	03/06/2020 19:05 13°C 1.9 m/s S	72	62	53	38	50	Road traffic 40-72 Insects 34-38 Dog barking 45 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	03/06/2020 22:53 13°C 2.1 m/s S	64	59	52	34	48	Insects 32-38 Wind in trees 32-34 Road traffic 35-64 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

Table 4 Location G, Buchanan Road, Buchanan

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (L_{Amax} – dBA)
		L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	
Day	04/06/2020 11:30 15°C 2.6 m/s S	74	60	54	43	51	Jets 55-74 Birdsong 45-59 Road traffic 43-50 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	03/06/2020 20:12 12°C 1.6 m/s S	52	48	45	36	42	Road traffic 45-52 Insects 33-38 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	03/06/2020 23:59 13°C 2.2 m/s S	51	47	39	30	37	Insects 25-35 Road traffic 33-51 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

Table 5 Location I, Magnetic Drive, Ashtonfield

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (**LAmax** – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	04/06/2020 12:18 16°C 2.3 m/s S	74	64	56	41	53	Road traffic 35-74 Birdsong 58 **Abel Mine Audible** CHPP operations 32-35
		Estimated Abel Mine Noise Contribution LAeq(15minute) 33 dBA					
Evening	03/06/2020 21:04 13°C 1.6 m/s S	72	57	41	35	47	Traffic 35-72 Insects 30-35 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	04/06/2020 00:50 12°C 2.1 m/s S	47	40	38	33	36	Traffic 33-47 Insects 30-35 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

Table 6 Location J, Parish Drive, Thornton

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (**LAmax** – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	04/06/2020 12:41 15°C 2.2 m/s S	60	52	43	36	41	Road traffic 60 Birdsong 40-56 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	03/06/2020 21:31 13°C 1.7 m/s S	64	43	37	34	37	Road traffic 34-64 Insects 30 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	03/06/2020 22:00 13°C 2.1 m/s S	47	39	37	34	36	Road traffic 34-47 Insects 30 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

Table 7 Location L, 65 Tipperary Drive, Ashtonfield

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	04/06/2020 11:57 16°C 2.5 m/s S	72	65	52	41	52	Road traffic 72 Neighbourhood noise 33-35 Wind in trees 35-41 **Abel Mine Audible** CHPP operation 34-43
		Estimated Abel Mine Noise Contribution LAeq(15minute) 36 dBA					
Evening	03/06/2020 20:40 12°C 1.6 m/s S	47	40	36	32	34	Road traffic 47 Dog barking 39 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	04/06/2020 00:27 12°C 2.1 m/s SSW	51	47	41	34	39	Road traffic 35-51 Wind in trees 35 Bats 45 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

4.2 Operator Attended Noise Monitoring Summary

4.2.1 Donaldson Mine

Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

4.2.2 Abel Coal Mine

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

The Bloomfield CHPP and stockpile area was inaudible during all operator attended noise surveys with the exception of Location I and Location L during the day time period. Noise generated by local and distant traffic was a significant contributor to ambient noise levels at all monitored locations as well as 'natural' noises such as birds, insects and wind related noise.

4.3 Compliance Assessment and Discussion of Results

4.3.1 Operations

Results of the operational compliance assessment are given in **Table 8**.

Table 8 Compliance Noise Assessment - Operations

Location	Estimated Abel $L_{Aeq(15minute)}$ Contribution dBA			Consent Conditions			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
D – Black Hill School, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
F – Black Hill Road, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
I – Magnetic Drive, Ashtonfield	33	Inaudible	Inaudible	36	36	36	Yes	Yes	Yes
J – Parish Drive, Thornton	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
L – 65 Tipperary Dr, Ashtonfield	36	Inaudible	Inaudible	40	40	40	Yes	Yes	Yes

Results presented in **Table 8** indicate that compliance with the relevant consent conditions was achieved at all noise monitoring locations during all periods.

4.3.2 Sleep Disturbance

Results of the sleep disturbance compliance assessment are given in **Table 9**.

Table 9 Compliance Noise Assessment – Sleep Disturbance

Location	Estimated Bloomfield $L_{A1(1minute)}$ Contribution dBA	Consent Conditions $L_{A1(1minute)}$ dBA	Compliance
D – Black Hill School, Black Hill	Inaudible	45	Yes
F – Black Hill Road, Black Hill	Inaudible	45	Yes
G – Buchanan Road, Buchanan	Inaudible	45	Yes
I – Magnetic Drive, Ashtonfield	Inaudible	45	Yes
J – Parish Drive, Thornton	Inaudible	45	Yes
L – 65 Tipperary Dr, Ashtonfield	Inaudible	47	Yes

Results presented in **Table 9** indicate that compliance with the sleep disturbance consent conditions was achieved at all noise monitoring locations during the night-time noise surveys.

5 Unattended Continuous Noise Monitoring

5.1 Results of Unattended Continuous Noise Monitoring

Unattended continuous noise monitoring was conducted between Tuesday 26 May 2020 and Thursday 4 June 2020 at each of the six monitoring locations given in **Table 10**.

Table 10 Noise Logger and Noise Monitoring Locations

Location	Noise Logger Serial Number	Date of Logging
D – Black Hill School, Black Hill	SVAN 957 23293	26 May 2020 -4 June 2020
F – Black Hill Road, Black Hill	SVAN 955 23244	26 May 2020 -4 June 2020
G – Buchanan Road, Buchanan	SVAN 955 69756	26 May 2020 -4 June 2020
I – Magnetic Drive, Ashtonfield	SVAN 957 21887	26 May 2020 -4 June 2020
L – 65 Tipperary Dr, Ashtonfield	SVAN 957 69507	26 May 2020 -4 June 2020
J – Parish Drive, Thornton[1]	SVAN 957 20665	26 May 2020 -4 June 2020

The unattended ambient noise logger data from each monitoring location are presented graphically on a daily basis and are attached as **Appendix C**. A summary of the results of the unattended continuous noise monitoring is given in **Table 11**. Due to a technical issue no results are available for Location G.

The ambient noise level data quantifies the overall noise level at a given location independent of its source or character.

The measured ambient noise levels were divided into three periods representing day, evening and night as designated in the NSW Noise Policy for Industry (NPfI).

Precautions were taken to minimise influences from extraneous noise sources (eg optimum placement of the loggers away from creeks, trees, houses, etc), however, not all these sources or their effects can be eliminated. This is particularly the case during the warmer times of year when noise from insects, frogs, birds and other animals can become quite prevalent.

Weather data for the subject area during the noise monitoring period was provided by Bloomfield Colliery. Noise data during periods of any rainfall and/or wind speeds in excess of 5 m/s were discarded in accordance with NPfI weather affected data exclusion methodology.

Table 11 Unattended Continuous Noise Monitoring Ambient Noise Levels (dBA)

Location	Period	Primary Noise Descriptor (dBA re 20 µPA)			
		L_{A1}	L_{A10}	L_{A90}	L_{Aeq}
D Black Hill School, Black Hill	Day	68	57	39	57
	Evening	58	46	37	51
	Night	48	43	34	48
F Lot 684 Black Hill Road, Black Hill	Day	72	59	45	60
	Evening	62	55	41	55
	Night	59	52	37	53
I 49 Magnetic Drive, Ashtonfield	Day	69	60	40	57
	Evening	54	48	37	49
	Night	45	41	32	46
L 65 Tipperary Dr, Ashtonfield	Day	62	53	40	53
	Evening	59	47	37	48
	Night	44	37	27	41
J 220 Parish Drive, Thornton	Day	52	47	39	50
	Evening	49	46	39	46
	Night	48	45	31	45

5.2 Long term Unattended Continuous Monitoring Summary for Donaldson Mine and Abel Coal Mine

5.2.1 Ambient LA90 Noise Levels

The long term ambient L_{A90} noise levels collected from each monitoring location are presented graphically in **Figure 1**, **Figure 2** and **Figure 3** for the daytime, evening and night-time periods respectively.

Figure 1 Long Term Daytime L_{A90} Noise Levels

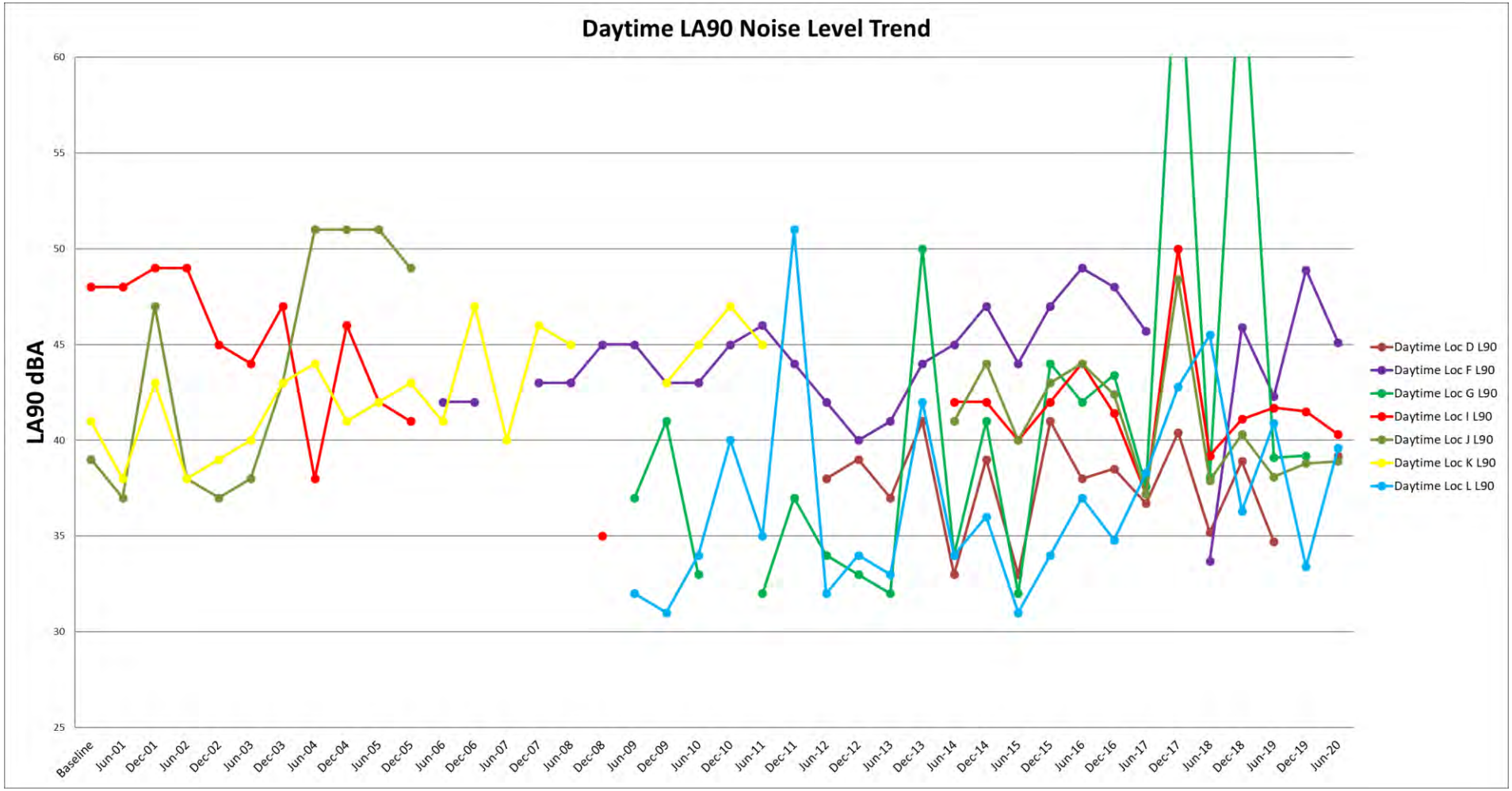


Figure 2 Long Term Evening L_{A90} Noise Levels

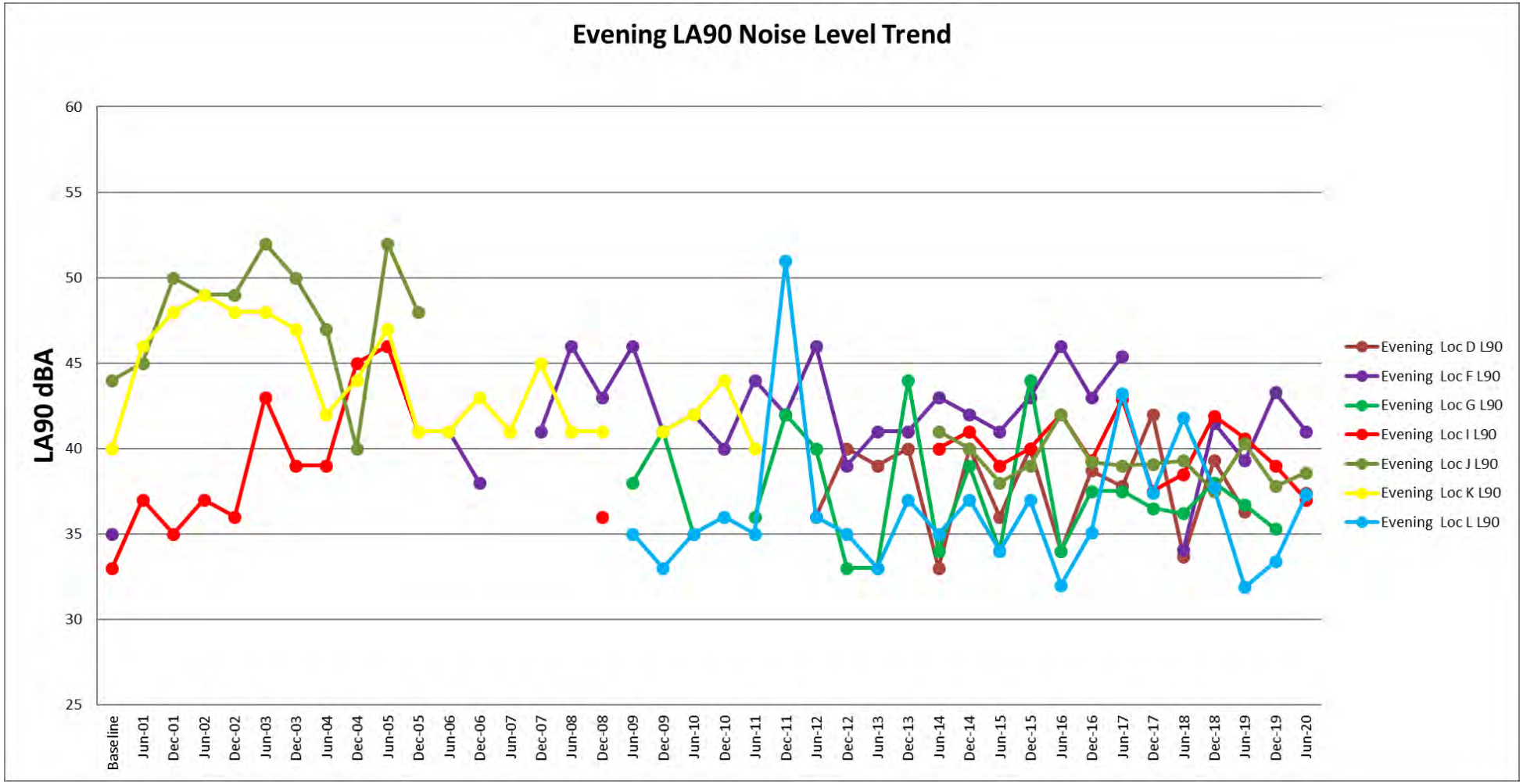
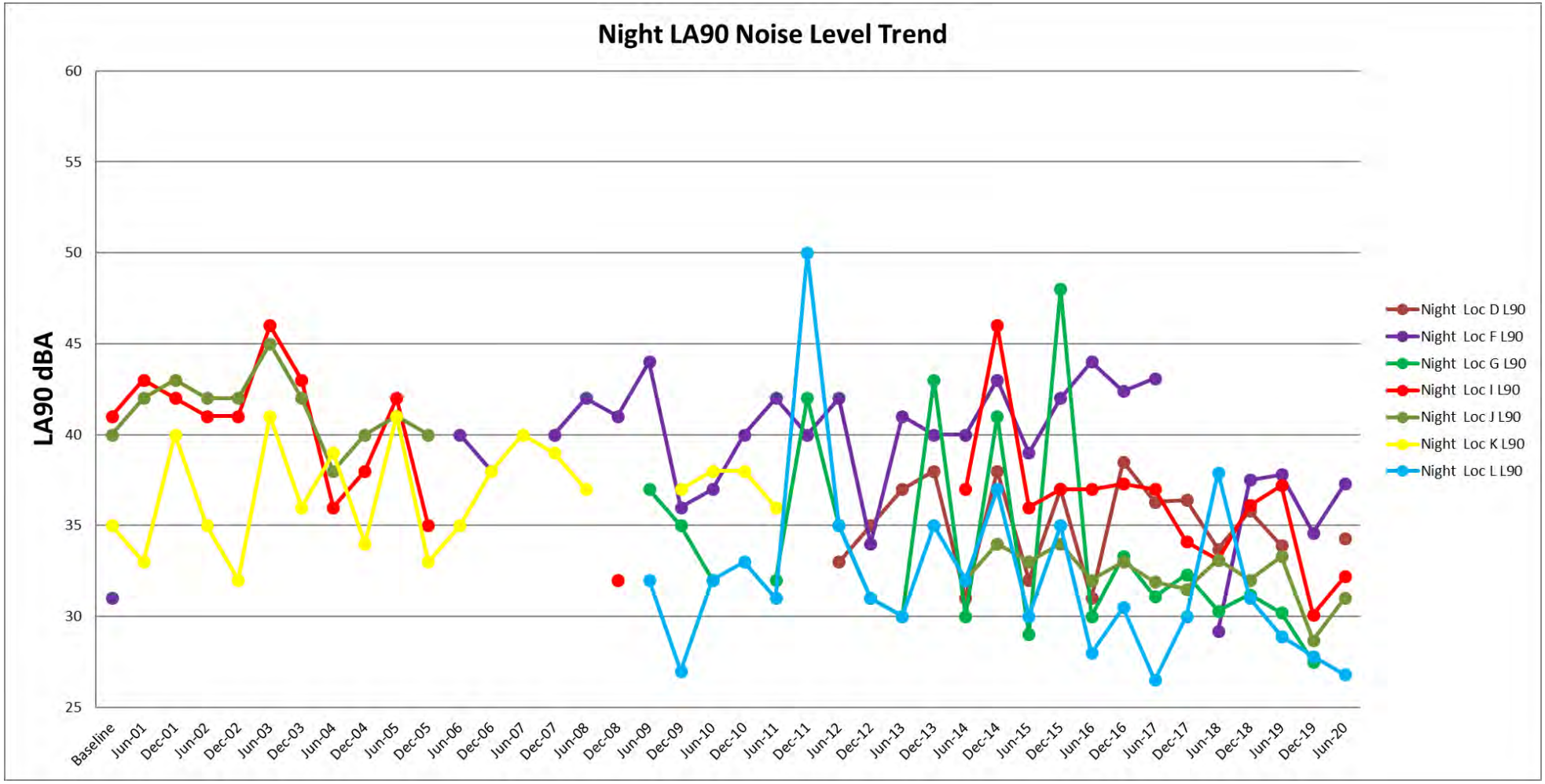


Figure 3 Long Term Night-time L_{A90} Noise Levels



5.2.1.1 Baseline

The summary of results in **Table 12** shows the ambient L_{A90} noise levels recorded for the current monitoring period compared to the levels recorded during the baseline monitoring process (ie. prior to commencement of mining operation at Donaldson).

Table 12 L_{A90} Results Comparison - Baseline

Monitoring Location	Period[1]	Long term Night-time L_{A90} Noise Levels		Difference dB[3]
		Baseline	June 2020	
D Black Hill School, Black Hill	Day	N/A[2]	39	N/A[2]
	Evening	N/A[2]	37	N/A[2]
	Night	N/A[2]	34	N/A[2]
F Lot 684 Black Hill Road, Black Hill	Day	39	45	10
	Evening	35	41	8
	Night	31	37	4
G 156 Buchanan Road, Buchanan	Day	N/A[2]	No result	N/A[2]
	Evening	N/A[2]	No result	N/A[2]
	Night	N/A[2]	No result	N/A[2]
I 49 Magnetic Drive, Ashtonfield	Day	48	40	-8
	Evening	33	37	4
	Night	41	32	-1
L 65 Tipperary Drive, Ashtonfield	Day	N/A[2]	40	N/A[2]
	Evening	N/A[2]	37	N/A[2]
	Night	N/A[2]	27	N/A[2]
J 220 Parish Drive, Thornton	Day	39	39	0
	Evening	44	39	-5
	Night	40	31	-9

Note 1: Periods are as detailed the NPfI and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.1.2 Previous Half-year

presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the previous monitoring period.

Table 13 L_{A90} Results Comparison – Previous Half-year

Monitoring Location	Period[1]	Long term Night-time L_{A10} Noise Levels		Difference dB[2]
		December 2019	June 2020	
D Black Hill School, Black Hill	Day	No result	39	-
	Evening	No result	37	-
	Night	No result	34	-
F Lot 684 Black Hill Road, Black Hill	Day	49	45	-4
	Evening	43	41	-2
	Night	35	37	3
G 156 Buchanan Road, Buchanan	Day	39	No result	-
	Evening	35	No result	-
	Night	28	No result	-
I 49 Magnetic Drive, Ashtonfield	Day	42	40	-1
	Evening	39	37	-2
	Night	30	32	2
L 65 Tipperary Drive, Ashtonfield	Day	33	40	6
	Evening	33	37	4
	Night	28	27	-1
J 220 Parish Drive, Thornton	Day	39	39	0
	Evening	38	39	1
	Night	29	31	2

Note 1: 1. Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.1.3 Coinciding Period last Year

Table 14 presents the ambient L_{A90} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 14 L_{A90} Results Comparison – Coinciding Period Last Year

Monitoring Location	Period[1]	Long term Night-time L_{A90} Noise Levels		Difference dB[2]
		June 2019	June 2020	
D Black Hill School, Black Hill	Day	35	39	5
	Evening	36	37	1
	Night	34	34	0
F Lot 684 Black Hill Road, Black Hill	Day	42	45	3
	Evening	39	41	2
	Night	38	37	-1
G 156 Buchanan Road, Buchanan	Day	39	No result	-
	Evening	37	No result	-
	Night	30	No result	-
I 49 Magnetic Drive, Ashtonfield	Day	42	40	-1
	Evening	41	37	-4
	Night	37	32	-5
L 65 Tipperary Drive, Ashtonfield	Day	41	40	-1
	Evening	32	37	5
	Night	29	27	-2
J 220 Parish Drive, Thornton	Day	38	39	1
	Evening	40	39	-2
	Night	33	31	-2

Note 1: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2 Ambient L_{A10} Noise Comparison

The long term ambient L_{A10} noise levels collected from each monitoring location are presented graphically in **Figure 4**, **Figure 5** and **Figure 6** for the daytime, evening and night-time respectively.

Figure 4 Long Term Daytime L_{A10} Noise Levels

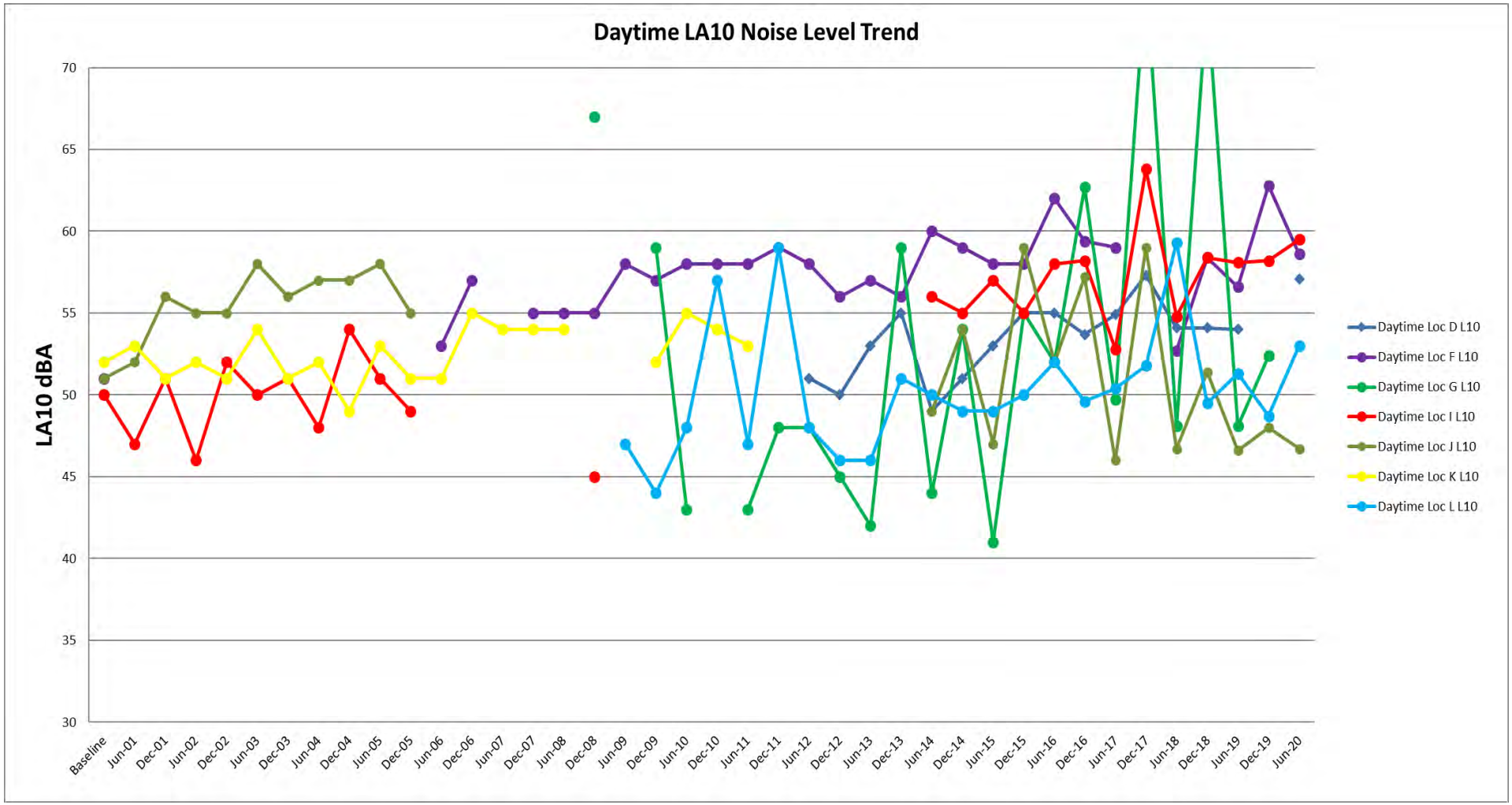


Figure 5 Long term Evening L_{A10} Noise Levels

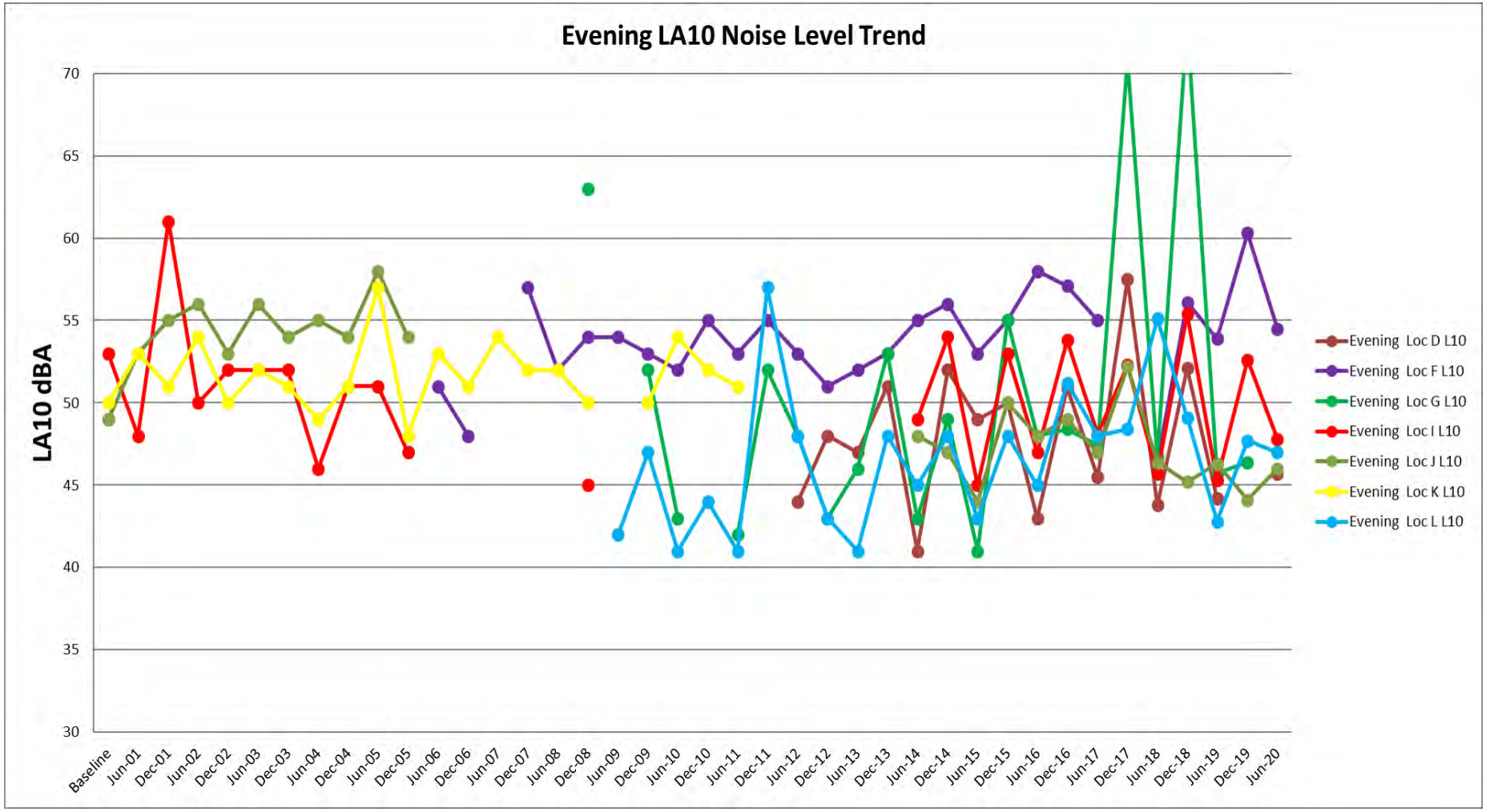
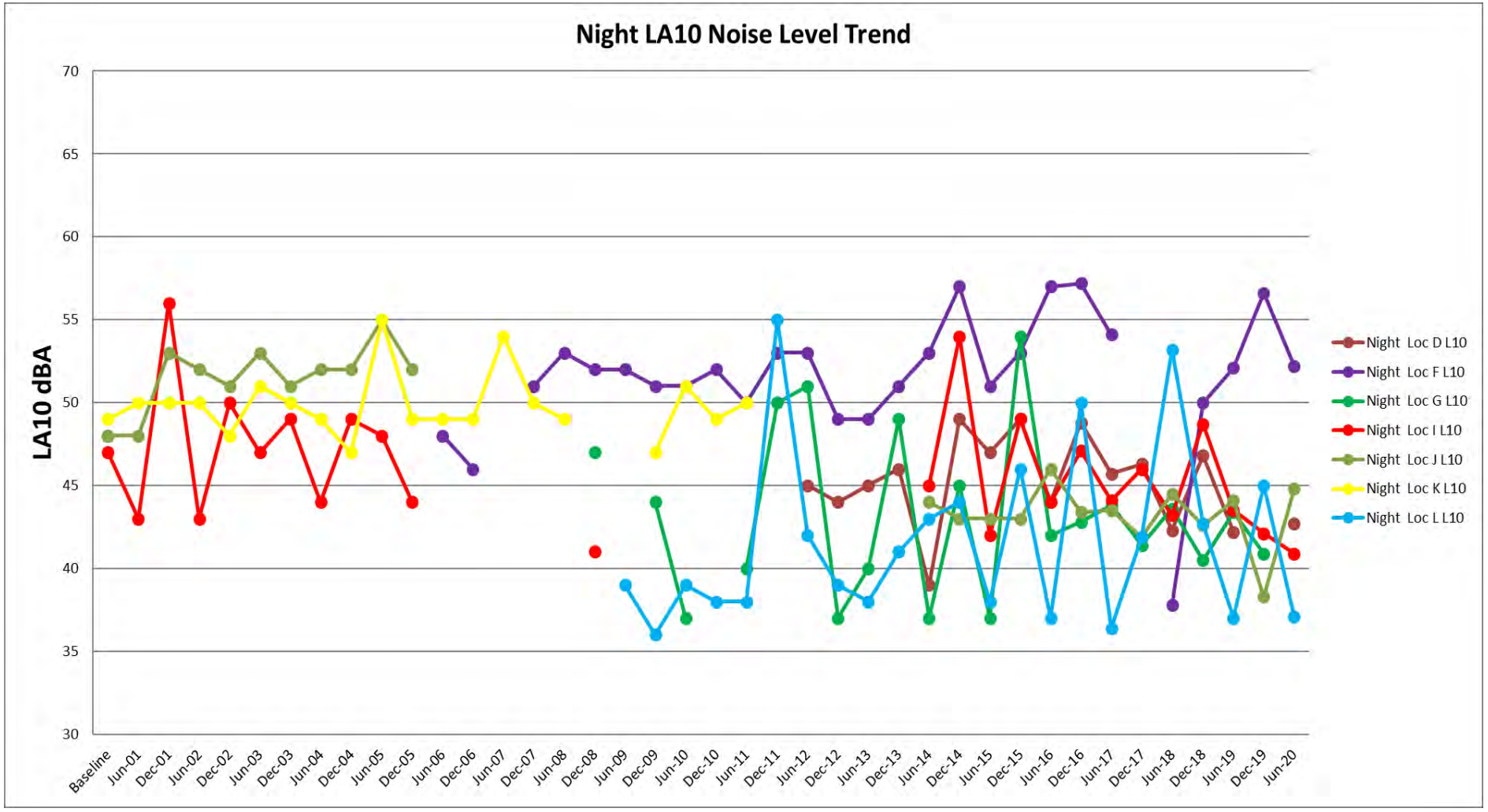


Figure 6 Long term Night L_{A10} Noise Levels



5.2.2.1 Baseline

Table 15 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to the levels recorded during the baseline monitoring period.

Table 15 L_{A10} Results Comparison – Baseline

Monitoring Location	Period[1]	Long term Night-time L_{A10} Noise Levels		Difference dB[3]
		Baseline	December 2019	
D Black Hill School, Black Hill	Day	N/A[2]	57	N/A
	Evening	N/A[2]	46	N/A
	Night	N/A[2]	43	N/A
F Lot 684 Black Hill Road, Black Hill	Day	51	59	8
	Evening	49	55	6
	Night	48	52	4
G 156 Buchanan Road, Buchanan	Day	N/A[2]	No result	N/A
	Evening	N/A[2]	No result	N/A
	Night	N/A[2]	No result	N/A
I 49 Magnetic Drive, Ashtonfield	Day	50	60	
	Evening	53	48	
	Night	47	41	
L 65 Tipperary Drive, Ashtonfield	Day	N/A[2]	53	N/A
	Evening	N/A[2]	47	N/A
	Night	N/A[2]	37	N/A
J 220 Parish Drive, Thornton	Day	51	47	-4
	Evening	49	46	-3
	Night	48	45	-3

Note 1: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.2.2 Previous Half-year

Table 16 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the previous monitoring period.

Table 16 L_{A10} Results Comparison – Previous Half-year

Monitoring Location	Period[1]	Long term Night-time L_{A10} Noise Levels		Difference dB[2]
		December 2019	June 2020	
D Black Hill School, Black Hill	Day	No result	57	-
	Evening	No result	46	-
	Night	No result	43	-
F Lot 684 Black Hill Road, Black Hill	Day	63	59	-4
	Evening	60	55	-6
	Night	57	52	-4
G 156 Buchanan Road, Buchanan	Day	52	No result	-
	Evening	46	No result	-
	Night	41	No result	-
I 49 Magnetic Drive, Ashtonfield	Day	58	60	1
	Evening	53	48	-5
	Night	42	41	-1
L 65 Tipperary Drive, Ashtonfield	Day	49	53	4
	Evening	48	47	-1
	Night	45	37	-8
J 220 Parish Drive, Thornton	Day	48	47	-1
	Evening	44	46	2
	Night	38	45	7

Note 1: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2.3 Coinciding Period Last Year

Table 17 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 17 L_{A10} Result Comparison – Coinciding Period Last Year

Monitoring Location	Period[1]	Long term Night-time L_{A10} Noise Levels		Difference dB[2]
		June 2019	June 2020	
D Black Hill School, Black Hill	Day	54	57	3
	Evening	44	46	2
	Night	42	43	1
F Lot 684 Black Hill Road, Black Hill	Day	57	59	2
	Evening	54	55	1
	Night	52	52	0
G 156 Buchanan Road, Buchanan	Day	48	No result	-
	Evening	46	No result	-
	Night	43	No result	-
I 49 Magnetic Drive, Ashtonfield	Day	58	60	1
	Evening	45	48	3
	Night	44	41	-3
L 65 Tipperary Dr, Ashtonfield	Day	51	53	2
	Evening	43	47	4
	Night	37	37	0
J 220 Parish Drive, Thornton	Day	47	47	0
	Evening	46	46	0
	Night	44	45	1

Note 1: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.3 Rail Noise Monitoring

In order to determine compliance with the rail noise criteria, a noise logger was positioned at Location J. The train loading times during the noise monitoring period are presented in **Table 18**.

Table 18 Coal Train Loading Operations Log

Date	Coal Train Loading Time	Period
26/05	13:35-16:30	Day
02/06	10:37-14:05	Day

The measured $L_{Aeq(period)}$ noise level for each period from rail traffic at Location J are presented in **Table 19.**

Table 19 Rail Noise Impact Monitoring Results

Location	Date	Period	Measured $L_{Aeq(period)}$	Criteria $L_{Aeq(period)}$	Compliance
J	26/05	Day	43	55	Yes
	02/06	Day	43	55	Yes

Results presented in **Table 19** indicate that rail noise levels from the Bloomfield Rail Spur were in compliance with the Abel Mine Project Approval during the noise monitoring period.

6 Conclusion

SLR was engaged by Donaldson Coal Pty Ltd to conduct half-yearly noise monitoring surveys for Donaldson Coal Mine and Abel Coal Mine in accordance with the NMP, dated 3 June 2019.

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

Operator-attended and unattended noise measurements were conducted for the June 2020 half at six focus locations surrounding the mine.

Abel portal operations were not observed to be audible at any locations during the monitoring period with CHPP operations audible at Location L and Location I during the daytime attended noise survey. Contributed noise levels from Abel Mine did not exceed noise emission goals and compliance with the Abel Mine *Project Approval* was indicated at all locations.

A comparison of ambient L_{A10} and L_{A90} noise levels recorded during the current monitoring period (June 2020), the baseline monitoring period, the last monitoring period (December 2020), and the coinciding monitoring period from last year (June 2019) has been conducted.

Rail noise levels from the Bloomfield Rail Spur were considered to be in compliance with the Abel Mine Project Approval during the noise monitoring period.

APPENDIX A

Acoustic Terminology

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2 x 10^{-5} Pa.

2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3. Sound Power Level

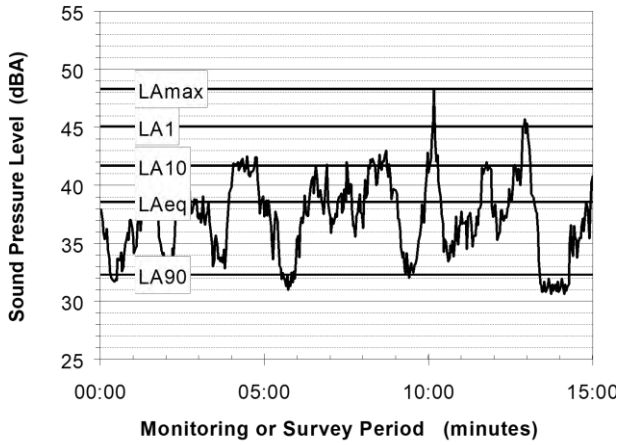
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

5. Frequency Analysis

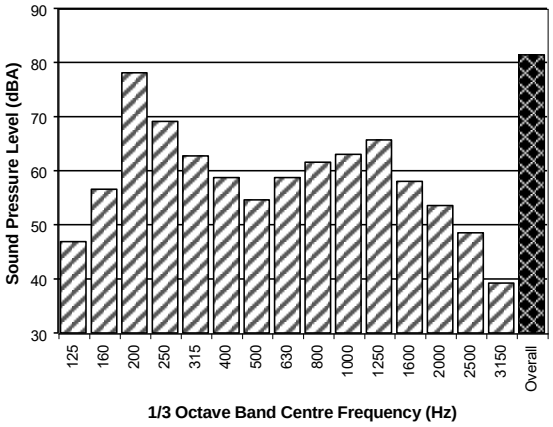
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/Vo), where Vo is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

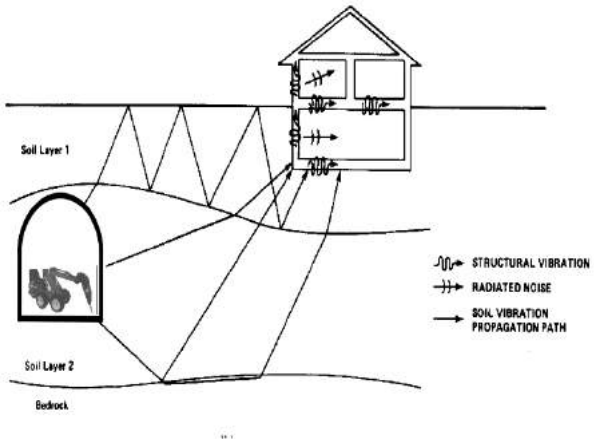
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

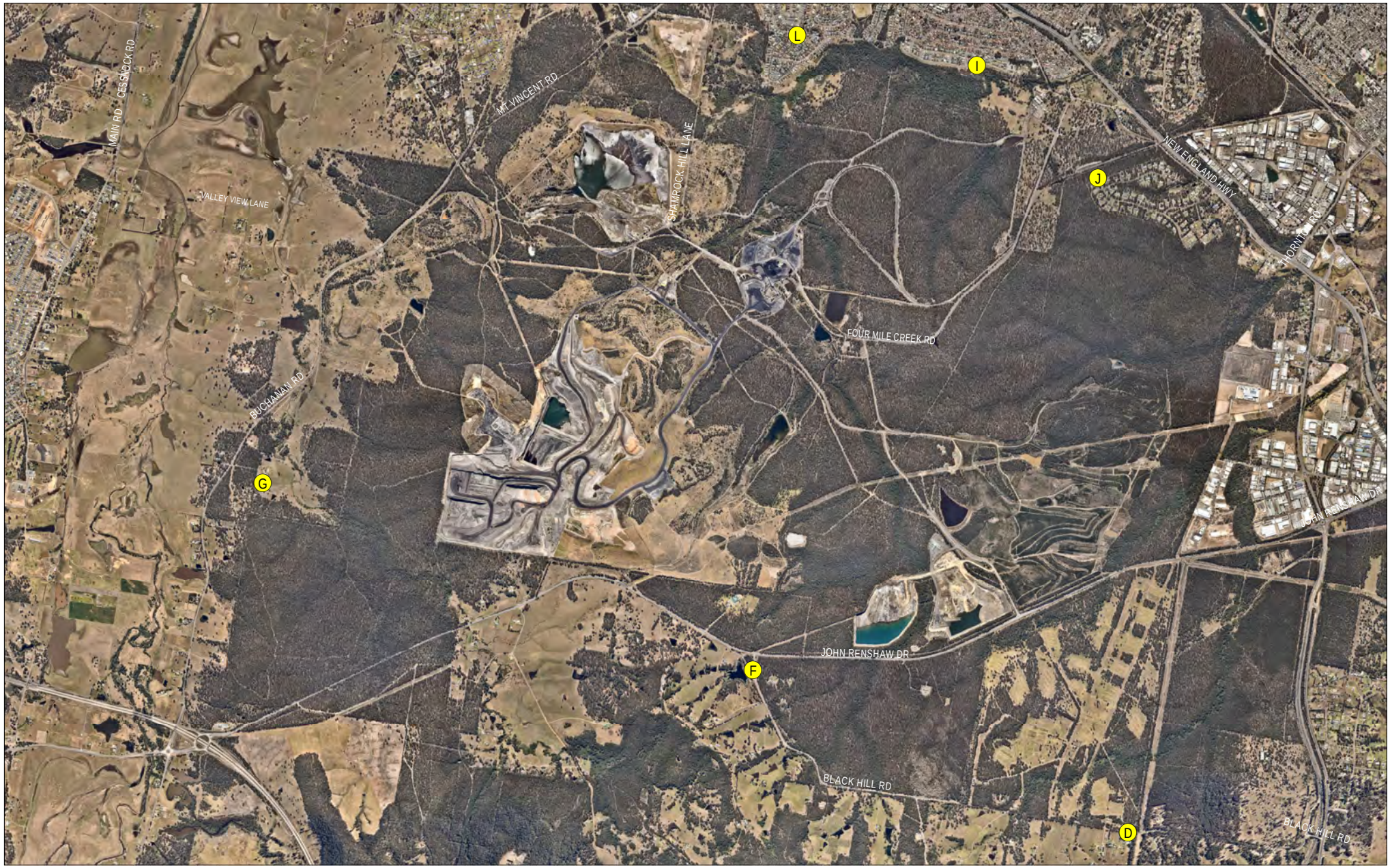
The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

APPENDIX B

Noise Monitoring Locations



D:\Quick Jobs\Martin Davenport\Donaldson\SLR630\01053\01200_AB_MonitoringLocations_01.mxd

SLR
10 KINGS ROAD
NEW LAMBTON
NEW SOUTH WALES 2305
AUSTRALIA
T: 61 2 4037 3200
F: 61 2 4037 3201
www.slrconsulting.com

Project No.:	630.01053.01200
Date:	11/01/2018
Drawn by:	NT
Scale:	1:45,000
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 56

LEGEND

Noise Monitoring Locations

N
W
E
S

0 500 1,000 1,500 2,000 m

Donaldson Coal

Noise Monitoring

Noise Monitoring Locations

APPENDIX B

APPENDIX C

Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: **SLM 25138 & FILT 5298**

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	20665
Microphone Type:	7052E	**Serial No:**	50614
Preamplifier Type:	SV12L	**Serial No:**	18987
Filter Type:	1/1 Octave	**Serial No:**	20665
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	999 hPa ±1.5 hPa		
Temperature:	25 °C ±2° C **Relative Humidity:** 32% ±5%		
Date of Calibration:	12/07/2019	**Issue Date:**	15/07/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: KB **AUTHORISED SIGNATURE:** .... Jack Kielt

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

NATA
WORLD RECOGNISED ACCREDITATION

ACU-VIB
ELECTRONICS

HEAD OFFICE
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02)96808233
Mobile: 0413 809806
web site: www.acu-vib.com.au

Accredited Lab. No. 9262
Acoustic and Vibration Measurements

CERTIFICATE NO.: SLM 25138 & FILT 5298

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Entered
Electrical Noise	11.2	Entered
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Pass
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 12/07/2019 **Issue Date:** 15/07/2019

Checked by: VKB

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 24614 & FILT 5162

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	21887
Microphone Type:	7052E	**Serial No:**	63580
Preamplifier Type:	SV12L	**Serial No:**	19607
Filter Type:	1/3 Octave	**Serial No:**	21887
Comments:	All tests passed for type 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	1002 hPa ±1.5 hPa		
Temperature:	22 °C ±2° C	**Relative Humidity:**	70% ±5%
Date of Calibration:	05/05/2019	**Issue Date:**	06/05/2019

Acu-Vib Test Procedure: AVP05 (SLM) & AVP06 (Filters)

CHECKED BY: NB. **AUTHORISED SIGNATURE:** ..... Jack Kielt

Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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web site: www.acu-vib.com.au

CERTIFICATE NO.: SLM 24614 & FILT 5162

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1. RMS Performance	clause 10.4.5
2. Time Weighting Response, F&S	clause 10.4.2
3. Time Weighting I	clause 10.4.3
4. Time Weighting P	clause 10.4.4
5. Input Attenuator Accuracy	clause 10.3.3
6. Detector & Differential Linearity	clause 10.4.1
7. Weighting Networks & Linearity	clause 10.2.3
8. Overload Indication	clause 10.3.2
9. AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10. Time Averaging	clause 9.3.2
11. Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 94.1 dB and adjusted to 94.0 dB
Uncertainty: ±0.13dB (at 95% c.l.) k=2

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation	clause 5.3

Date of Calibration: 05/05/2019 **Issue Date:** 06/05/2019

Checked by: ...VKB

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.
The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 24615 & FILT 5161

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	23244
Microphone Type:	7052H	**Serial No:**	43700
Preamplifier Type:	SV12L	**Serial No:**	22282
Filter Type:	1/3 Octave	**Serial No:**	23244
Comments:	All tests passed for type 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	1002 hPa ±1.5 hPa		
Temperature:	22 °C ±2° C	**Relative Humidity:**	69% ±5%
Date of Calibration:	03/05/2019	**Issue Date:**	06/05/2019

Acu-Vib Test Procedure: AVP05 (SLM) & AVP06 (Filters)

CHECKED BY: KB..... **AUTHORISED SIGNATURE:** .....Jack Rielt.....

Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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CERTIFICATE NO.: SLM 24615 & FILT 5161

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1. RMS Performance	clause 10.4.5
2. Time Weighting Response, F&S	clause 10.4.2
3. Time Weighting I	clause 10.4.3
4. Time Weighting P	clause 10.4.4
5. Input Attenuator Accuracy	clause 10.3.3
6. Detector & Differential Linearity	clause 10.4.1
7. Weighting Networks & Linearity	clause 10.2.3
8. Overload Indication	clause 10.3.2
9. AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10. Time Averaging	clause 9.3.2
11. Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 94.1 dB and adjusted to 94.0 dB
Uncertainty: ±0.13dB (at 95% c.l.) k=2

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation	clause 5.3

Date of Calibration: 03/05/2019 **Issue Date:** 06/05/2019

Checked by: MKS

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 25694 & FILT 5461

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	23293
Microphone Type:	7052E	**Serial No:**	54742
Preamplifier Type:	SV12L	**Serial No:**	22487
Filter Type:	1/3 Octave	**Serial No:**	23293
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln street Lane Cove, NSW 2066		
Ambient Pressure:	1010 hPa ±1.5 hPa		
Temperature:	25 °C ±2° C	**Relative Humidity:**	31% ±5%
Date of Calibration:	09/10/2019	**Issue Date:**	11/10/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: NKB **AUTHORISED SIGNATURE:** ..... Hein Soe .....

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CERTIFICATE NO.: SLM 25694 & FILT 5461

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Entered
Electrical Noise	11.2	Entered
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Pass
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 09/10/2019 **Issue Date:** 11/10/2019

Checked by: IKB

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 24631 FILT 5163

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-977	**Serial No:**	69507
Microphone Type:	7052E	**Serial No:**	52496
Preamplifier Type:	SV12L	**Serial No:**	22232
Filter Type:	1/3 Octave	**Serial No:**	69507
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	1003 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	44% ±5%
Date of Calibration:	06/05/2019	**Issue Date:**	09/05/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....
Jack Kielt

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CERTIFICATE NO.: SLM 24631 FILT 5163

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Entered
Electrical Noise	11.2	Entered
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Pass
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 06/05/2019 **Issue Date:** 09/05/2019

Checked by: .....

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 23825 & FILT 4991

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	SVAN-977	**Serial No:**	69756
Microphone Type:	7052E	**Serial No:**	72478
Preamplifier Type:	SV12L	**Serial No:**	77821
Filter Type:	1/3 Octave	**Serial No:**	69756
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	1000 hPa ±1.5 hPa		
Temperature:	26 °C ±2° C	**Relative Humidity:**	48% ±5%
Date of Calibration:	18/01/2019	**Issue Date:**	21/01/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: .I.K.L. **AUTHORISED SIGNATURE:** ..... Jack Kielt

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CERTIFICATE NO.: SLM 23825 & FILT 4991

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Entered
Electrical Noise	11.2	Entered
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Pass
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 18/01/2019 **Issue Date:** 21/01/2019

Checked by: J.K.

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 25532 & FILT 5408

Equipment Description:	Sound Level Meter		
Manufacturer:	B & K		
Model No:	2270	**Serial No:**	2679354
Microphone Type:	4189	**Serial No:**	2695417
Preamplifier Type:	ZC0032	**Serial No:**	12254
Filter Type:	1/3 Octave	**Serial No:**	2679354
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	998 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	26% ±5%
Date of Calibration:	09/09/2019	**Issue Date:**	09/09/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: IKB **AUTHORISED SIGNATURE:** ..... Jack Kielt

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CERTIFICATE NO.: SLM 25532 & FILT 5408

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Entered
Electrical Noise	11.2	Entered
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	NA
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 09/09/2019 **Issue Date:** 09/09/2019

Checked by: KB

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 25534

EQUIPMENT TESTED:	1/2" Microphone
Manufacturer:	B & K
Type No:	4197 **Serial No:** 3077697 (Part 2)
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066
Tests Performed:	Acoustic Microphone Frequency Response with Inverse A Weighting

CONDITION OF TEST:

Ambient Pressure:	997 hPa ±1.5 hPa	**Relative Humidity:**	24 % ±5%
Temperature:	23 °C ±2° C		
Date of Calibration:	09/09/2019	**Issue Date**	09/09/2019
Acu-Vib Test Procedure:	AVP05 (Microphone Acoustic Frequency Response)		

CHECKED BY: VKB . **AUTHORISED SIGNATURE:** .....
Jack Kelt

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Acoustic Tests, Microphone response

Job No: 13678 Test No: 255334

Microphone type: B&K 4197 Serial No,: 3077697 (Part 2)

Preamplifier type: 2683 Serial No. : 2792513

SLM body (if appropriate): SVAN 912 AE Serial No: 4396

Ambient Temperature: 23C ±2° C, Relative Humidity: 997 RH ±5% RH,

Ambient Pressure: 24 hPa ±1.5 hPa

Frequency Hz	Deviation re 1 kHz	Type 2 Tol.	Type 1 Tol.	U95 dB	P/F
31.5 Hz	0.11dB	± 3.0 dB	± 1.5 dB dB	0.12	P
63 Hz	-0.01dB	± 2.0 dB	± 1.5 dB dB	0.10	P
125 Hz	-0.08dB	± 1.5 dB	± 1.0 dB dB	0.09	P
250 Hz	-0.15dB	± 1.5 dB	± 1.0 dB dB	0.09	P
500 Hz	-0.14dB	± 1.5 dB	± 1.0 dB dB	0.09	P
1 kHz Ref	0.00dB	± 1.5 dB	± 1.0 dB dB	0.09	P
2 kHz	0.05dB	± 2.0 dB	± 1.0 dB dB	0.07	P
4 kHz	-0.25dB	± 3.0 dB	± 1.0 dB dB	0.13	P
8 kHz	-0.21dB	± 5.0 dB	+1.5;-3.0 dB	0.13	P
12.5 kHz	-0.10dB	+ 5.0; - ∞ dB	+3.0;-6.0 dB	0.19	P
16 kHz	0.61dB	+ 5.0; - ∞ dB	+ 3.0; - ∞ dB	0.30	P

Tolerances from AS1259-1990 part 1, (IEC 60651).

Notes:

Signed (Testing Officer) _____ Date:09/09/2019

Checked by: _____ Date:09/09/2019

Acoustic test WS 1 results

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 25533

EQUIPMENT TESTED:	1/2" Microphone
Manufacturer:	B & K
Type No:	4197 **Serial No:** 3077697 (Part 1)
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066
Tests Performed:	Acoustic Microphone Frequency Response with Inverse A Weighting

CONDITION OF TEST:

Ambient Pressure:	997 hPa ±1.5 hPa **Relative Humidity:** 24% ±5%
Temperature:	23 °C ±2° C
Date of Calibration:	09/09/2019 **Issue Date** 09/09/2019
Acu-Vib Test Procedure:	AVP05 (Microphone Acoustic Frequency Response)

CHECKED BY: JKB **AUTHORISED SIGNATURE:** .....
Jack Rielt

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Acoustic Tests, Microphone response

Job No: 13678 Test No: 25533

Microphone type: B&K 4197 Serial No,: 3077697 (Part 1)

Preamplifier type: 2683 Serial No. : 2792513

SLM body (if appropriate): SVAN 912 AE Serial No: 4396

Ambient Temperature: 23C ±2° C, Relative Humidity: 997 RH ±5% RH,

Ambient Pressure: 24 hPa ±1.5 hPa

Frequency Hz	Deviation re 1 kHz	Type 2 Tol.	Type 1 Tol.	U95 dB	P/F
31.5 Hz	0.11dB	± 3.0 dB	± 1.5 dB dB	0.12	P
63 Hz	-0.11dB	± 2.0 dB	± 1.5 dB dB	0.10	P
125 Hz	-0.18dB	± 1.5 dB	± 1.0 dB dB	0.09	P
250 Hz	-0.25dB	± 1.5 dB	± 1.0 dB dB	0.09	P
500 Hz	-0.24dB	± 1.5 dB	± 1.0 dB dB	0.09	P
1 kHz Ref	0.00dB	± 1.5 dB	± 1.0 dB dB	0.09	P
2 kHz	0.05dB	± 2.0 dB	± 1.0 dB dB	0.07	P
4 kHz	-0.25dB	± 3.0 dB	± 1.0 dB dB	0.13	P
8 kHz	-0.31dB	± 5.0 dB	+1.5;-3.0 dB	0.13	P
12.5 kHz	-0.20dB	+ 5.0; - ∞ dB	+3.0;-6.0 dB	0.19	P
16 kHz	0.51dB	+ 5.0; - ∞ dB	+ 3.0; - ∞ dB	0.30	P

Tolerances from AS1259-1990 part 1, (IEC 60651).

Notes:

Signed (Testing Officer) _____ Date:09/09/2019

Checked by: _____ Date:09/09/2019

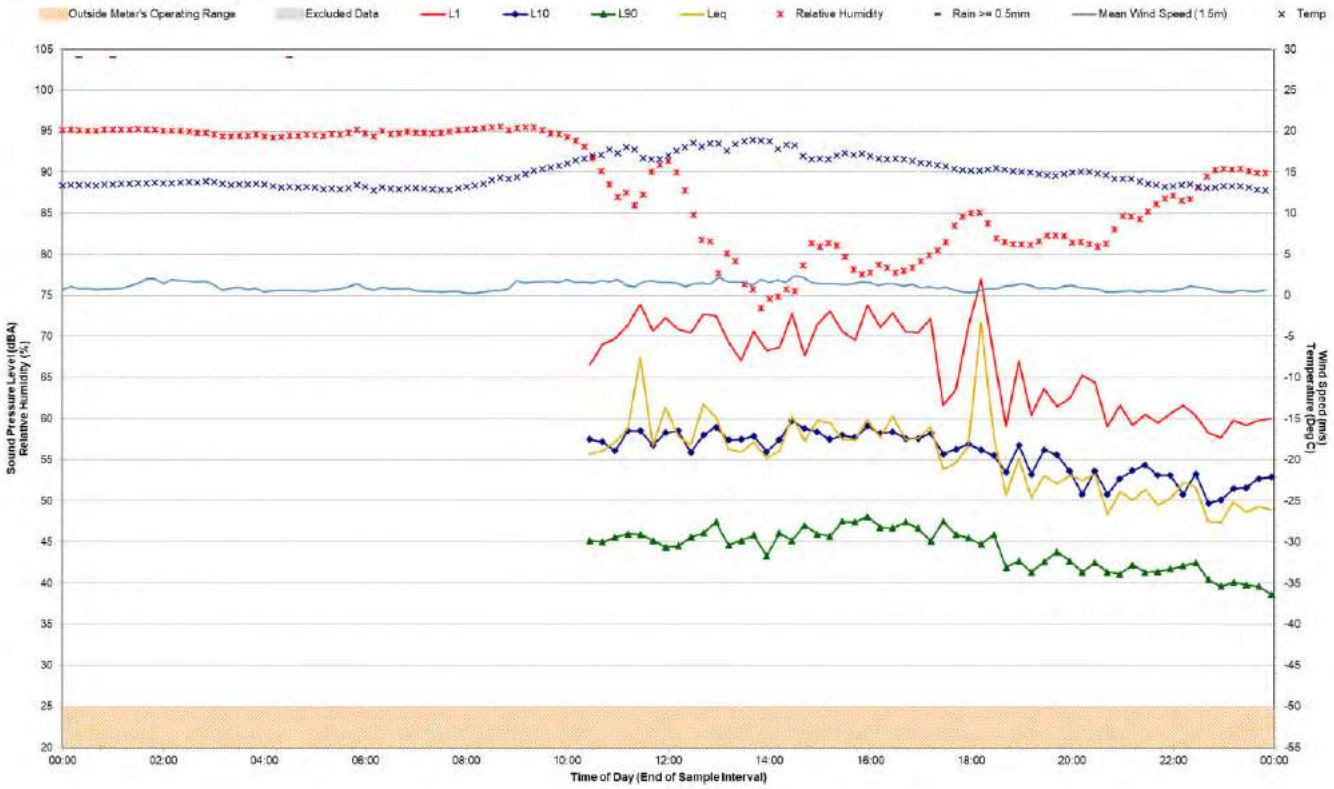
Acoustic test WS 1 results

APPENDIX D

Statistical Ambient Noise Levels

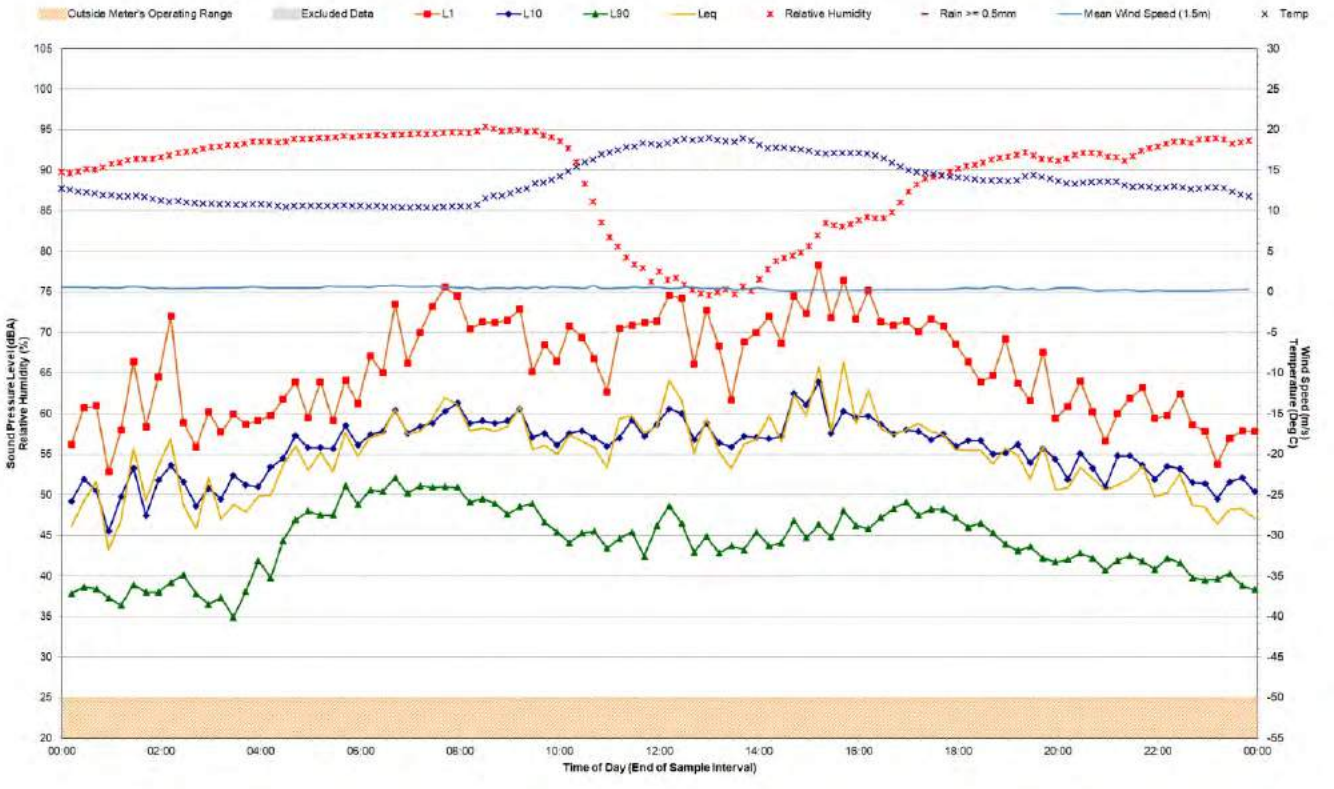
Statistical Ambient Noise Levels

Location F - Tuesday, 26 May 2020



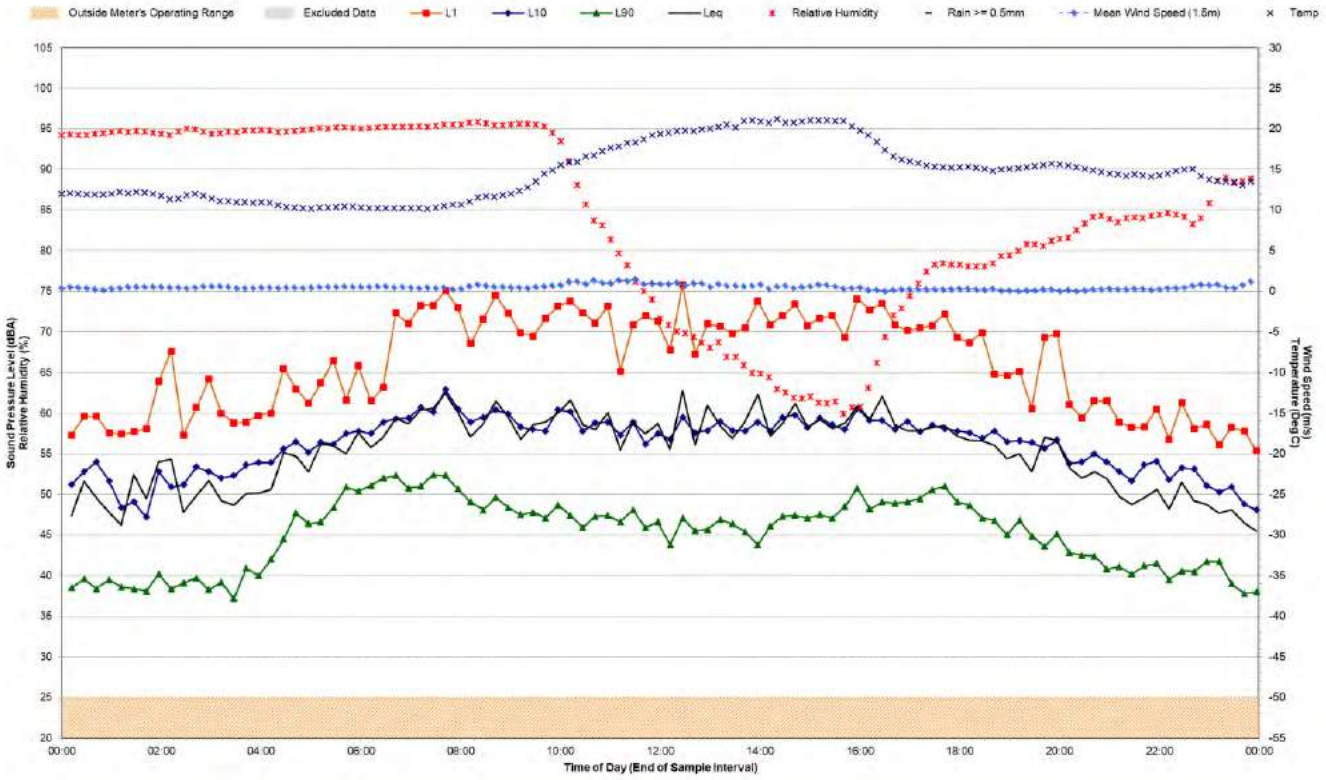
Statistical Ambient Noise Levels

Location F - Wednesday, 27 May 2020



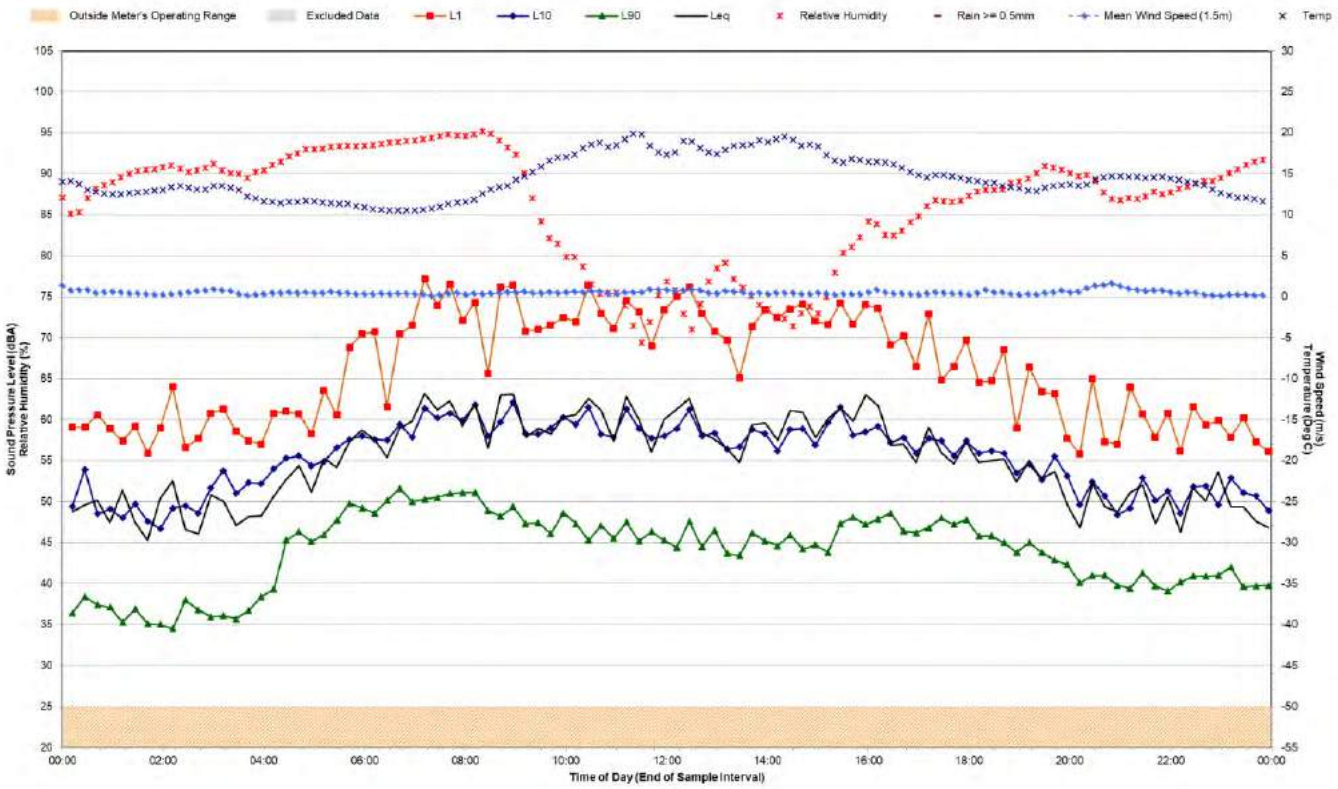
Statistical Ambient Noise Levels

Location F - Thursday, 28 May 2020



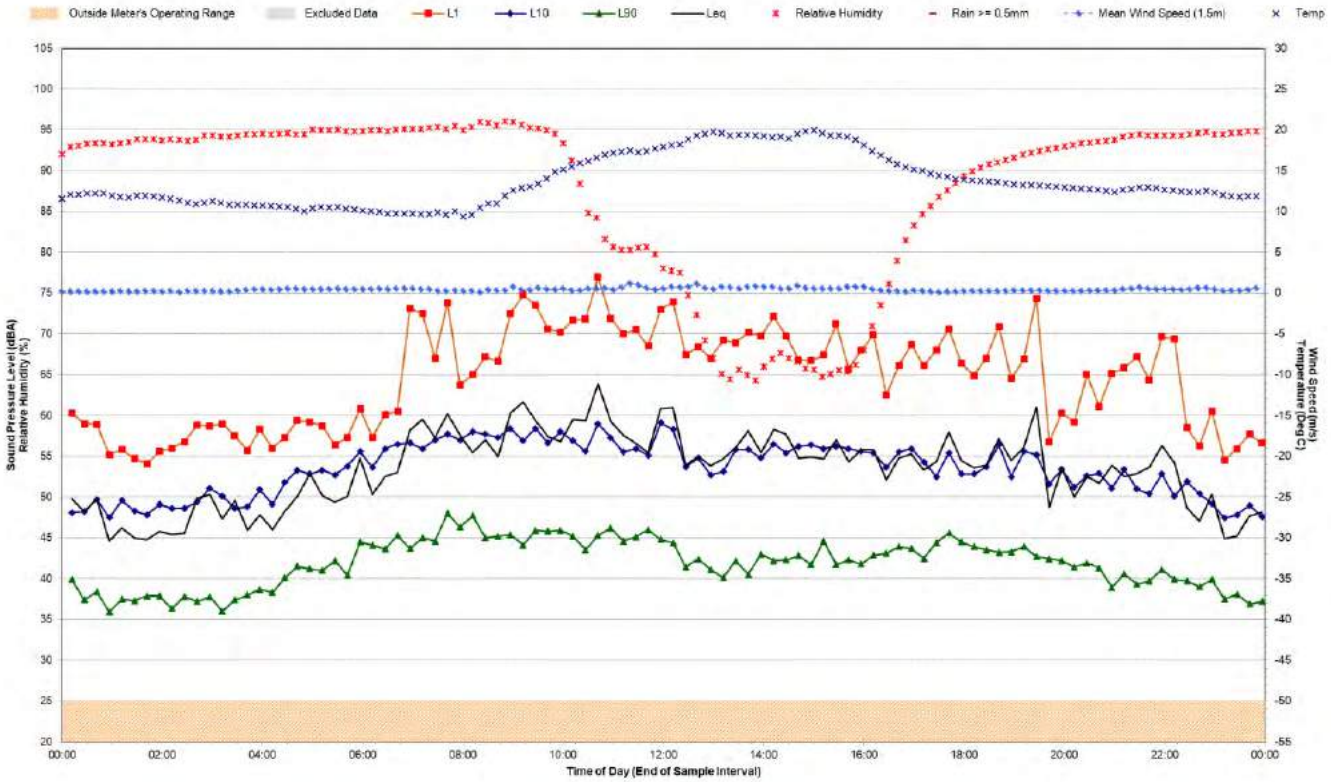
Statistical Ambient Noise Levels

Location F - Friday, 29 May 2020



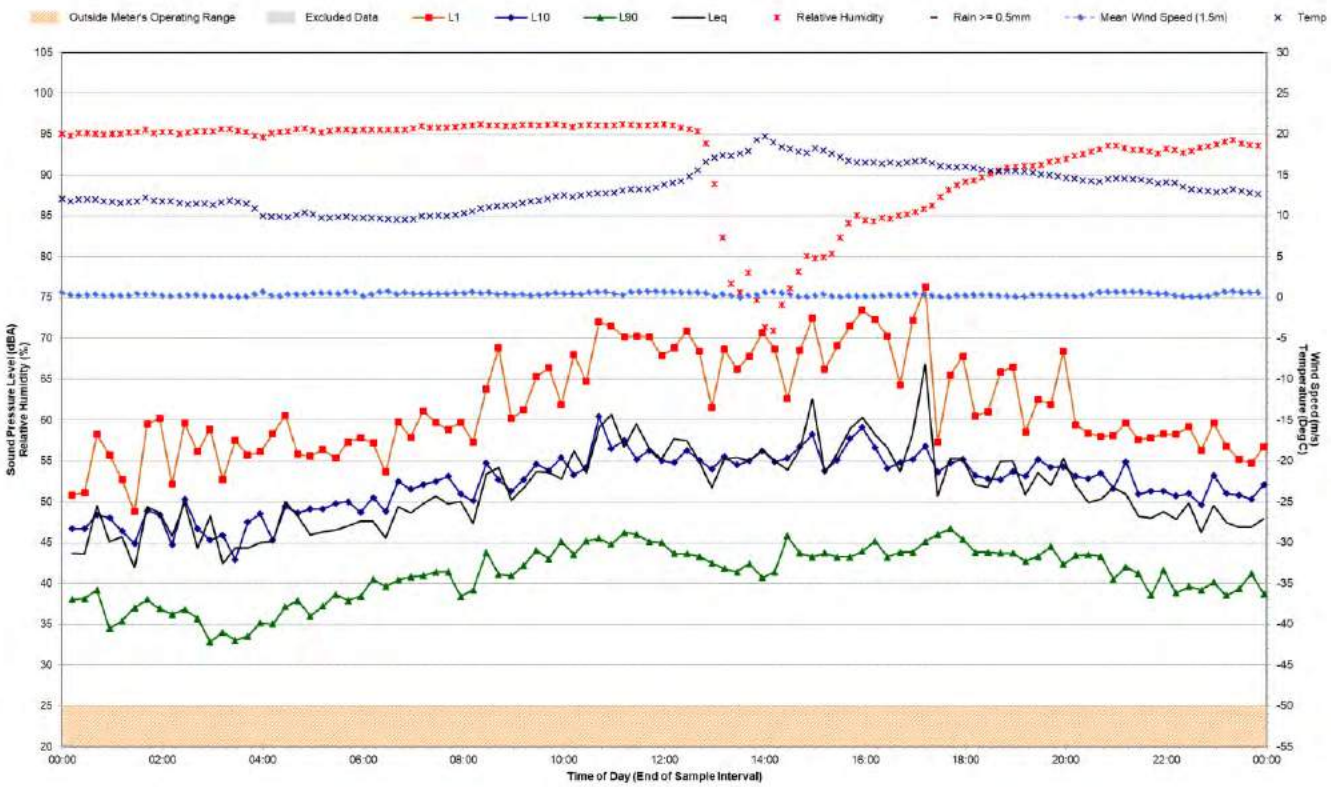
Statistical Ambient Noise Levels

Location F - Saturday, 30 May 2020



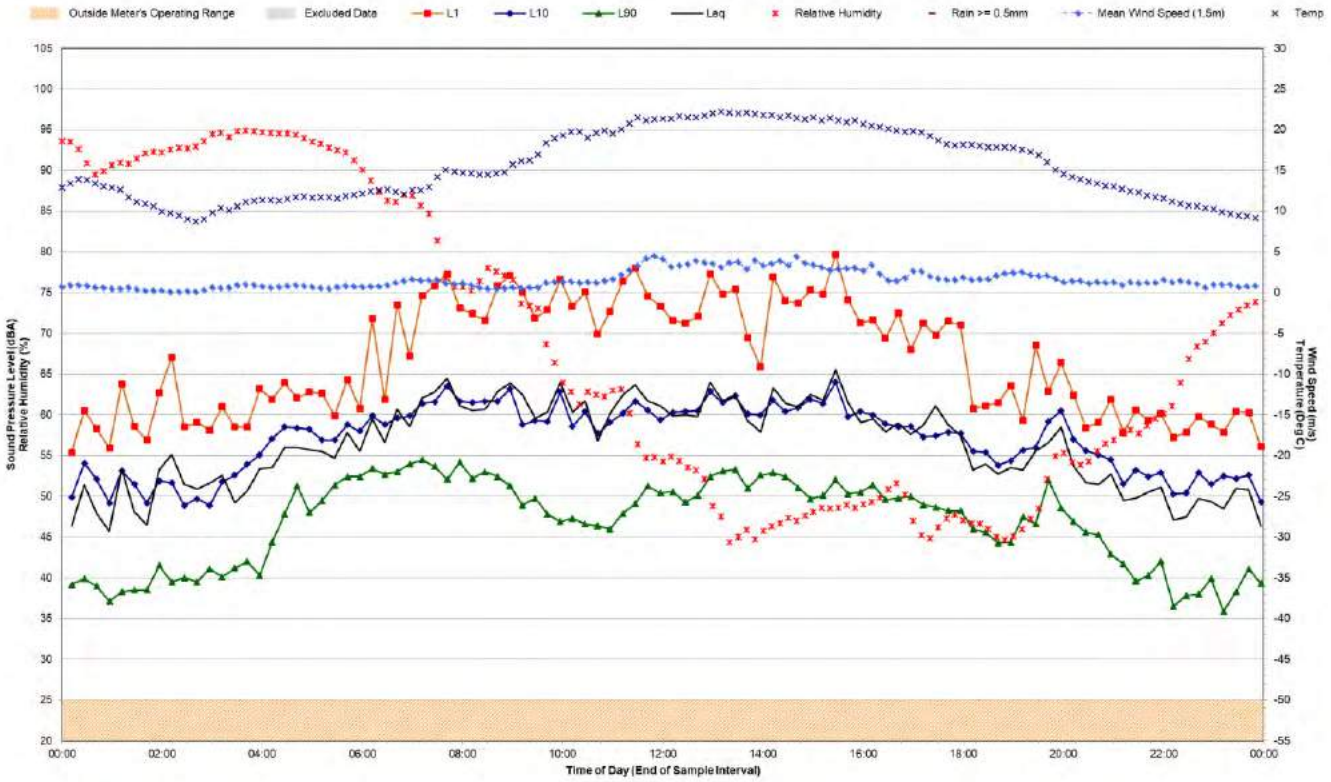
Statistical Ambient Noise Levels

Location F - Sunday, 31 May 2020



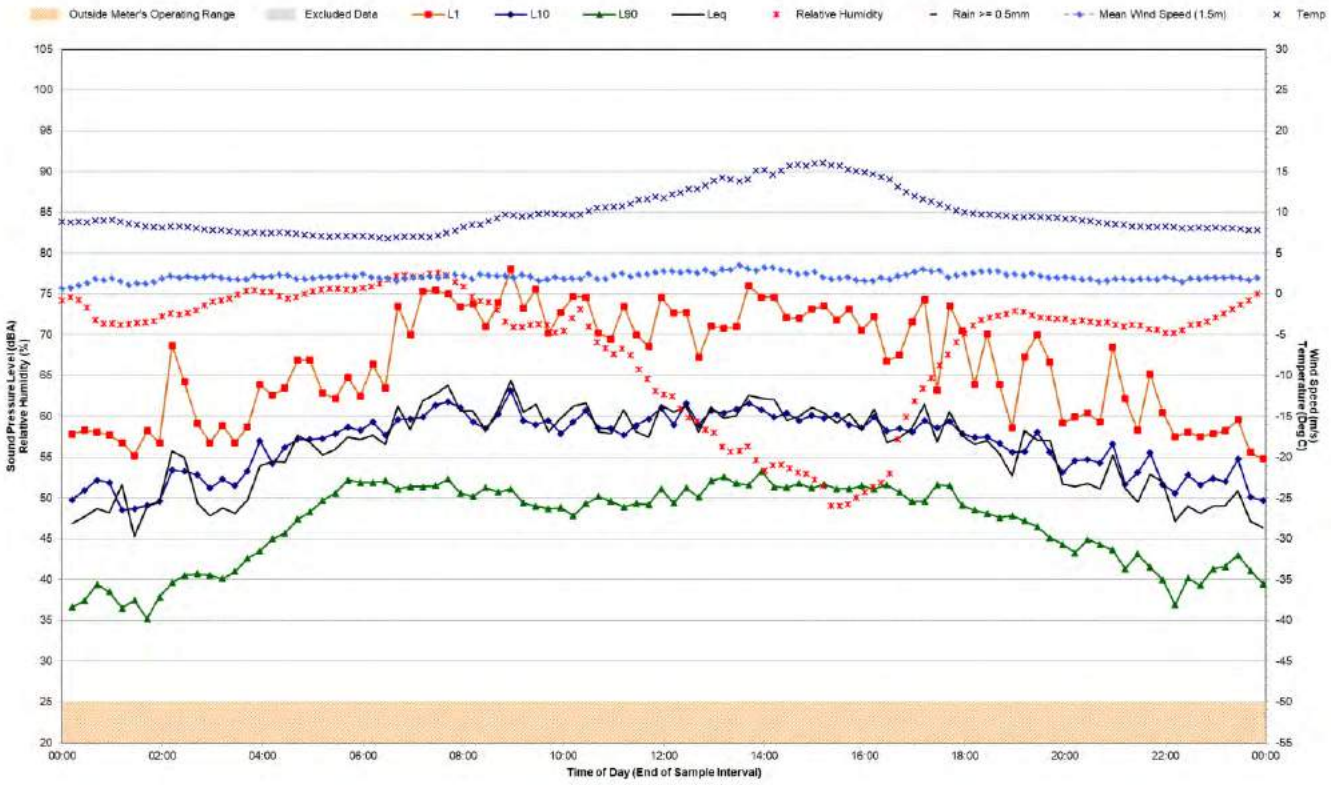
Statistical Ambient Noise Levels

Location F - Monday, 1 June 2020



Statistical Ambient Noise Levels

Location F - Tuesday, 2 June 2020



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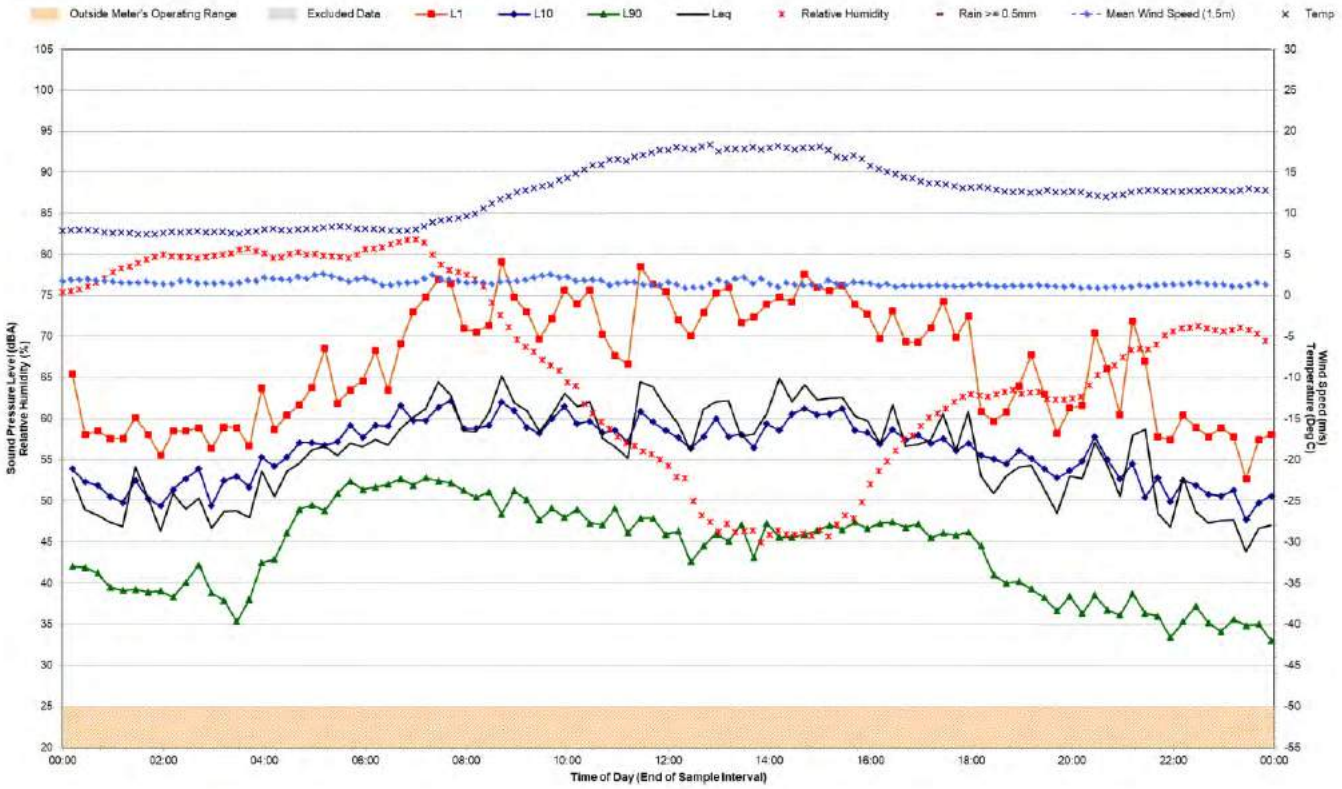

Statistical Ambient Noise Levels

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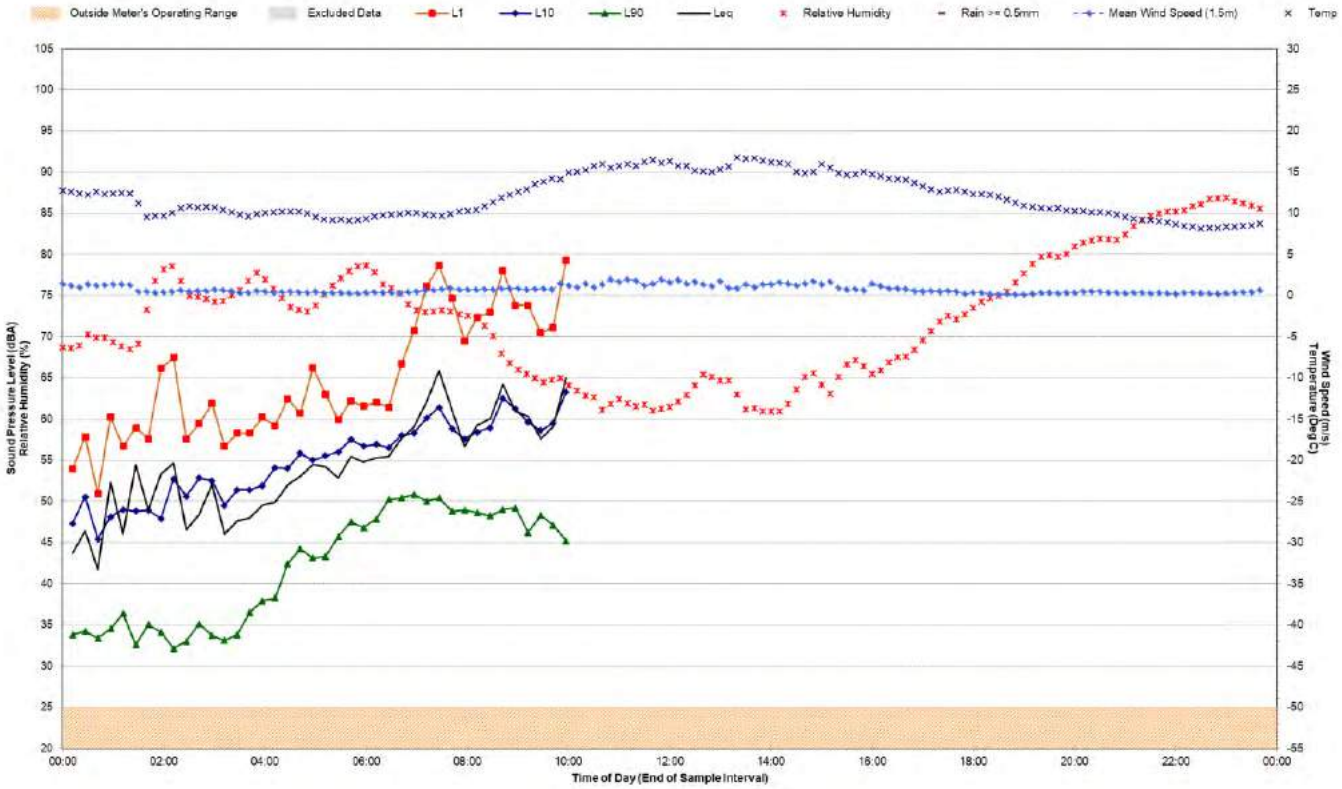

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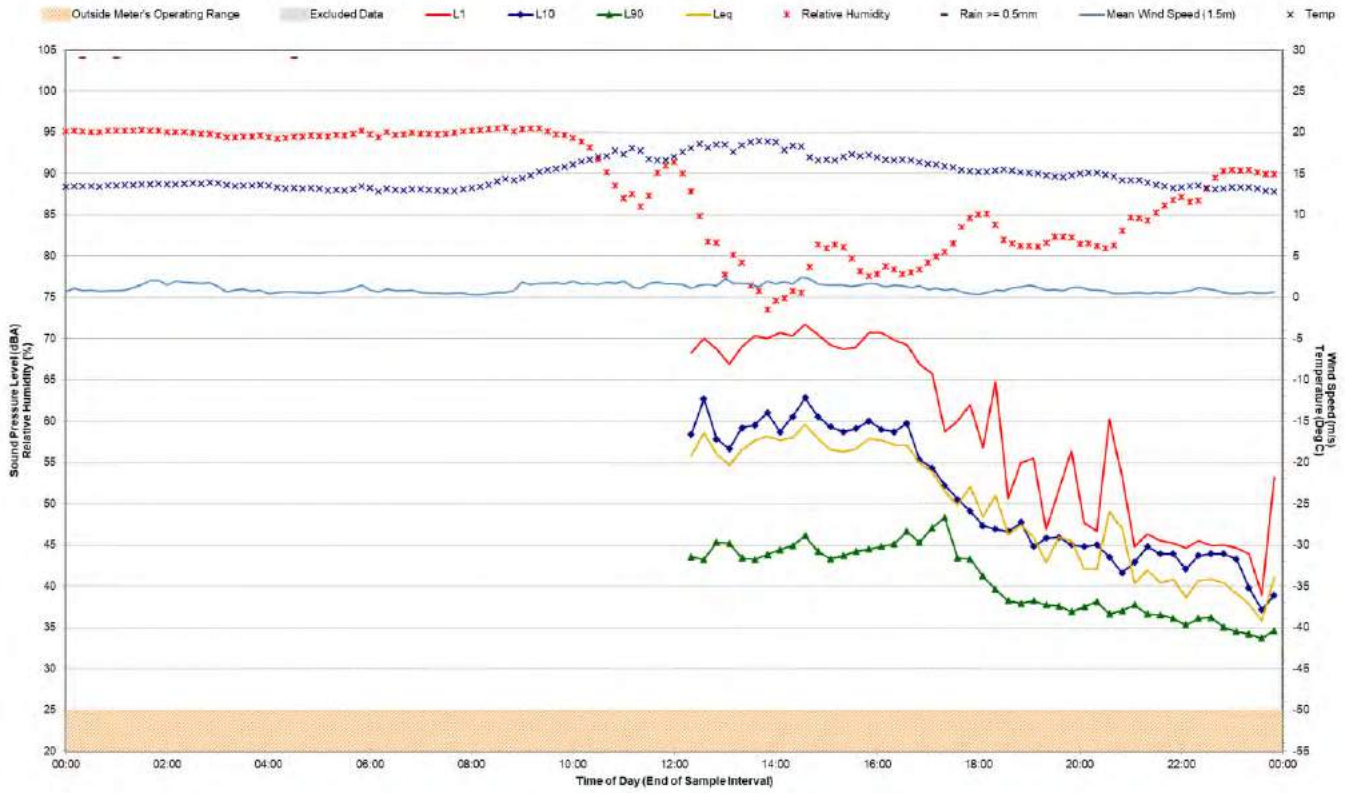

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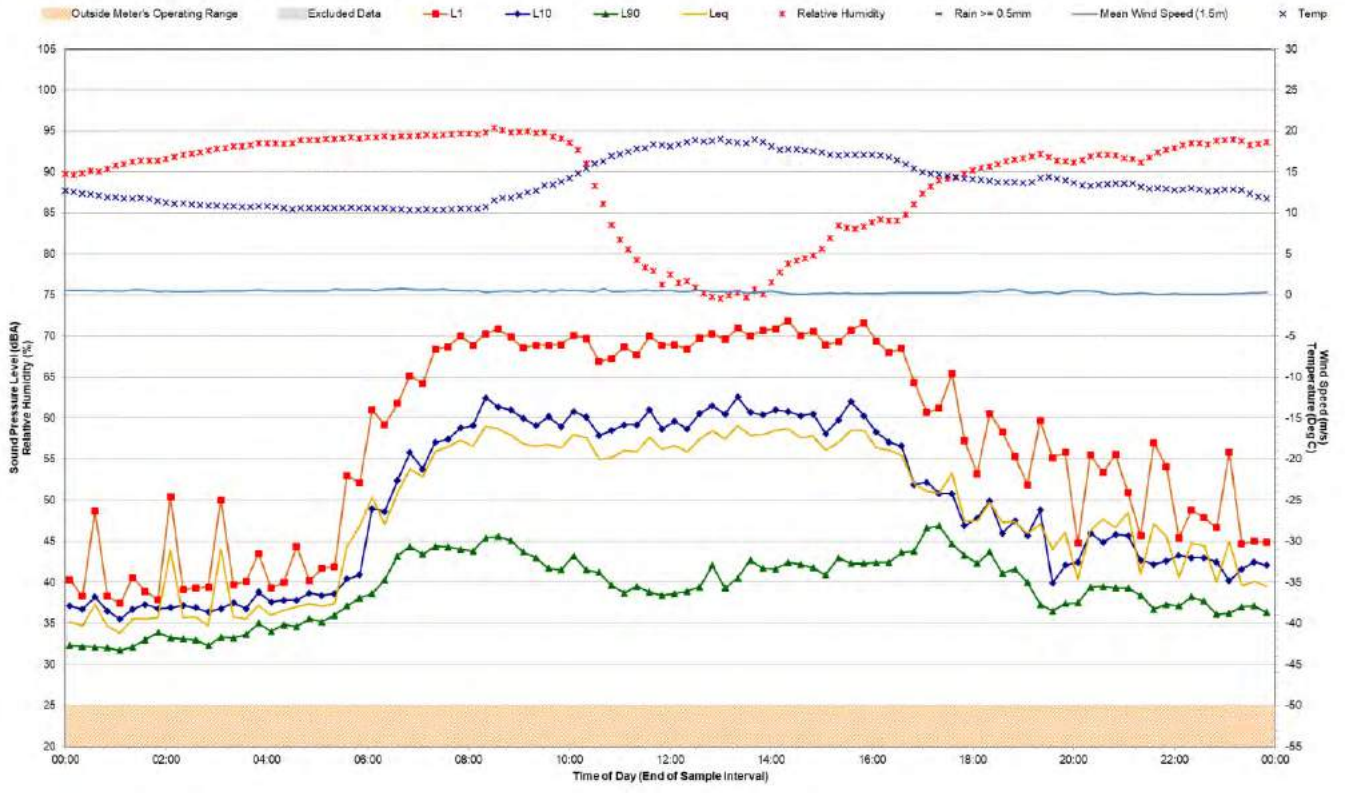

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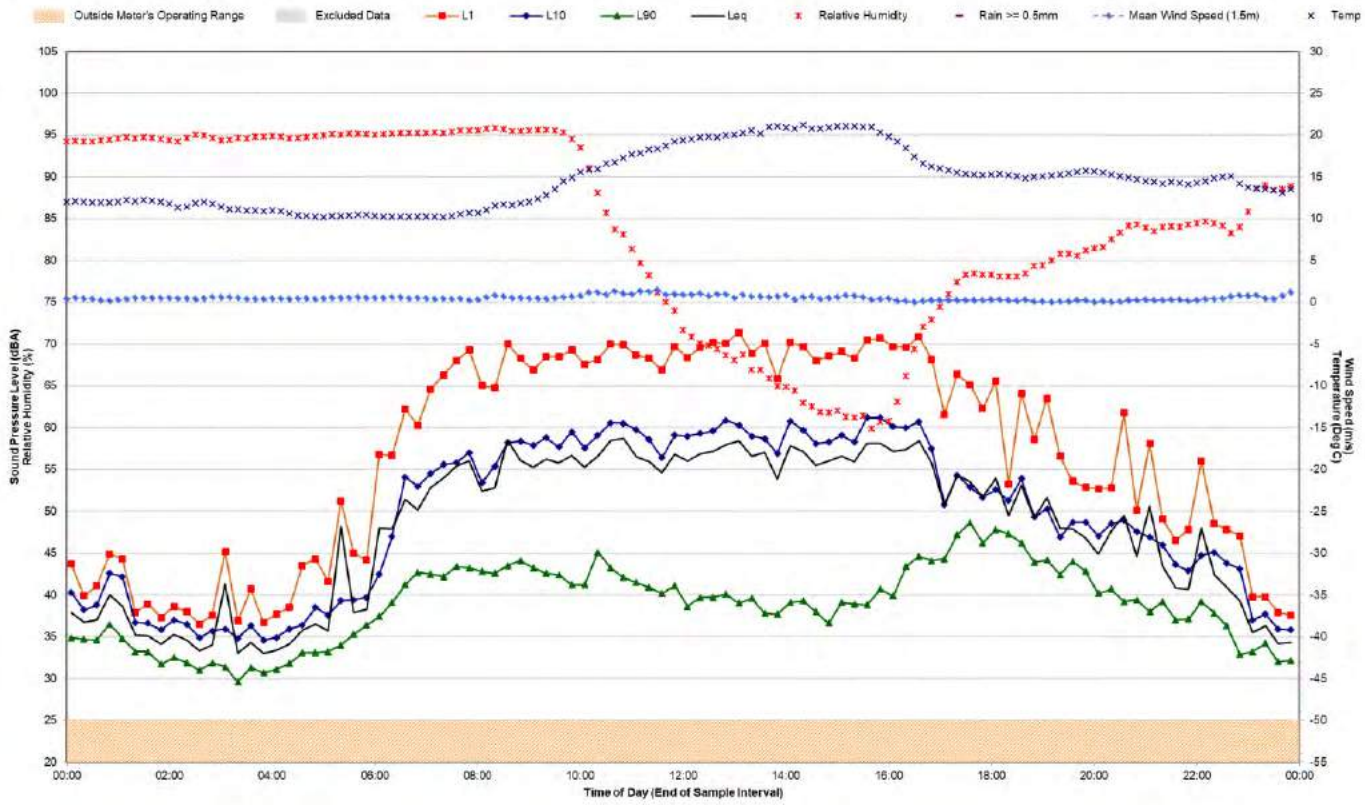

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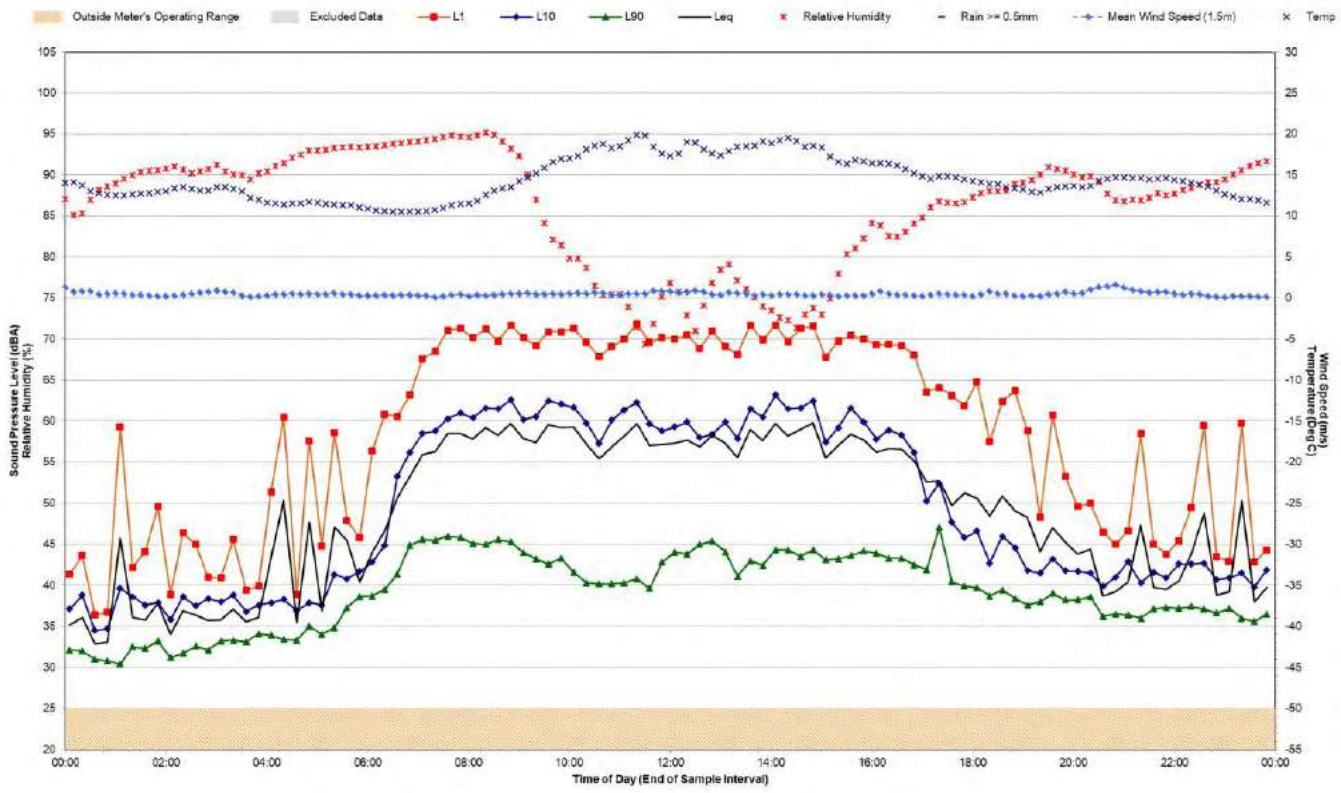

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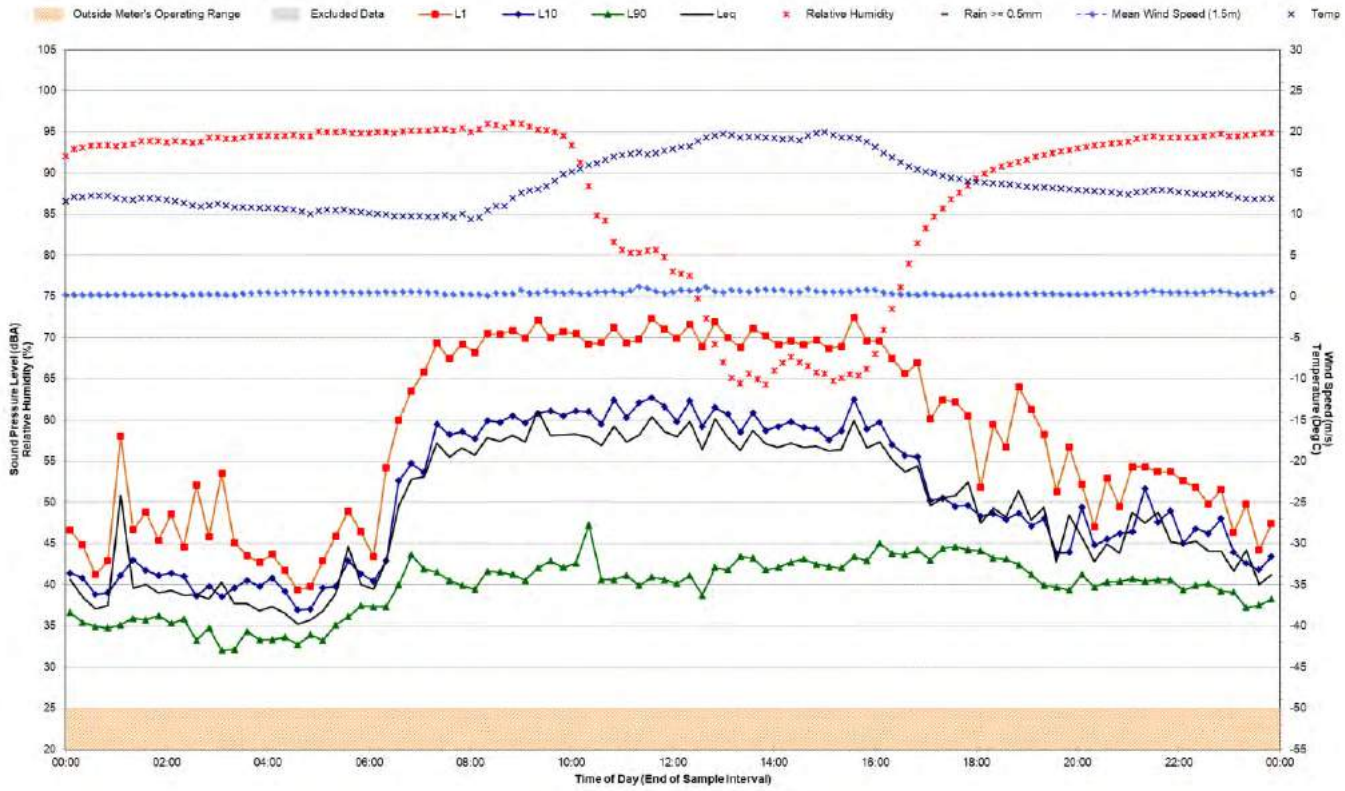

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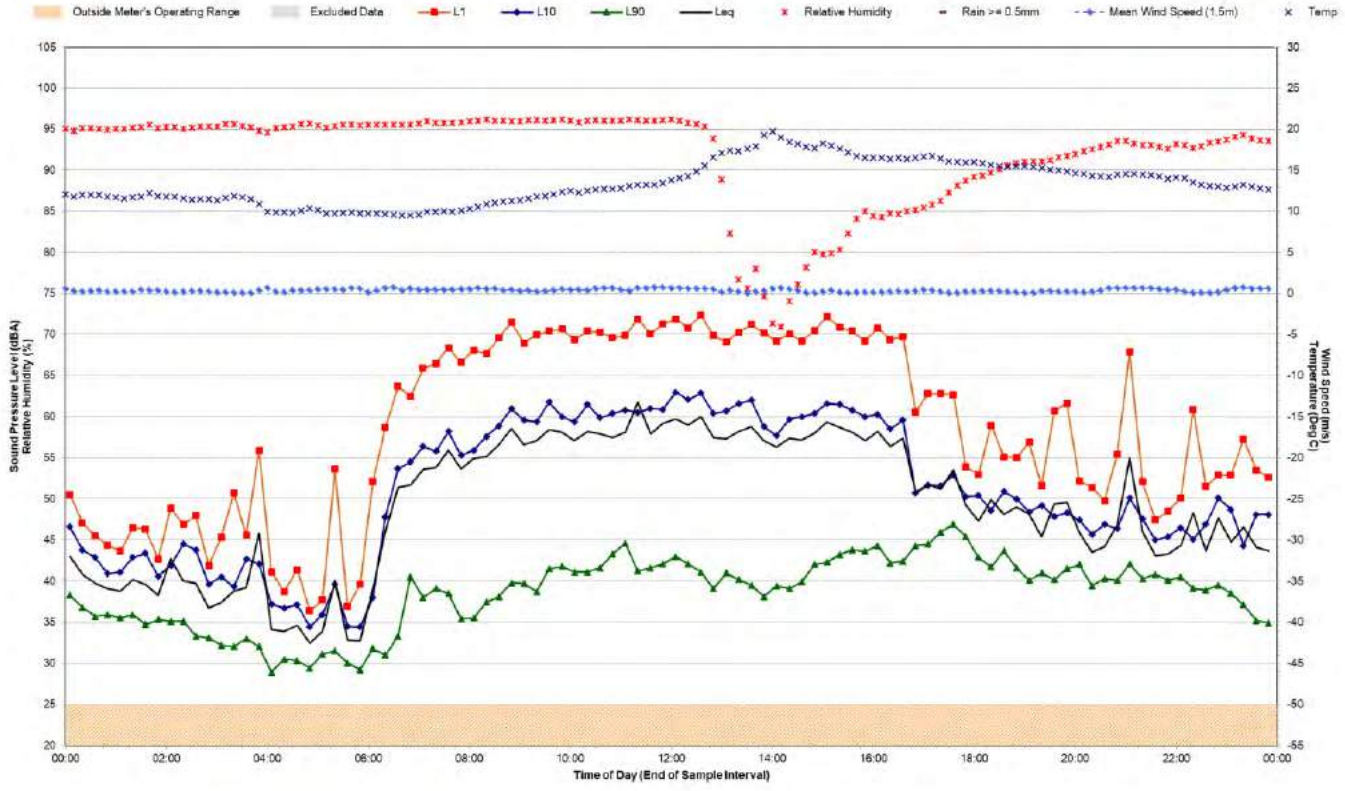

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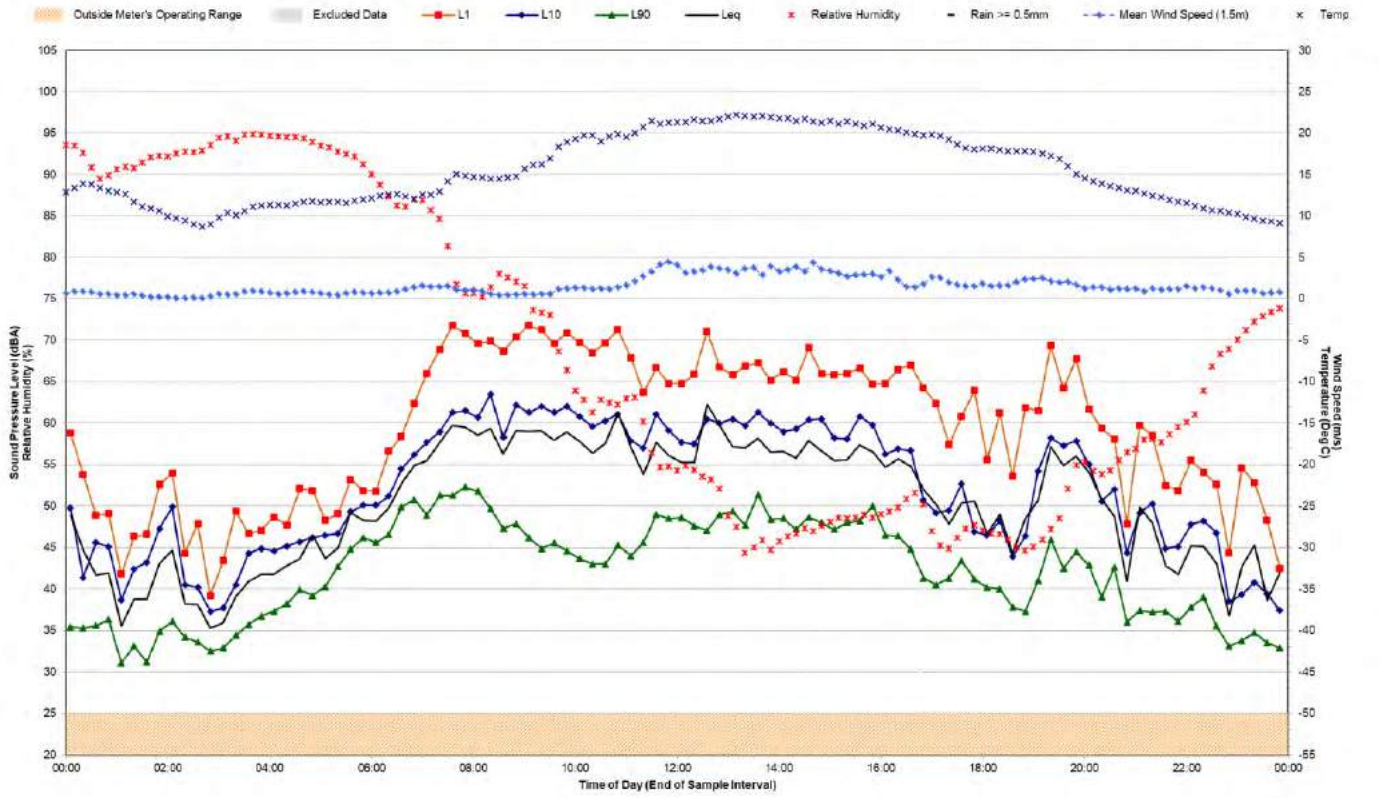

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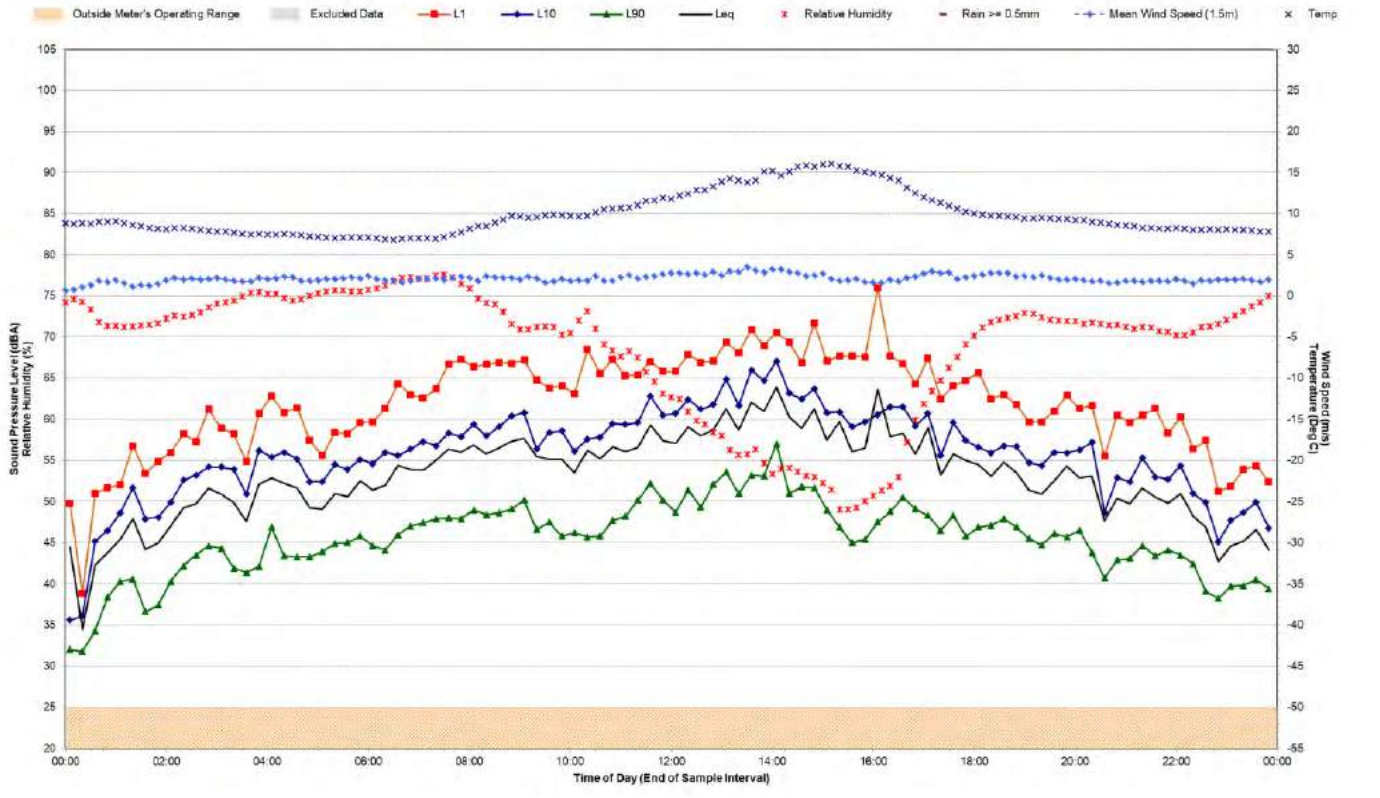

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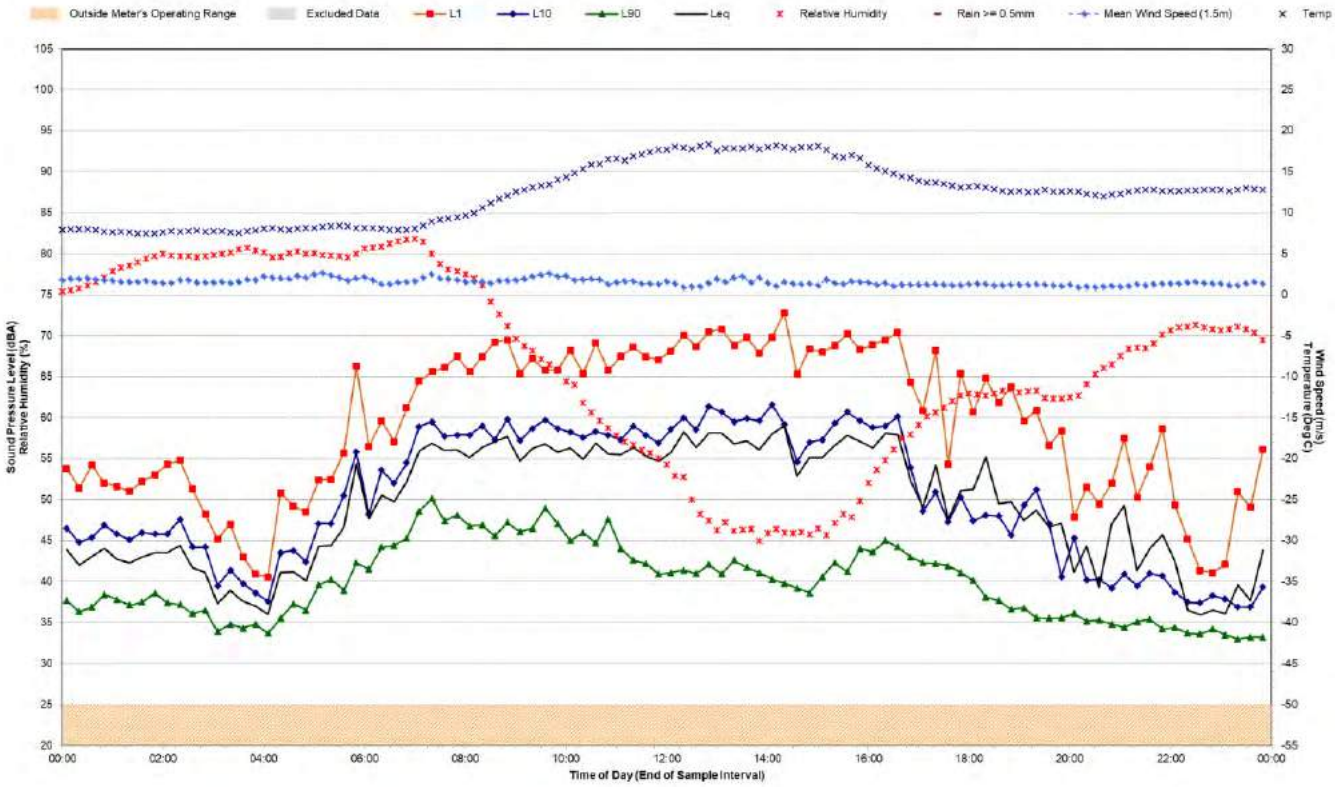

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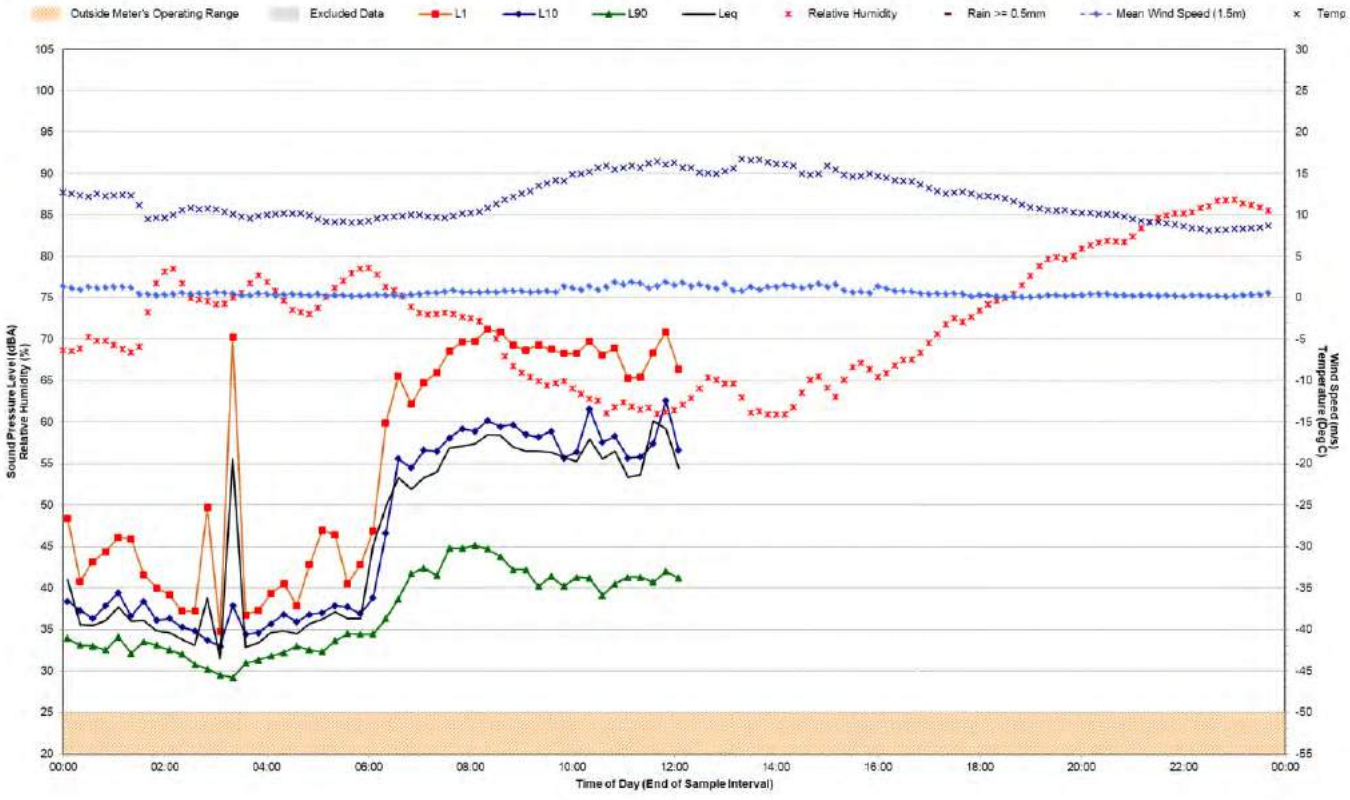

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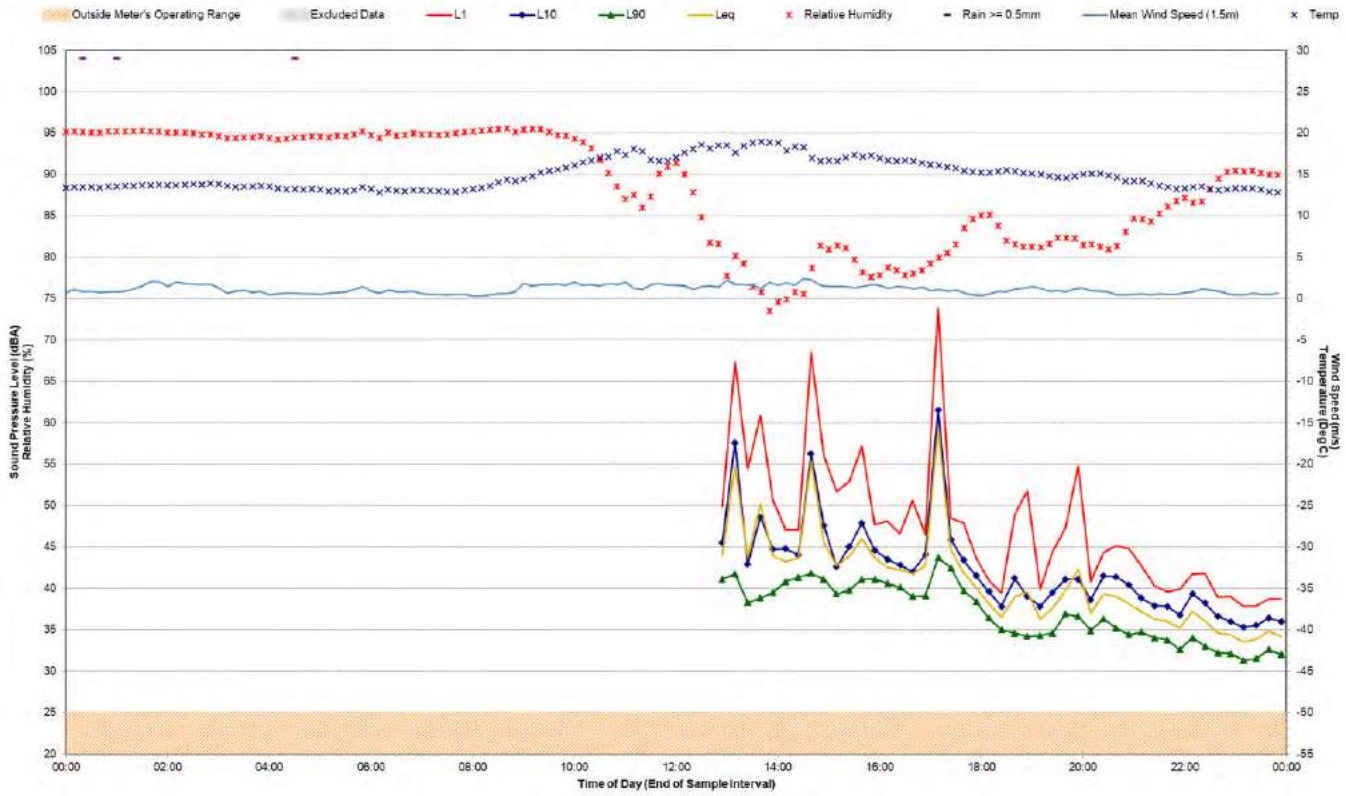

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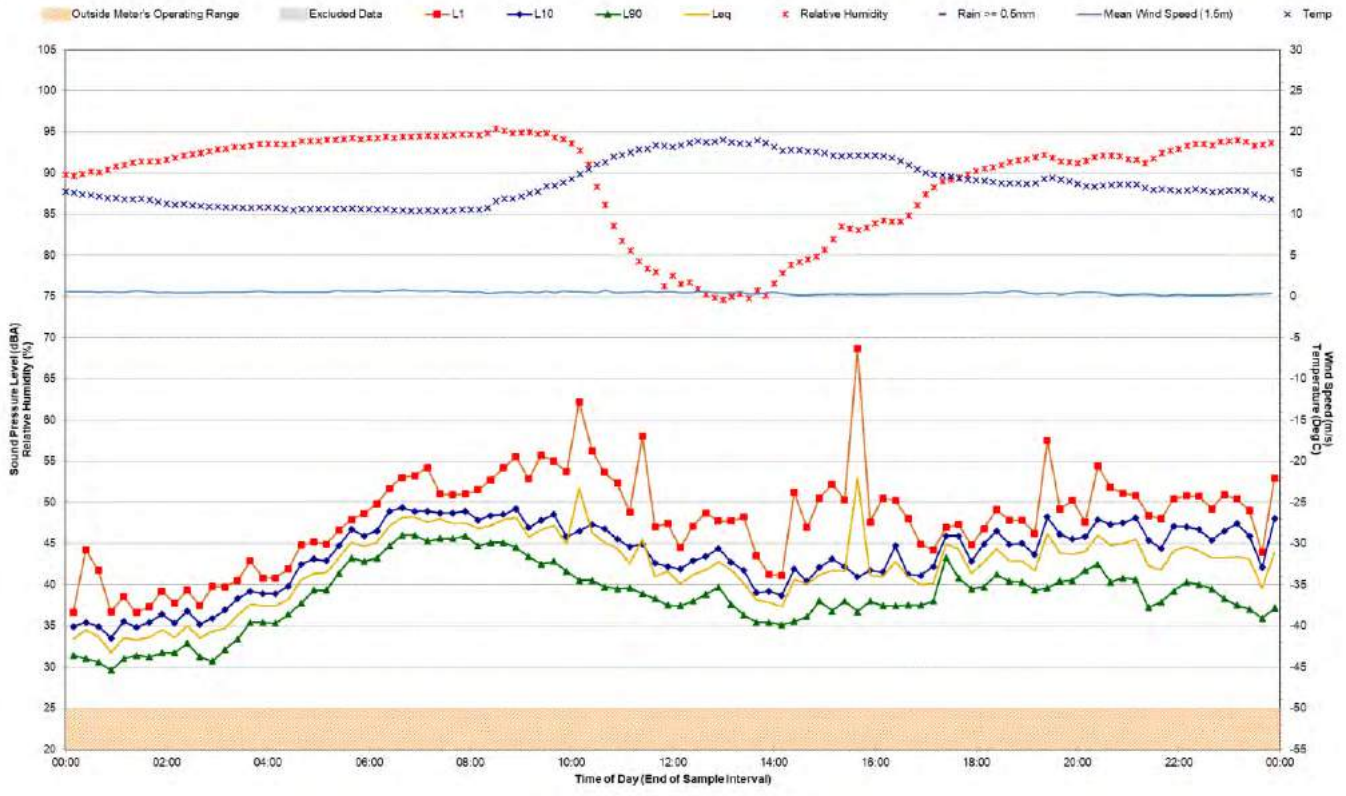

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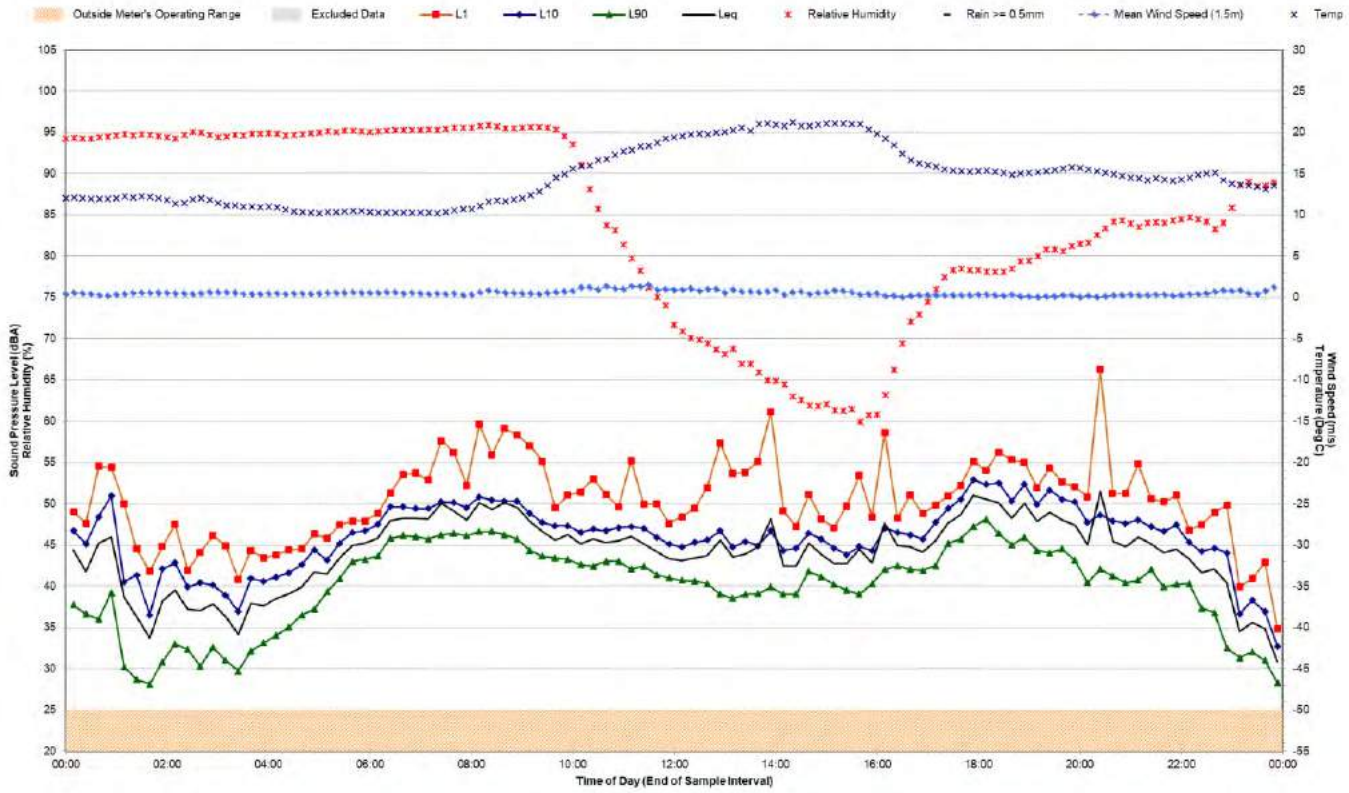

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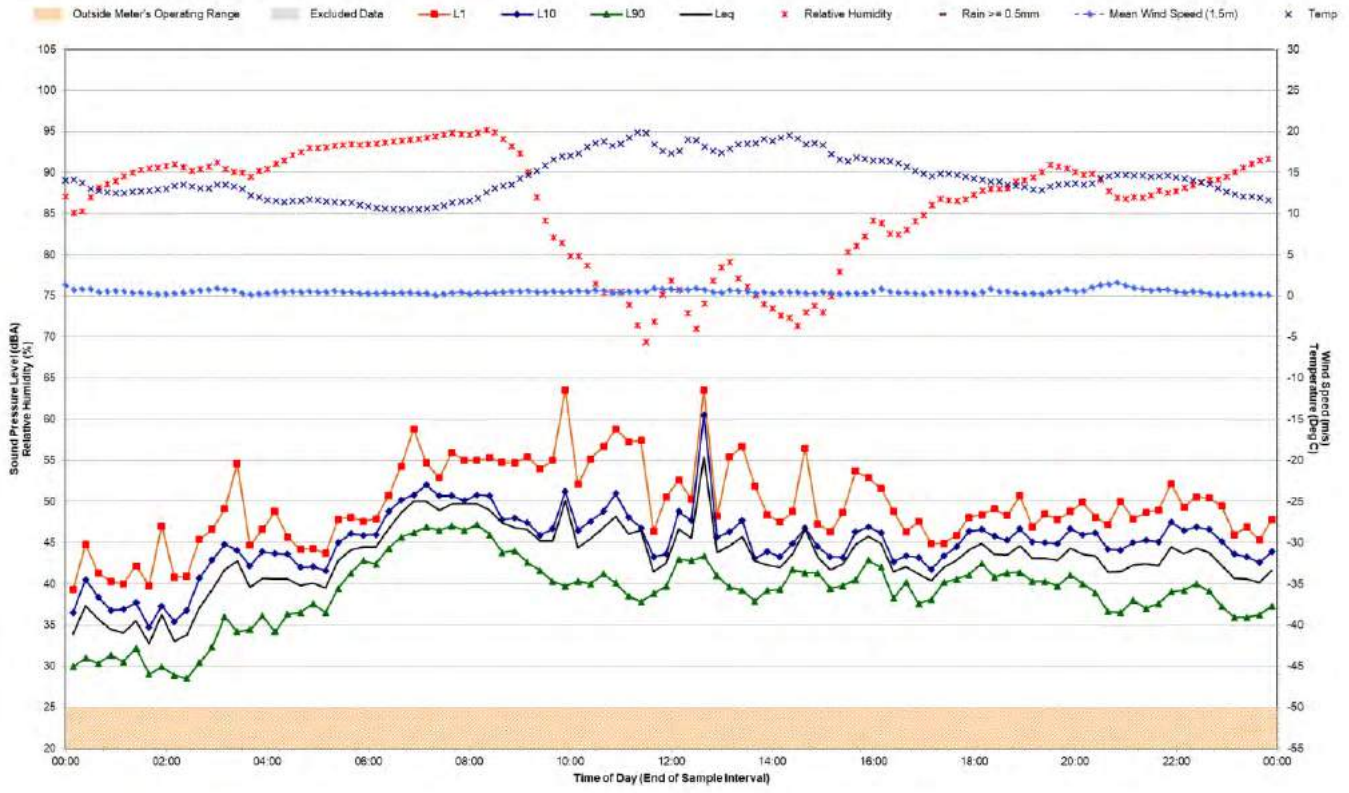

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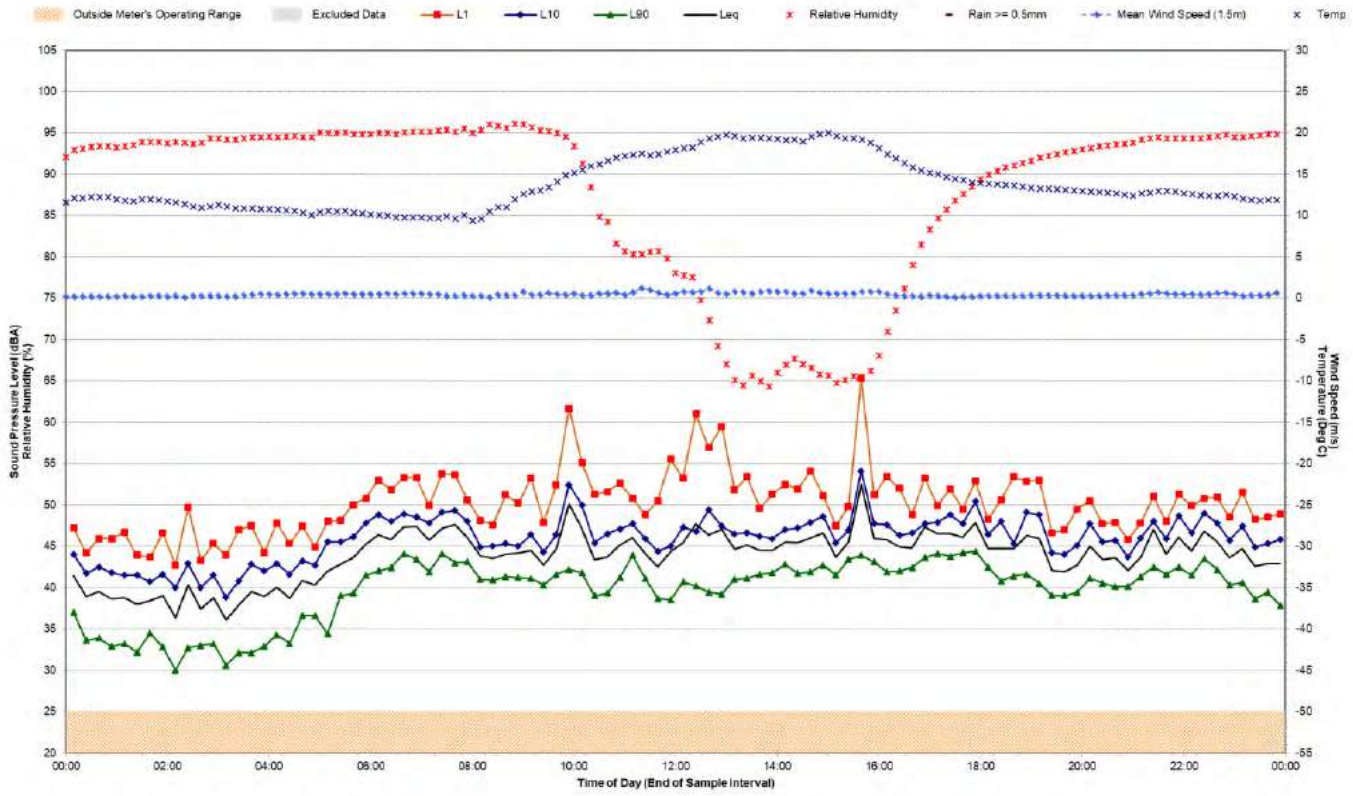

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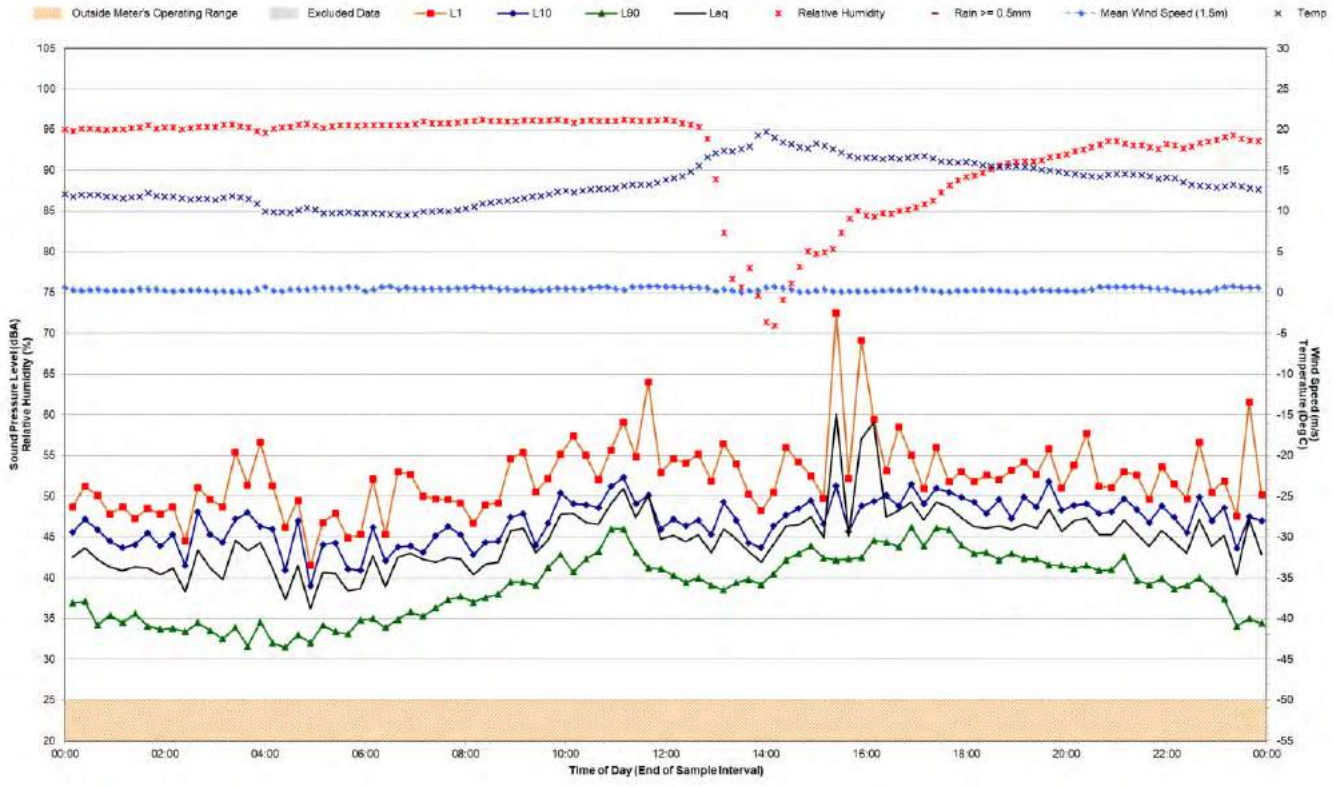

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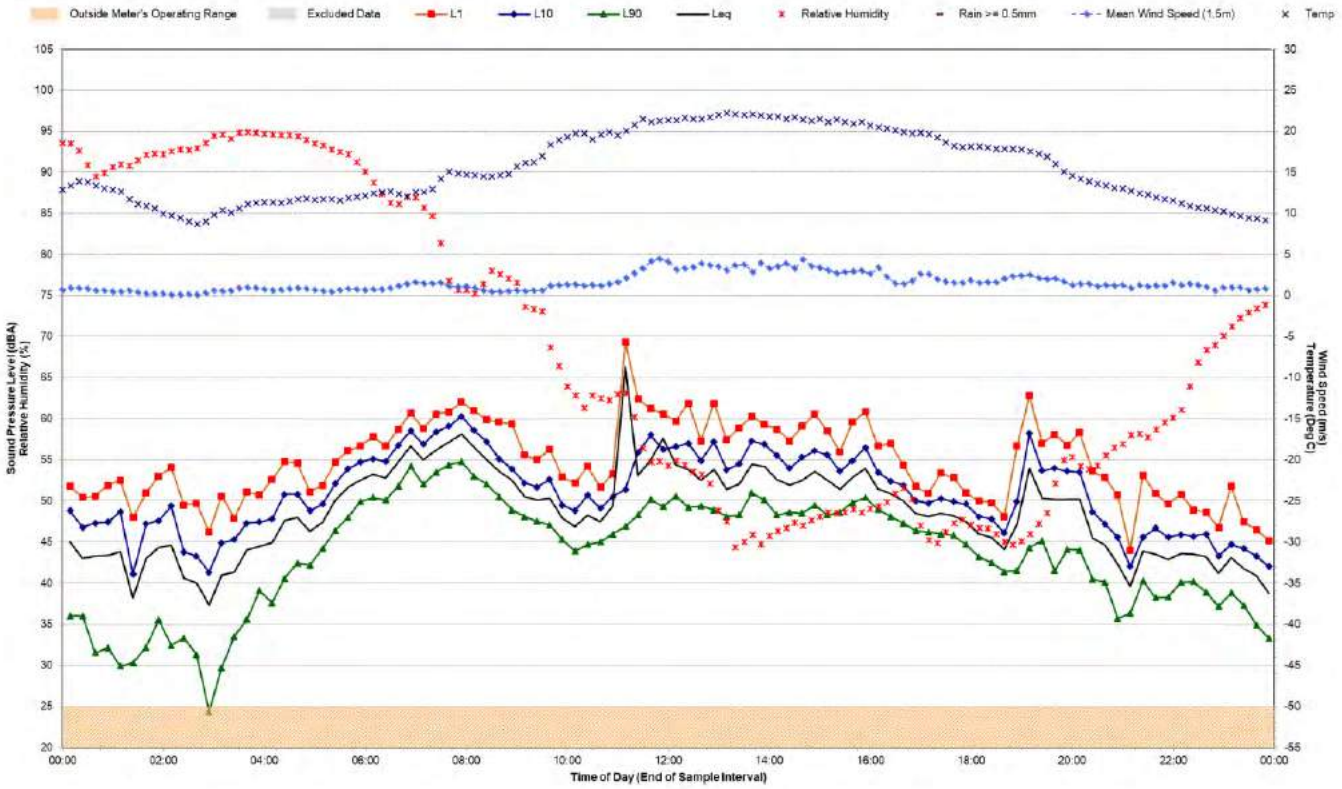

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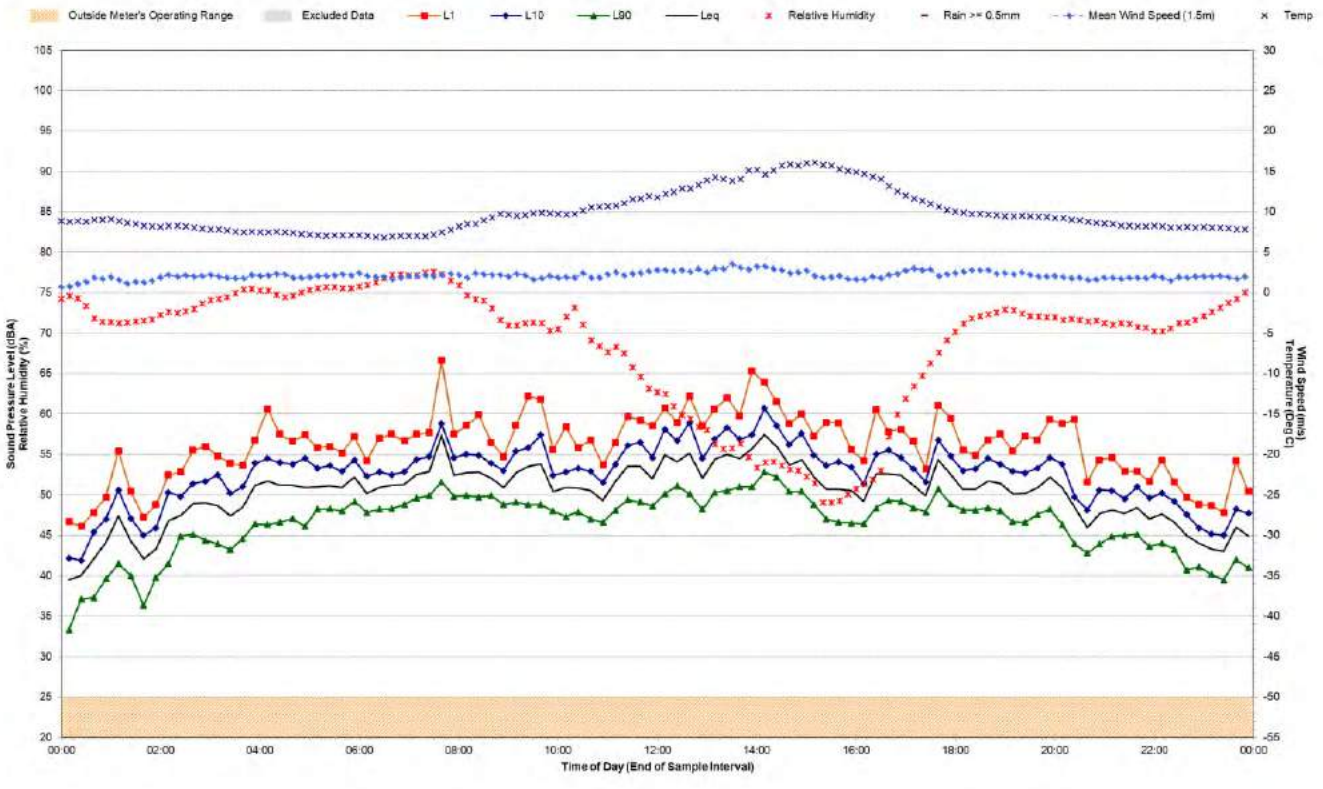

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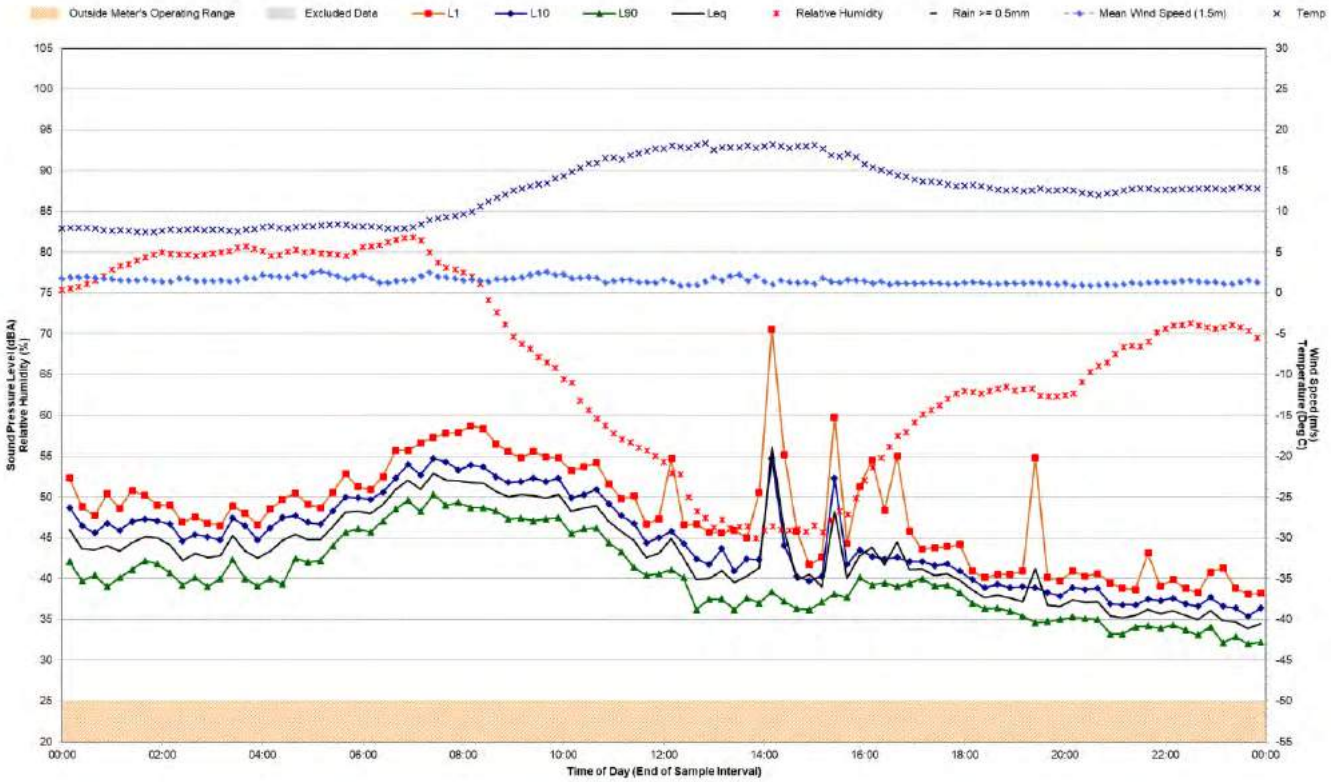

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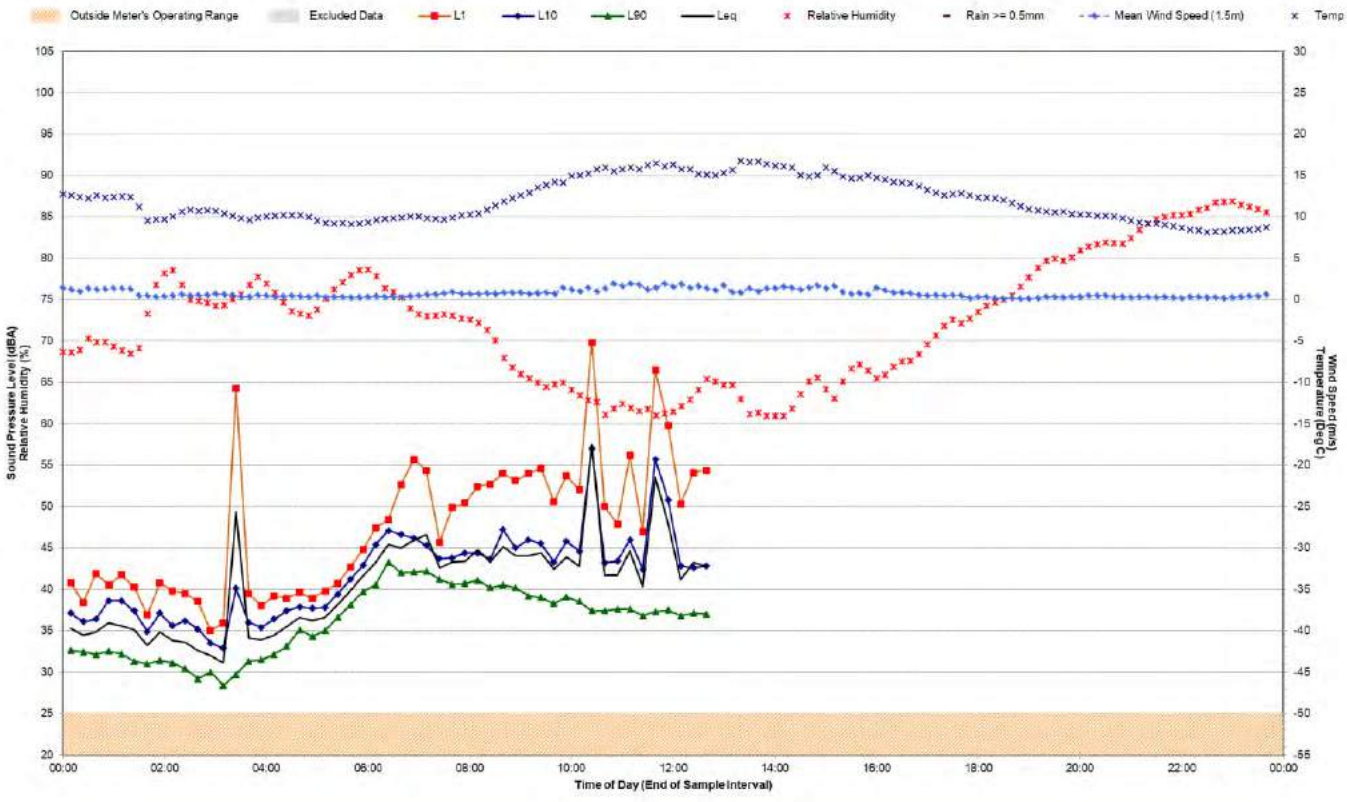

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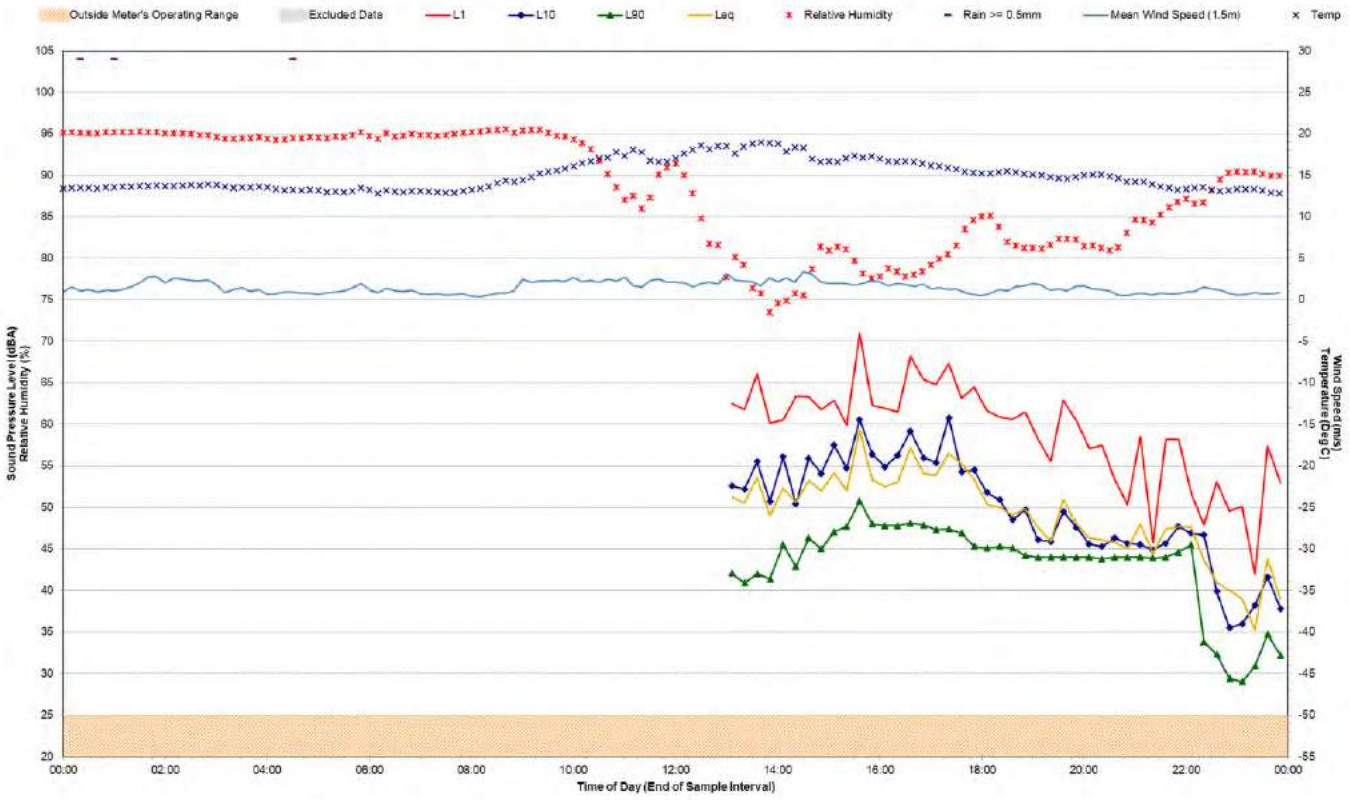

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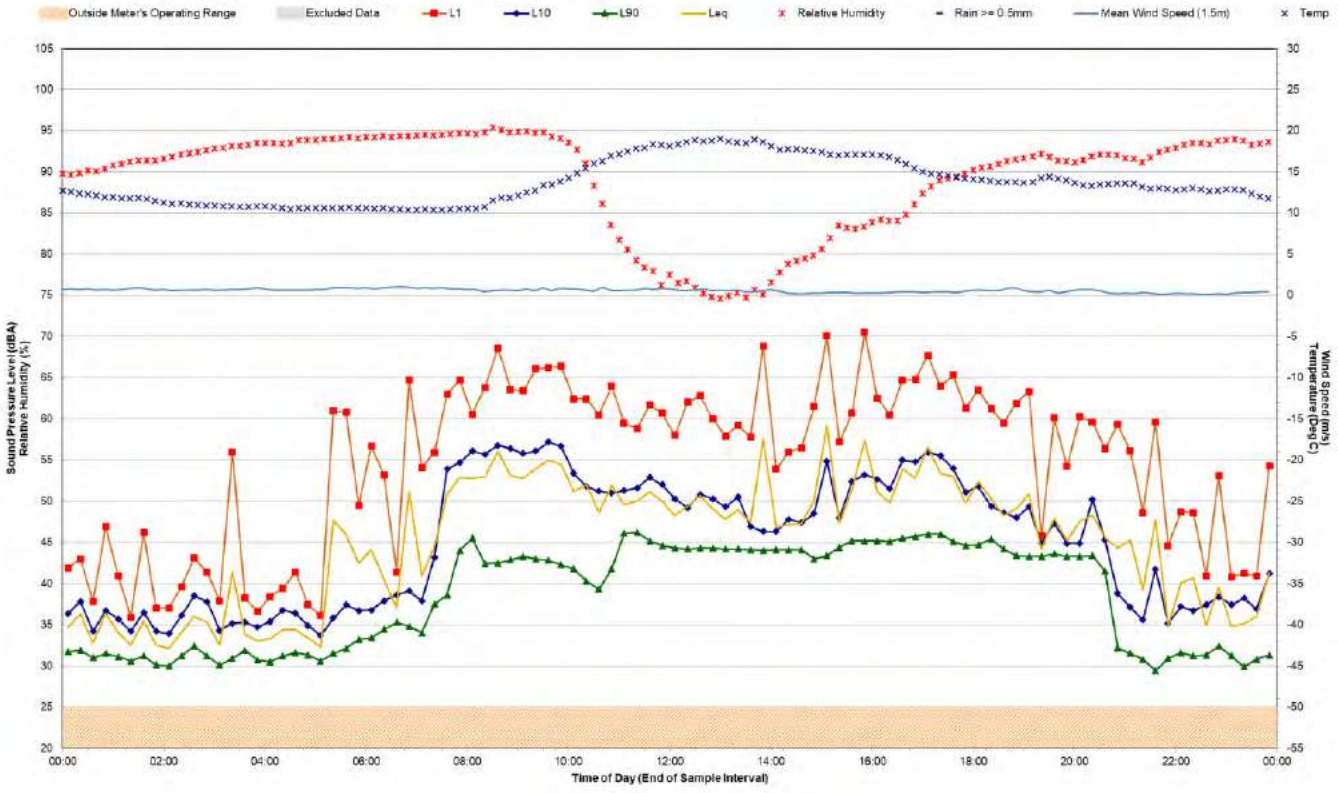

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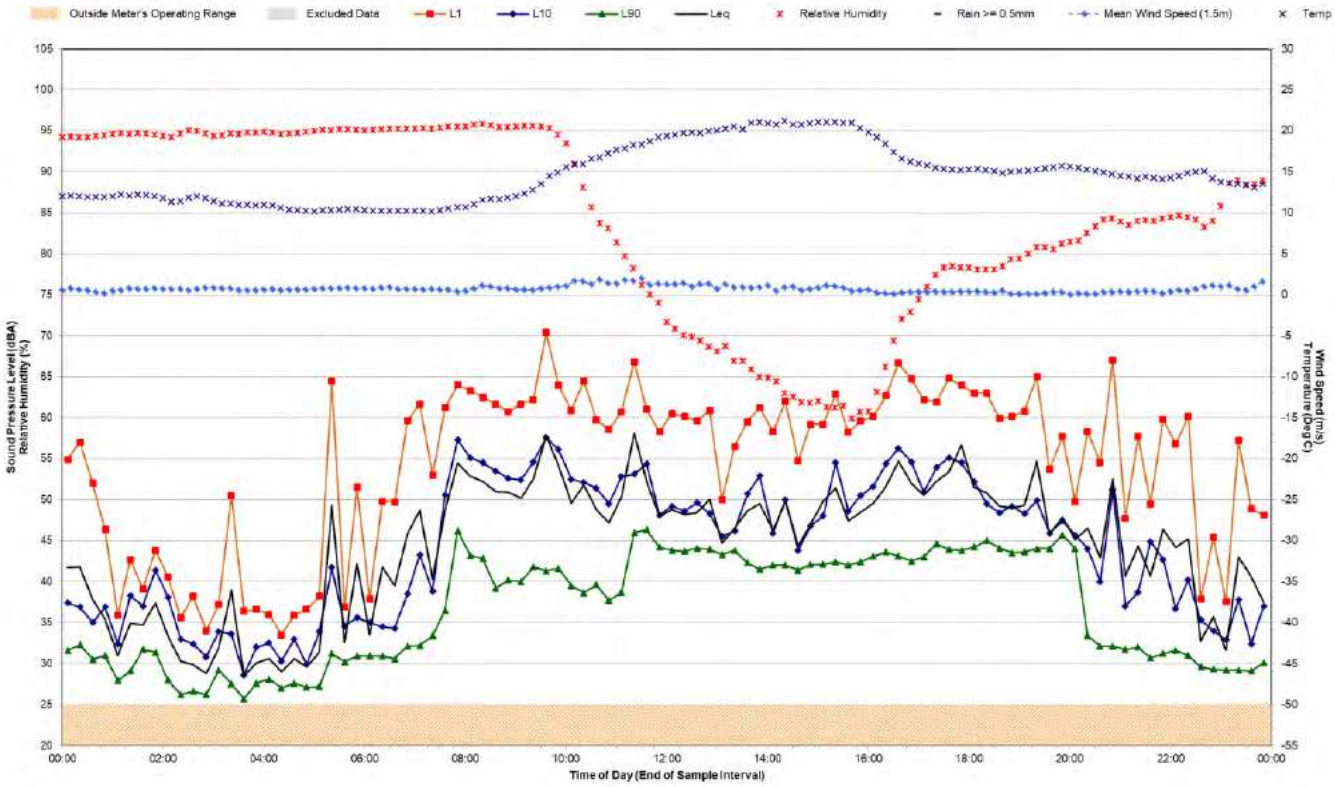

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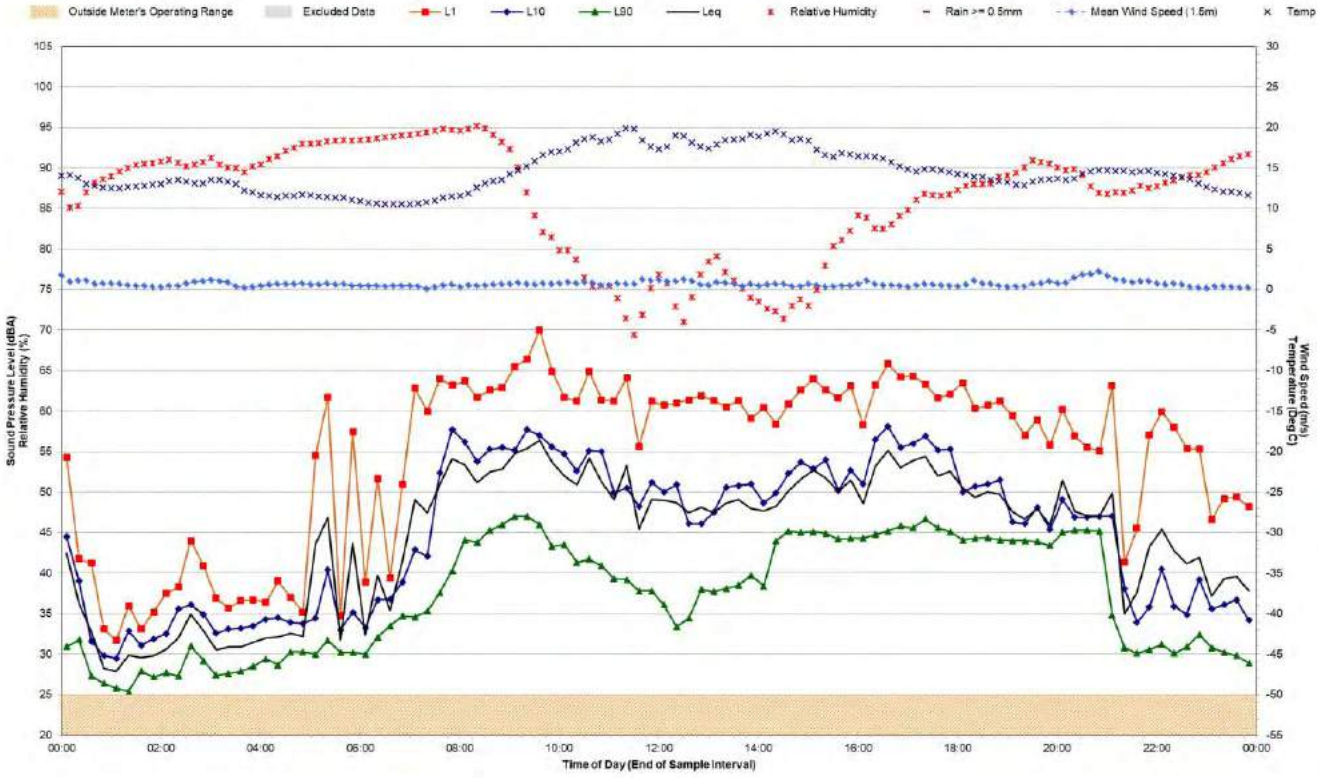

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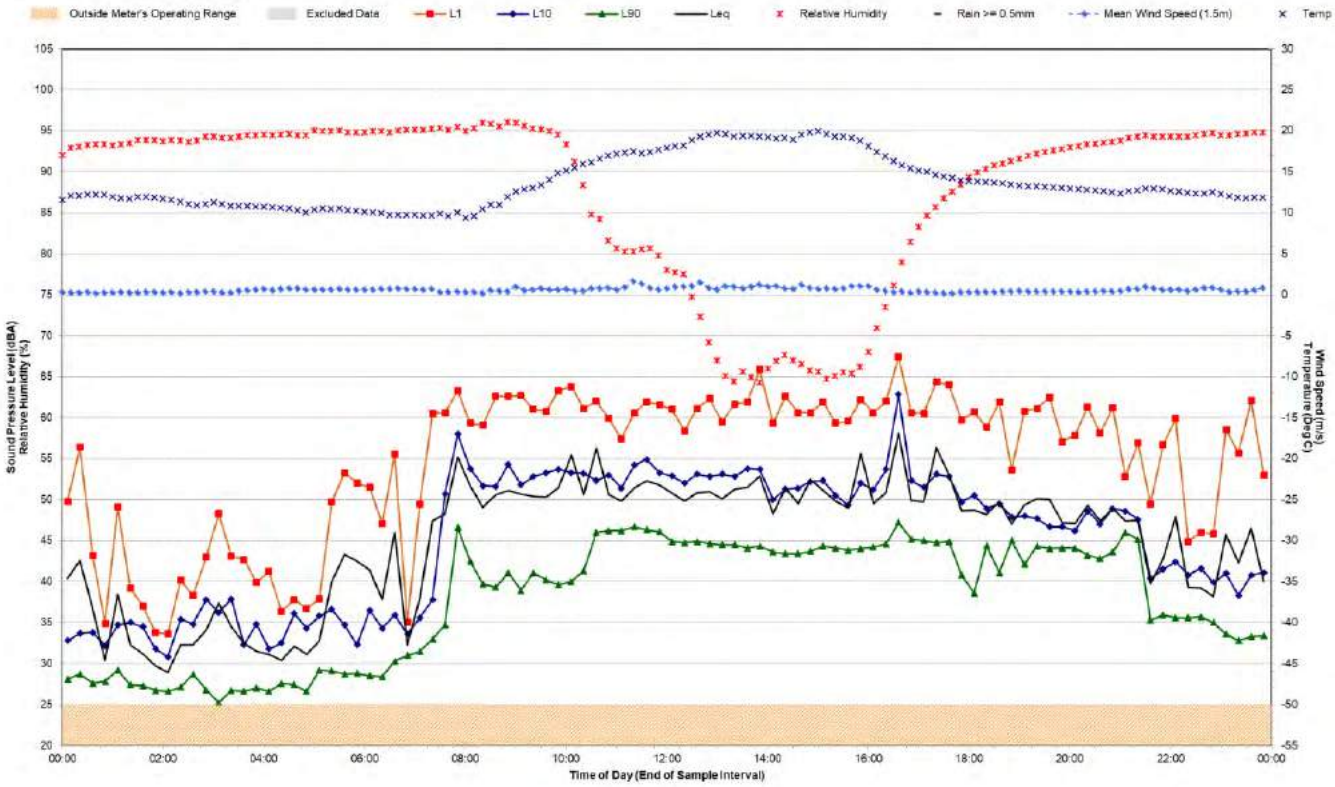

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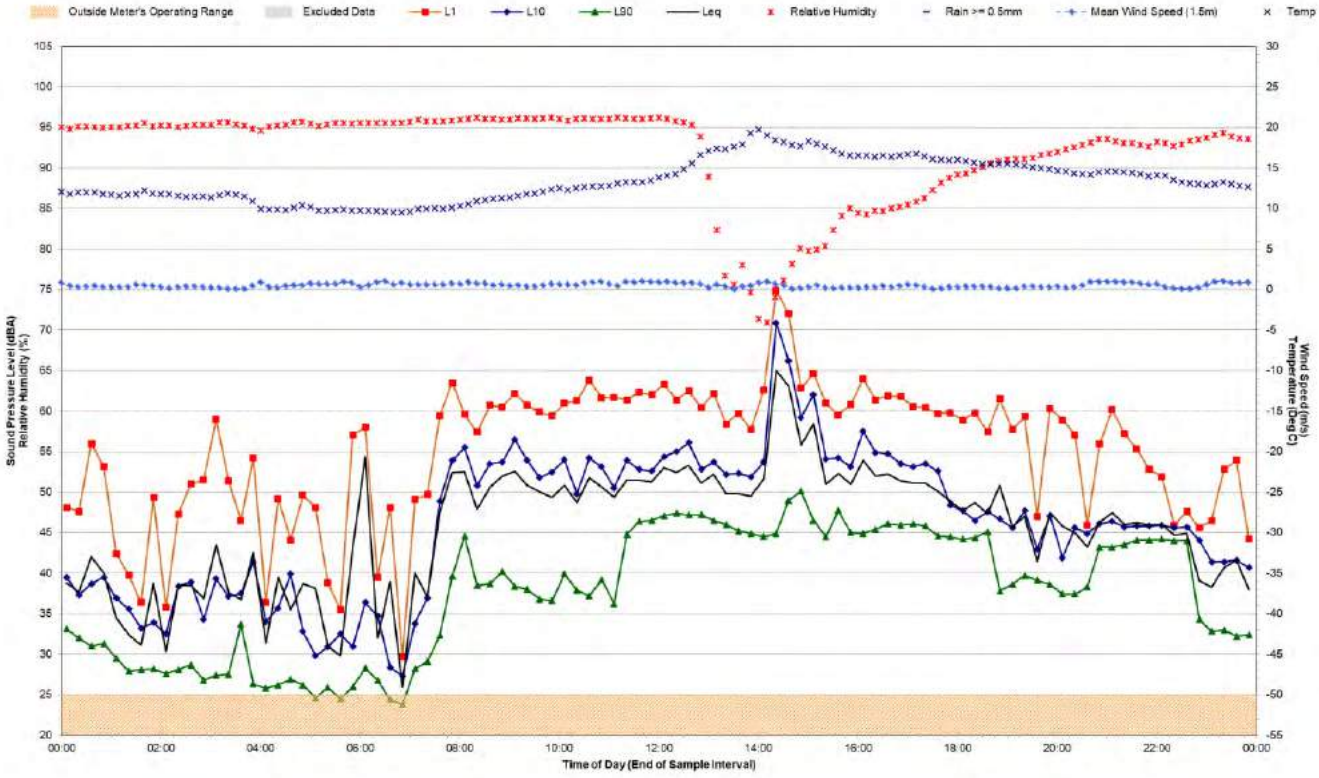

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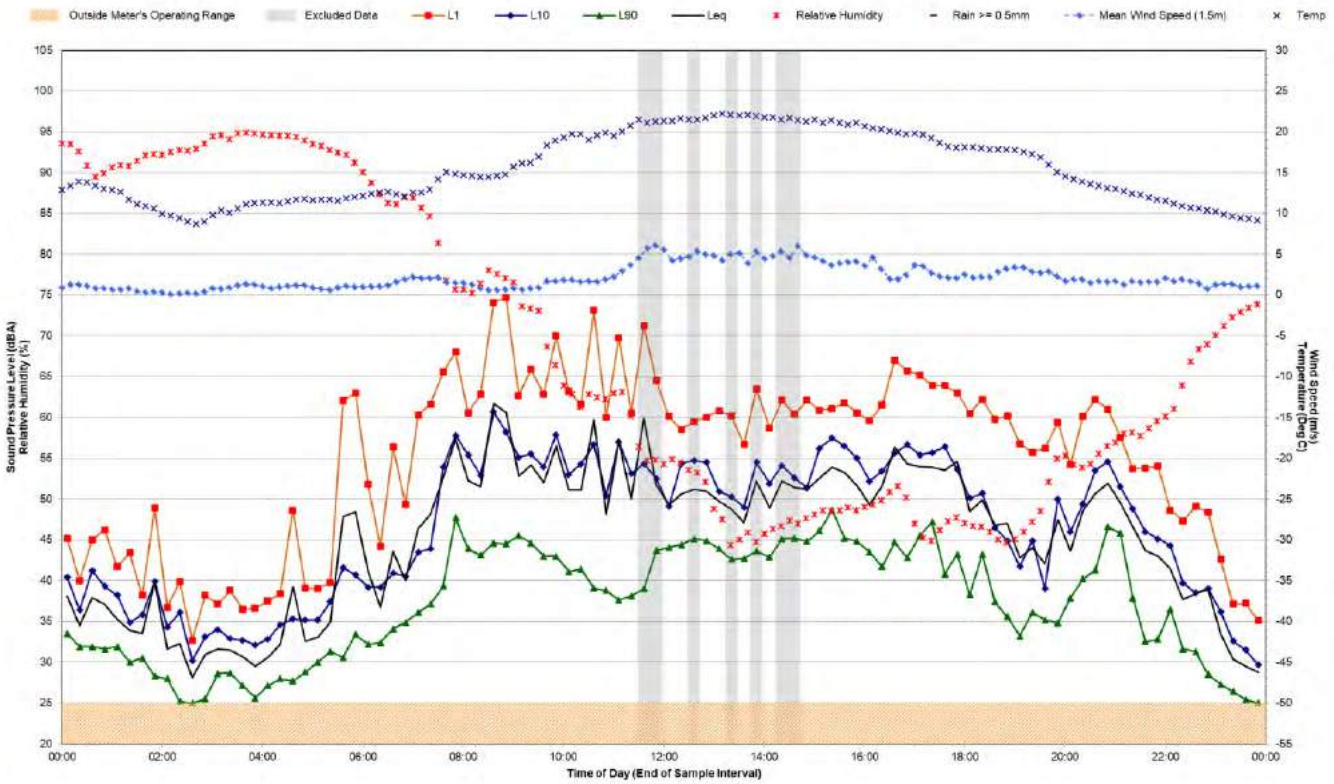

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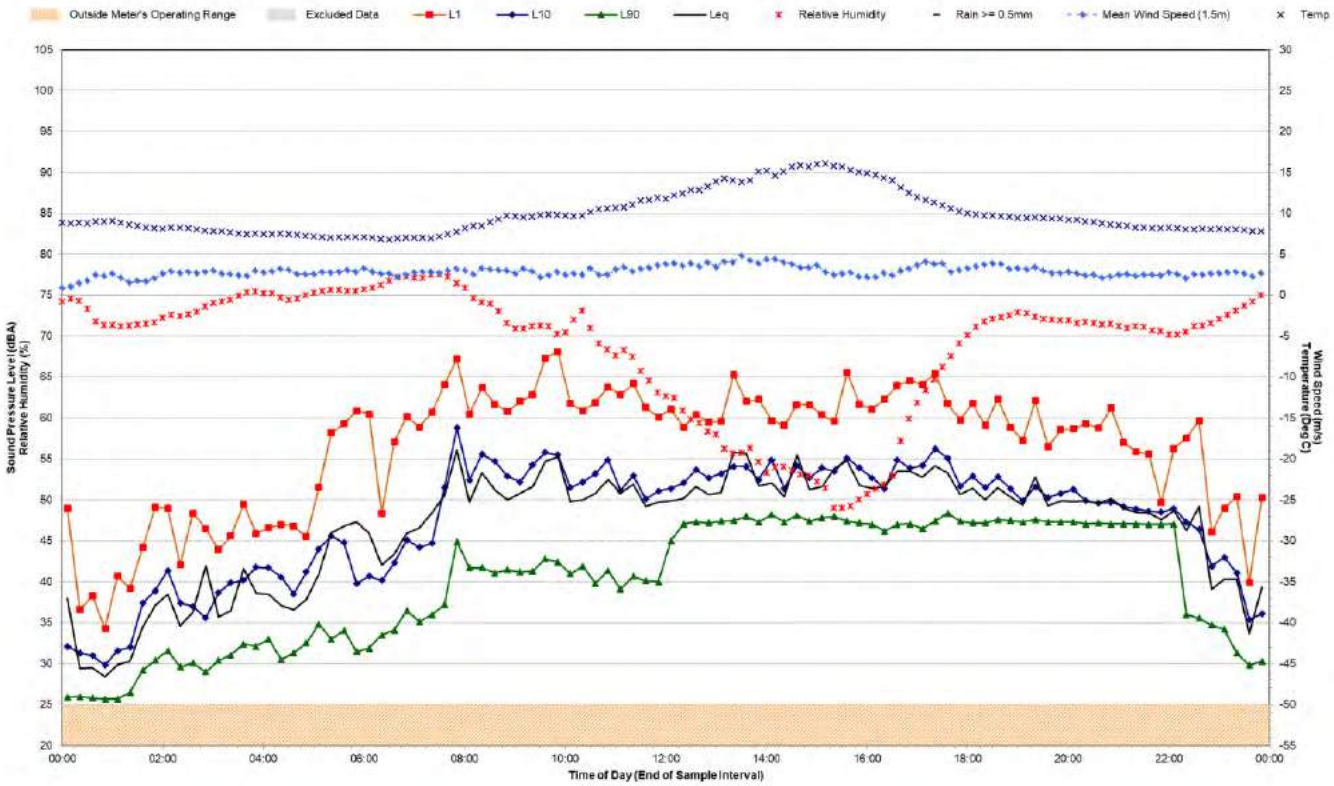

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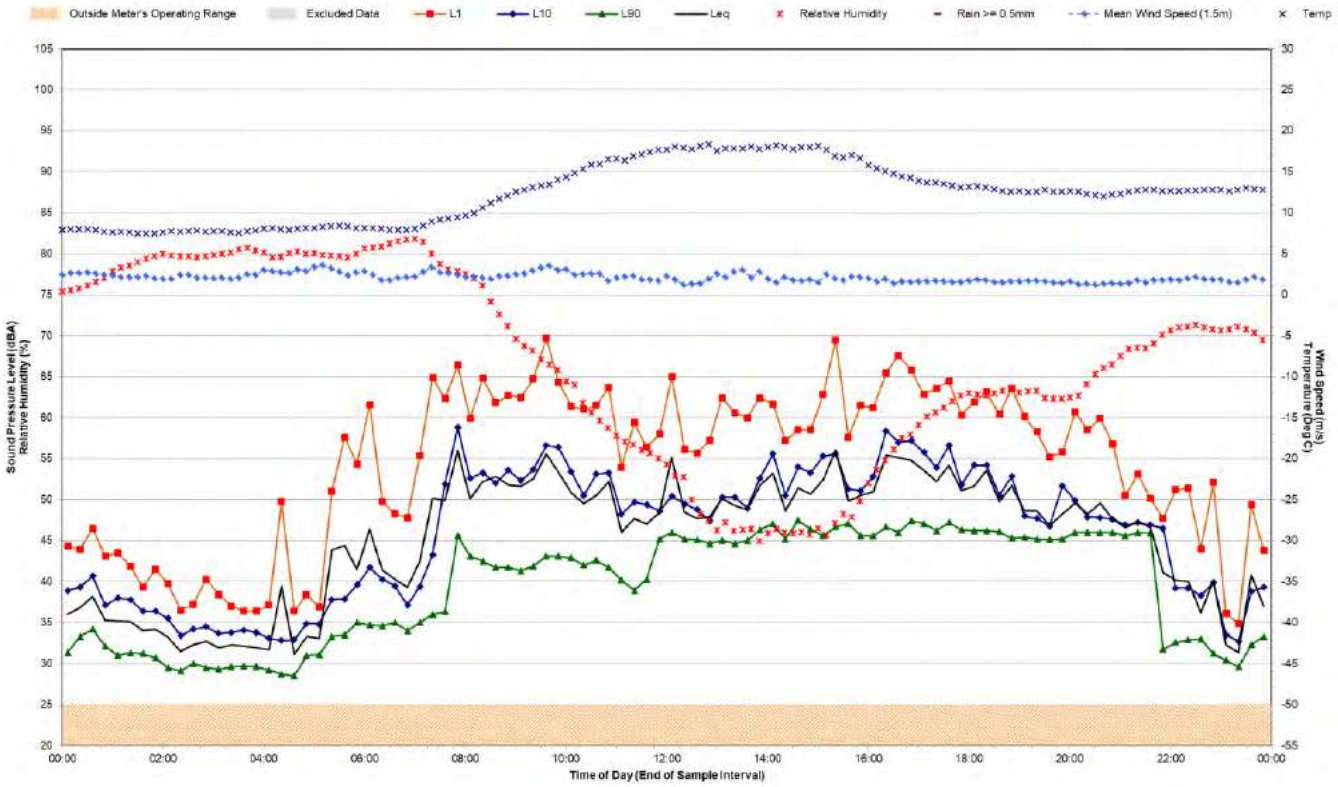

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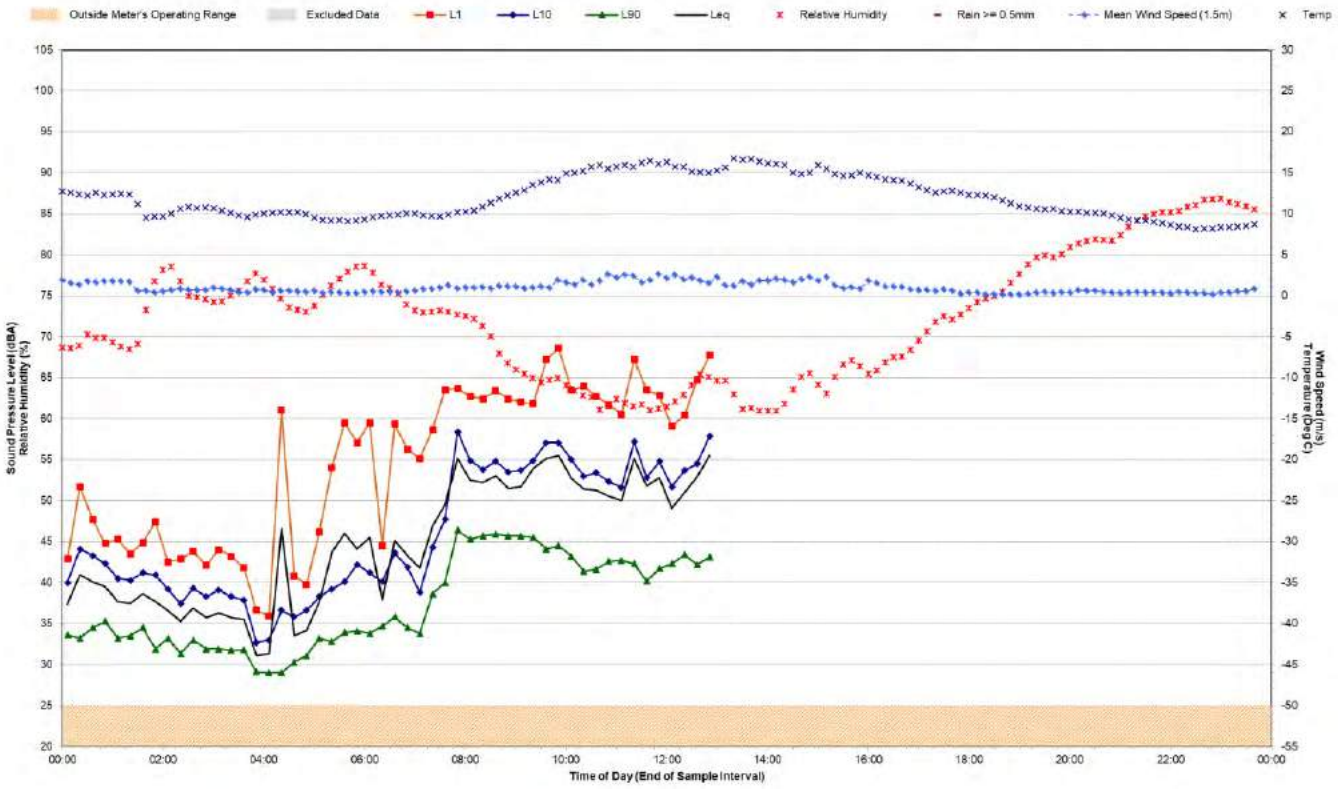

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DONALDSON AND ABEL COAL MINES

Half-yearly Noise Monitoring
Half-year Ending December 2020

Prepared for:

Donaldson Coal Pty Ltd
PO Box 675
Green Hills 2320

SLR Ref: 630.01053-R01
Version No: -v1.0
February 2021

PREPARED BY

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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 Donaldson Coal 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.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
630.01053-R01-v1.0	19 February 2021	Martin Davenport	Jordan Murray	Martin Davenport

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DOCUMENT REFERENCES

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FIGURES

APPENDICES

1 Introduction

1.1 Background

Donaldson Coal Pty Ltd has commissioned SLR Consulting Australia Pty Ltd (SLR) to conduct half-yearly noise monitoring surveys for the Donaldson Coal Mine and Abel Coal Mine during the December 2020 half in accordance with the *Donaldson Coal Mine and Abel Underground Coal Mine - Noise Management Plan Care and Maintenance* (the NMP) dated 3 June 2019.

1.2 Objectives of this Report

The objectives of the noise monitoring survey for this operating half-year were as follows:

- Measure the ambient noise levels at six focus receptor locations (potentially worst affected) surrounding Donaldson Coal Mine and Abel Coal Mine.
- Qualify all sources of noise within each of the attended surveys, including estimated contribution or maximum level of individual noise sources.
- Assess the noise emissions of Donaldson Coal Mine and Abel Coal Mine with respect to the limits contained in the Development Consent.

1.3 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

2 Development Consent Project Approval

Development consent was obtained by Donaldson Coal Pty Ltd for the Donaldson Mine in October 1999 following a Commission of Inquiry. Development Consent number N97/00147 was issued by the Minister for Urban Affairs pursuant to Section 101 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Project Approval (Application No. 05_0136) granted by the Minister of Planning was obtained by Donaldson Coal Pty Ltd for Abel Coal Mine in 2007.

2.1 Donaldson Coal Mine Development Consent Conditions

The Development Consent nominates hours of operation and mine noise emission goals in the Sections entitled "*Operation of Development, Condition No. 3(1) and 3(2)"*, and *"Noise and Vibrational Noise Limits: Condition No. 15*" as follows:

3.(1) Subject to (2) the approved hours of operation are as follows:

Works	*Period*	*Hours*
Construction, including construction of any bunds	*Monday to Friday* *Saturday*	*7 am to 6 pm* *8 am to 1 pm*
Mining operations, including mining, haulage of waste to dumps and coal processing	*Monday to Friday* *Saturday, Sunday*	*24 hours per day* *7 am to 6 pm*
Road Transportation and stockpiling of coal	*7 days per week*	*24 hours per day*
Rail loading of coal	*7 days per week*	*7 am to 10 pm*
Maintenance of mobile and fixed plant	*7 days per week*	*24 hours per day*
Blasting, not involving closure of John Renshaw Drive	*Monday to Saturday*	*7 am to 5 pm*
Blasting, involving closure of John Renshaw Drive	*Monday to Saturday*	*10 am to 2 pm*

Notes: Restrictions on Public Holidays are the same as Sundays

(2) The Applicant shall submit a report to the Director-General's satisfaction demonstrating the noise limits in Condition 15 can be met while rail loading of coal is occurring during the period from 6 pm to 10 pm. If that report does not demonstrate that the noise limits can be met to the Director-General's satisfaction, then the hours of operation for rail loading of coal shall be restricted to 7 am to 6 pm."

15. *Unless subject to a negotiated agreement in accordance with Condition 23, the Applicant shall ensure that the noise emission from construction or mining operations, when measured or computed at the boundary of any dwelling not owned by the applicant (or within 30 metres of the dwelling, if the boundary is more than 30 metres from the dwelling), shall not exceed the following noise limits:*

Location	*$L_{A10(15minute)}$ Noise Limits (dBA)*	
	Daytime	Night-time
Beresfield area (residential)	*45*	*35*
Steggles Poultry Farm	*50*	*40*
Ebenezer Park Area	*46*	*41*
Black Hill Area	*40*	*38*
Buchanan and Louth Park Area	*38*	*36*
Ashtonfield Area	*41*	*35*
Thornton Area	*48*	*40*

Note: Daytime is 7 am to 10 pm Monday-Saturday, and 8 am to 10 pm Sundays and Public Holidays. Night-time is 10 pm to 7 am Monday-Saturday, and 10 pm to 8 am Sundays and Public Holidays.

The noise limits apply for prevailing meteorological conditions (winds up to 3 m/s), except under conditions of temperature inversions."

Other Conditions of Consent relevant to noise are as follows:

18. *The applicant shall survey and investigate noise reduction measures from plant and equipment and set targets for noise reduction in each Annual Environmental Management Report (AEMR), taking into consideration valid noise complaints received in the previous year. The Report shall also include remedial measures.*

19. *The Applicant shall revise the Noise Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, the independent noise expert (Condition 48), EPA, Councils and the Community Consultative Committee.*

2.2 Abel Coal Mine – Project Approval

Approved Operations

The following operations are approved under the Abel Coal Mine Project Approval:

- Extraction of up to 6.1 Mtpa of Run of Mine (ROM) coal from the Abel Underground Coal Mine.
- Transport coal to the existing Bloomfield Coal Handling and Preparation Plant by private haul roads, or by coal conveyor, or by a combination of both methods.
- Operate the Bloomfield Coal Handling Processing Plant (CHPP) to process coal extracted from the Abel Coal Mine and the Bloomfield and Donaldson Coal Mines.
- Transportation of product coal from the Bloomfield site by rail via the Bloomfield rail loading facility.

The Project Approval was modified in June 2010 (05_0136 MOD 1) allowing construction and operation of a downcast ventilation fan. In May 2011 the Project Approval was modified again (05_0136 MOD 2) to allow the construction and operation of an upcast ventilation fan (and associated facilities). In December 2013 the Project Approval was further modified (05_0136 MOD3) to account for the increase in coal extracted including the upgrade of the Bloomfield CHPP.

Consent Conditions

The relevant conditions relating to noise from the Abel Coal Mine approval are reproduced below.

Schedule 4

NOISE

Operational Noise Criteria

1. *The Proponent shall ensure that the noise generated by the Project does not exceed the criteria in Table 4 at any residence on privately-owned land.*

Table 4: Operational Noise Criteria dB(A)

Location	Receiver Area	Day	Evening	Night	
		$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{A1(1minute)}$
Location I	Lord Howe Drive, Ashtonfield	*36*	*36*	*36*	*45*
Location K	Catholic Diocese Land	*37*	*37*	*37*	*45*
Location L	Kilshanny Avenue, Ashtonfield	*40*	*40*	*40*	*47*
All other Locations	All other privately owned Residences	*35*	*35*	*35*	*45*

Notes:

- *To interpret the locations referred to in Table 4, see plan in Appendix 3.*
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 4 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

These noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Construction Noise Criteria

1. *The proponent shall ensure that the noise generated during the construction of the downcast ventilation shaft as described in EA (MOD3) does not exceed the criteria in Table 5.*

Table 5: Construction Noise Criteria dB(A)

Location	Receiver	Day
		$L_{Aeq(15minute)}$
Location R	*281 Lings Road, Buttai*	*50*
Location S	*189 Lings Road, Buttai*	*43*

Notes:

- *The criteria in Table 5 apply only whilst the downcast ventilation shaft is being constructed, and for a maximum of 12 weeks from the commencement of construction.*
- *To interpret the locations referred to in Table 5, see plan in Appendix 3* (attached to this report as **Appendix A**).
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

However, these noise criteria do not apply if the Proponent has an Agreement with the relevant landowner to generate higher noise levels, and the proponent has advised the Department in writing of the terms of this agreement.

Rail Noise Criteria

1. *The proponent shall ensure that the noise from rail movements on the Bloomfield Rail Spur does not exceed the limits in Table 6 at any residence on privately owned land.*

Table 6: Rail Spur noise criteria dB (A)

Location	*Day*	*Evening*	*Night*
	$L_{Aeq(period)}$		
All privately-owned land	*55*	*45*	*40*

Cumulative Noise Criteria

1. *The proponent shall implement all reasonable and feasible measures to ensure that the noise generated by the project combined with noise generated by other mines does not exceed the criteria in Table 7 at any residence on privately-owned land.*

Table 7: Cumulative noise criteria dB (A)

Location	*Day*	*Evening*	*Night*
	$L_{Aeq(period)}$		
All privately-owned land	*55*	*45*	*40*

Notes: Cumulative noise is to be measured in accordance with the relevant requirements, and exemptions (including meteorological conditions), of the NSW Industrial Noise Policy. Appendix 4 sets out the metrological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

Operating Conditions

1. *The proponent shall:*
    a. *Implement best management practise to minimise the construction, operational, road and rail noise of the project;*
    b. *Operate an on-site noise management system to ensure compliance with the relevant conditions of this approval;*
    c. *Minimise the noise impacts of the project during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 4);*
    d. *Only receive and/or dispatch locomotives and rolling stock either on or from the site that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL (No. 3142);*
    e. *Carry out regular monitoring to determine whether the project is complying with the noise criteria and other relevant conditions of approval, to the satisfaction of the Director-General.*

Noise Management Plan

2. *The proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:*
    a. *Be prepared in consultation with the EPA, and be submitted to the Director-General for approval within 6 months of the date of approval of MOD 3;*
    b. *Describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval; Describe the proposed noise management system in detail; and*
    c. *Include a monitoring program that:*
        - *Uses attended monitoring to evaluate the compliance of the project against the noise criteria in this approval;*
        - *Evaluates and reports on:*
            - *The effectiveness of the on-site noise management system; and*
            - *Compliance against the noise operating conditions; and*

Defines what constitutes a noise incident, and includes protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents. Appendix 4

Noise Compliance Assessment

Applicable Meteorological Conditions

1. *The noise criteria in Tables 4 and 7 are to apply under all metrological conditions except the following:*
    a. *During periods of rain or hail.*
    b. *Average wind speed at microphone height exceeds 5 m/s;*
    c. *Wind speeds greater than 3 m/s measured at 10m above ground level; or*
    d. *Temperature inversion conditions greater than 3°C/100m.*

Determination of metrological conditions

2. *Except for wind speed at microphone height, the data to be used for determining metrological conditions shall be that recorded by the meteorological station located on the site.*

Compliance monitoring

3. *Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.*
4. *Unless otherwise agreed with the director-general, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:*
    a. *Monitoring locations for the collection of representative noise data;*
    b. *Metrological conditions during which collection of noise data is not appropriate;*
    c. *Equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and*
    d. *Modification to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.*

Appendix 5

Statement of Commitments

3. Noise

3.1 Construction Activities

The following noise control measures will be implemented prior to commencement of construction of the Abel Underground Mine or the upgrade of the Bloomfield CHPP.

1. *Maintain all machinery and equipment in working order;*
    a. *No construction activities at the Abel pit top will take place on Sundays or Public Holidays;*
    b. *Where possible locate noisy site equipment behind structures that act as barriers or at the greatest distance from noise sensitive areas; and*
    c. *Orientate equipment so that noise emissions are directed away from noise sensitive areas.*

3.2 Noise Control Measures

a. *The following noise control measures will be implemented prior to the mining of coal from the Abel underground Mine:*
    i. *Orientation of the ventilation fans away from residential receivers and angle the output parallel to the ground.*
    ii. *The sound power level of the front end loader to be used near the portal should not exceed 113 dBA and will be fitted with a noise sensitive reversing alarm.*

b. *The following noise control measures will be implemented prior to the Bloomfield CHPP receiving any ROM coal from Able Underground Mine;*

i. *Noise mitigation works including partial enclosure and noise screening of drives and conveyors of the Bloomfield CHPP to screen residences to the north of the site.*

3.2 Monitoring

The Company will implement a Noise Monitoring Program for the Abel Underground Mine and the Bloomfield CHPP, to the satisfaction of the Director-General. The Noise Monitoring Program shall include a combination of real-time and supplementary attended monitoring measures, and a noise monitoring protocol for evaluating compliance with the noise environmental assessment. This plan will be integrated with the monitoring plans for the Tasman, Donaldson and Bloomfield Mines to provide a single integrated Noise Monitoring Program for all 4 mines.

3.4 Continuous Improvement

The Company shall:

a. *Report on these investigations and implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director General.*

The operator of the Bloomfield CHPP shall:

b. *Investigate ways to reduce the noise generated by the Bloomfield CHPP, including maximum noise levels which may result in sleep disturbance;*

c. *Implement all reasonable and feasible best practice noise mitigation measures on the site; and*

d. *Report on these investigations and the implementation of any new noise mitigation measures on site in the AEMR, to the satisfaction of the Director-General.*

3 Noise Monitoring Methodology

3.1 General Requirements

The operational noise monitoring program was conducted with reference to Development Consent N97/00147 (Donaldson Coal Mine), Project Approval 05_0136 (Abel Coal Mine), the NMP and AS 1055-2018 *Acoustics - Description and Measurement of Environmental Noise*.

All acoustic instrumentation employed throughout the monitoring program has been designed to comply with the requirements of AS IEC 61672.1 – 2004 *Electroacoustics—Sound level meters – Specifications*, AS IEC 61672.2-2004, AS IEC 61672.3-2004 and carried current NATA or manufacturer calibration certificates. Certificates for acoustic instrumentation used during the December 2020 half is provided in **Appendix B**.

Instrument calibration was conducted before and after each measurement, with the variation in calibrated levels not exceeding ±0.5 dBA.

3.2 Monitoring Locations

Baseline and preceding operational half-yearly surveys have been conducted at 11 locations surrounding the Donaldson Mine and Abel Coal Mine sites. With the experience of these previous surveys, it was decided to concentrate noise monitoring at six focus locations that represent the potentially most noise affected areas from Donaldson Mine and Abel Coal Mine. The details of the monitoring locations are contained within **Table 1**.

It is relevant to note that Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Furthermore, Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite during the December 2020 noise monitoring period.

Table 1 Monitoring Locations

Noise Monitoring Location	Description
D	Black Hill School, Black Hill
F	Lot 684 Black Hill Road, Black Hill
G	156 Buchannan Road, Buchannan
I	Magnetic Drive, Ashtonfield
J	Parish Drive, Thornton
L	65 Tipperary Dr, Ashtonfield

A map giving the approximate location of the noise monitoring sites is contained within **Appendix C**.

3.3 Unattended Continuous Noise Monitoring

An environmental noise logger was deployed for a minimum of a seven day period between Wednesday 16 December 2020 and Wednesday 23 December 2020 at each of the six (6) nominated locations given in **Table 1**.

All unattended monitoring equipment was programmed to continuously record statistical noise level indices in 15 minute intervals including the L_{Amax}, L_{A1}, L_{A10}, L_{A90}, L_{A99}, L_{Amin} and L_{Aeq}. The statistical noise exceedance levels (L_{AN}) are the levels exceeded for N% of the 15 minute interval. The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level. The L_{A10} is the level exceeded for 10% of the time and is usually referred to as the average maximum noise level. The L_{Aeq} is the equivalent continuous sound pressure level and represents the steady sound level which is equal in energy to the fluctuating level over the interval period. The L_{Amax} is the maximum noise level recorded over the interval.

3.4 Operator Attended Noise Monitoring

Operator attended surveys were conducted at each of the six monitoring locations during the daytime, evening and night-time periods, to verify the unattended logging results and to determine the character and contribution of ambient noise sources.

4 Operator Attended Noise Monitoring

4.1 Results of Operator Attended Noise Monitoring

Operator attended noise measurements were commenced on Wednesday 16 December 2020 finishing on Wednesday 23 December 2020. Operator attended noise surveys were conducted using a Brüel & Kjær Type 2270 (serial number 2679354).

Ambient noise levels given in the tables include all noise sources such as traffic, insects, birds, and mine operations as well as any other industrial operations.

The tables provide the following information:

- Monitoring location.
- Date and start time.
- Wind velocity (m/s) and Temperature (ºC) at the measurement location.
- Typical maximum (L_{Amax}) and contributed noise levels.

Mine contributions listed in the tables are from the Abel Coal Mine and are stated only when a contribution could be quantified.

Table 2 Location D, Black Hill Public School, Black Hill

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	16/12/2020 15:30 30°C 2.9 m/s NNE	77	66	58	50	56	Birdsong 45-60 Insects 51-54 Wind in trees 45-50 Road traffic 65-77 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	17/12/2020 18:48 27°C 0.4 m/s SE	75	65	62	50	59	Road traffic 61-75 Insects -50-66 Birdsong 66 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	17/12/2020 22:31 24°C 0.4 m/s SE	68	55	49	43	48	Insects 45-52 Road traffic 40-68 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

Table 3 Location F, Lot 684 Black Hill Road, Black Hill

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	23/12/2020 11:26 25°C 1.6 m/s SSW	74	64	59	46	55	Road traffic 40-74 Insects 50-62 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	17/12/2020 19:08 26°C 0.5 m/s ESE	72	68	67	50	62	Road traffic 40-72 Insects 50-69 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	17/12/2020 22:53 23°C 0.5 m/s SSE	67	59	51	43	49	Road traffic 35-67 Insects 43-48 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

Table 4 Location G, Buchanan Road, Buchanan

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	23/12/2020 12:42 25°C 2.5 m/s S	78	77	75	66	72	Insects 62-78 Road traffic 40-54 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	17/12/2020 20:11 25°C 0.6 m/s ESE	77	76	71	69	70	Road traffic 40-50 Insects 69-77 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	17/12/2020 23:56 22°C 0.1 m/s SE	54	53	53	42	48	Insects 43-54- Road traffic 35-49 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

Table 5 Location I, Magnetic Drive, Ashtonfield

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (**LAmax** – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	16/12/2020 17:08 29°C 2.1 m/s ESE	73	66	63	57	60	Road traffic 45-73 Birdsong55-62 Insects 55-67 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	17/12/2020 21:01 25°C 0.6 m/s SE	69	59	47	44	48	Traffic 35-69 Insects 45-50 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	18/12/2020 00:44 23°C 0.6 m/s WNW	69	58	47	42	48	Traffic 30-69 Insects 42-53 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

Table 6 Location J, Parish Drive, Thornton

Period	Date/ Start time/Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (**LAmax** – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	16/12/2020 17:31 28°C 2 m/s SE	71	69	69	66	68	Road traffic 45-52 Birdsong 55-69 Insects 66-71 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Evening	17/12/2020 21:36 24°C 0.8 m/s ESE	50	48	47	45	46	Road traffic 35-50 Insects 45-50 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	17/12/2020 22:00 24°C 0.3 m/s SSE	57	56	49	45	48	Road traffic 40-51 Insects 45-57 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

Table 7 Location L, 65 Tipperary Drive, Ashtonfield

Period	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels (LAmax – dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Day	23/12/2020 13:09 25°C 1.1 m/s SSE	73	63	45	41	50	Road traffic 40-73 Wind in trees 39 Insects 38-44 **Abel Mine Audible** CHPP operation 27-38
		Estimated Abel Mine Noise Contribution $L_{Aeq(15minute)}$ 32 dBA					
Evening	17/12/2020 20:39 25°C 0.7 m/s ESE	85	68	52	41	58	Road traffic 38-85- Residential noise 45 Insects 44-53 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					
Night	18/12/2020 00:23 23°C 0.3 m/s ESE	50	49	48	35	44	Road traffic 35-43 Insects 35-50 **Abel Mine Inaudible**
		Estimated Abel Mine Noise Contribution Inaudible					

4.2 Operator Attended Noise Monitoring Summary

4.2.1 Donaldson Mine

Donaldson Open Cut Mine has ceased production and all major earthworks on the site have been finalised. Therefore, compliance noise monitoring for the Donaldson Open Cut Mine is no longer required.

4.2.2 Abel Coal Mine

Abel mine was placed in Care & Maintenance on 28th April 2016 and there was no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

The Bloomfield CHPP and stockpile area was inaudible during all operator attended noise surveys with the exception of Location L during the day time period. Noise generated by local and distant traffic was a significant contributor to ambient noise levels at all monitored locations as well as 'natural' noises such as birds, insects and wind related noise.

4.3 Compliance Assessment and Discussion of Results

4.3.1 Operations

Results of the operational compliance assessment are given in **Table 8**.

Table 8 Compliance Noise Assessment - Operations

Location	Estimated Abel $L_{Aeq(15minute)}$ Contribution dBA			Consent Conditions			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
D – Black Hill School, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
F – Black Hill Road, Black Hill	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
I – Magnetic Drive, Ashtonfield	Inaudible	Inaudible	Inaudible	36	36	36	Yes	Yes	Yes
J – Parish Drive, Thornton	Inaudible	Inaudible	Inaudible	35	35	35	Yes	Yes	Yes
L – 65 Tipperary Dr, Ashtonfield	32	Inaudible	Inaudible	40	40	40	Yes	Yes	Yes

Results presented in **Table 8** indicate that compliance with the relevant consent conditions was achieved at all noise monitoring locations during all periods.

4.3.2 Sleep Disturbance

Results of the sleep disturbance compliance assessment are given in **Table 9**.

Table 9 Compliance Noise Assessment – Sleep Disturbance

Location	Estimated Bloomfield $L_{A1(1minute)}$ Contribution dBA	Consent Conditions $L_{A1(1minute)}$ dBA	Compliance
D – Black Hill School, Black Hill	Inaudible	45	Yes
F – Black Hill Road, Black Hill	Inaudible	45	Yes
G – Buchanan Road, Buchanan	Inaudible	45	Yes
I – Magnetic Drive, Ashtonfield	Inaudible	45	Yes
J – Parish Drive, Thornton	Inaudible	45	Yes
L – 65 Tipperary Dr, Ashtonfield	Inaudible	47	Yes

Results presented in **Table 9** indicate that compliance with the sleep disturbance consent conditions was achieved at all noise monitoring locations during the night-time noise surveys.

5 Unattended Continuous Noise Monitoring

5.1 Results of Unattended Continuous Noise Monitoring

Unattended continuous noise monitoring was conducted between Wednesday 16 December 2020 and Wednesday 23 December 2020 at each of the six monitoring locations given in **Table 10**.

Table 10 Noise Logger and Noise Monitoring Locations

Location	Noise Logger Serial Number	Date of Logging
D – Black Hill School, Black Hill	SVAN 957 27580	16 December 2020 -23 December 2020
F – Black Hill Road, Black Hill	SVAN 957 27578	16 December 2020 -23 December 2020
G – Buchanan Road, Buchanan	SVAN 957 23245	16 December 2020 -23 December 2020
I – Magnetic Drive, Ashtonfield	ARL EL316 16-203-508	16 December 2020 -23 December 2020
L – 65 Tipperary Dr, Ashtonfield	SVAN 957 23244	16 December 2020 -23 December 2020
J – Parish Drive, Thornton[1]	SVAN 957 20674	16 December 2020 -23 December 2020

The unattended ambient noise logger data from each monitoring location are presented graphically on a daily basis and are attached as **Appendix C**. A summary of the results of the unattended continuous noise monitoring is given in **Table 11**.

The ambient noise level data quantifies the overall noise level at a given location independent of its source or character.

The measured ambient noise levels were divided into three periods representing day, evening and night as designated in the NSW Noise Policy for Industry (NPfI).

Precautions were taken to minimise influences from extraneous noise sources (eg optimum placement of the loggers away from creeks, trees, houses, etc), however, not all these sources or their effects can be eliminated. This is particularly the case during the warmer times of year when noise from insects, frogs, birds and other animals can become quite prevalent.

Weather data for the subject area during the noise monitoring period was provided by Bloomfield Colliery. Noise data during periods of any rainfall and/or wind speeds in excess of 5 m/s were discarded in accordance with NPfI weather affected data exclusion methodology.

Table 11 Unattended Continuous Noise Monitoring Ambient Noise Levels (dBA)

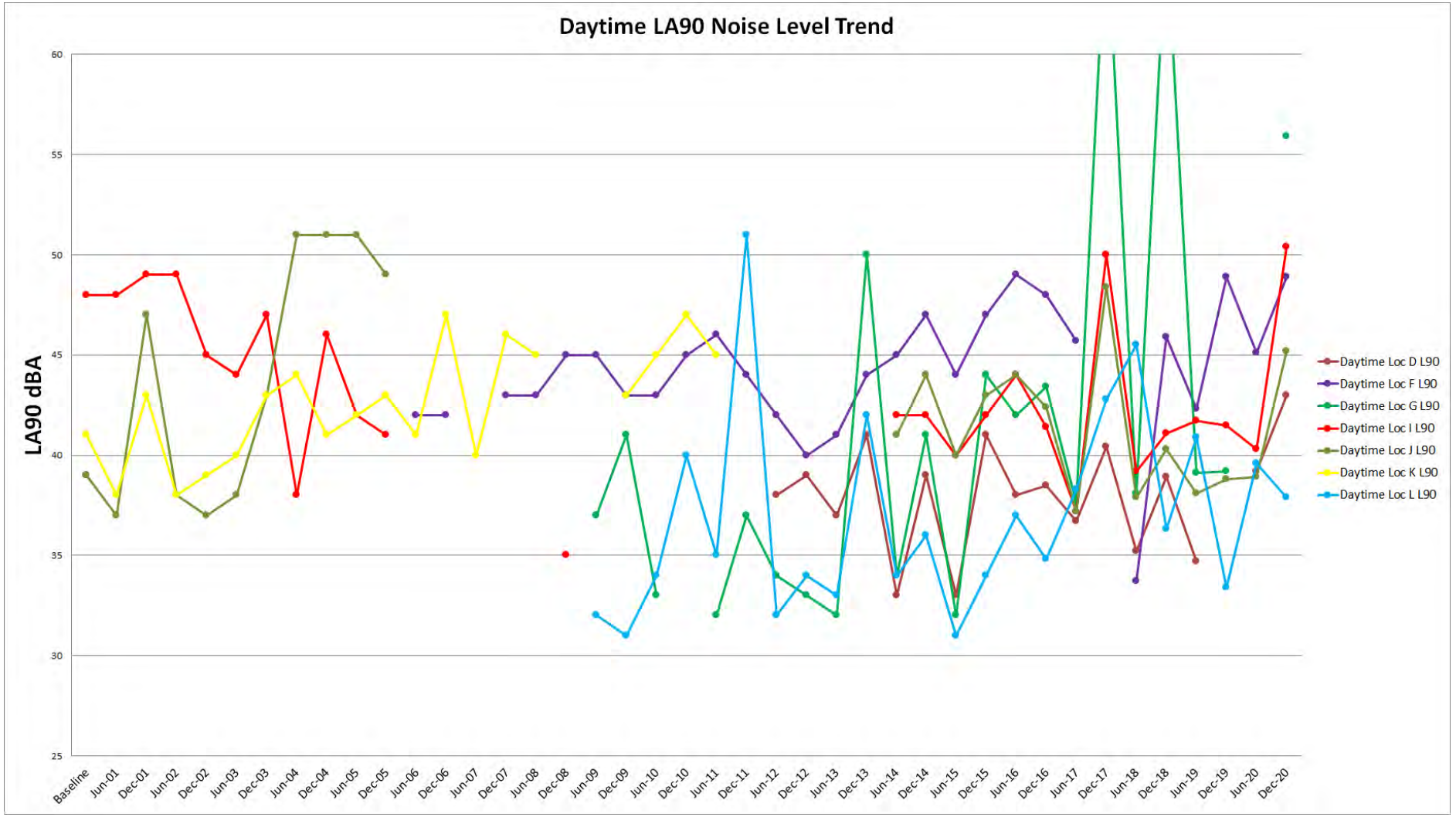
Location	Period	Primary Noise Descriptor (dBA re 20 µPA)			
		L_{A1}	L_{A10}	L_{A90}	L_{Aeq}
D Black Hill School, Black Hill	Day	68	58	43	58
	Evening	64	56	41	56
	Night	51	48	40	51
F Lot 684 Black Hill Road, Black Hill	Day	73	64	49	64
	Evening	71	65	46	67
	Night	59	54	43	57
G 156 Buchanan Road, Buchanan	Day	77	75	56	74
	Evening	76	74	42	71
	Night	49	45	35	64
I 49 Magnetic Drive, Ashtonfield	Day	70	65	50	64
	Evening	66	59	46	61
	Night	55	53	46	56
L 65 Tipperary Dr, Ashtonfield	Day	61	50	38	52
	Evening	60	49	37	51
	Night	53	49	35	48
J 220 Parish Drive, Thornton	Day	78	77	45	73
	Evening	75	71	46	69
	Night	52	50	38	56

5.2 Long term Unattended Continuous Monitoring Summary for Donaldson Mine and Abel Coal Mine

5.2.1 Ambient LA90 Noise Levels

The long term ambient L_{A90} noise levels collected from each monitoring location are presented graphically in **Figure 1**, **Figure 2** and **Figure 3** for the daytime, evening and night-time periods respectively.

Figure 1 Long Term Daytime L_{A90} Noise Levels


Daytime LA90 Noise Level Trend
LA90 dBA
60
55
50
45
40
35
30
25
Baseline
Jun-01
Dec-01
Jun-02
Dec-02
Jun-03
Dec-03
Jun-04
Dec-04
Jun-05
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Dec-20
Daytime Loc D L90
Daytime Loc F L90
Daytime Loc G L90
Daytime Loc I L90
Daytime Loc J L90
Daytime Loc K L90
Daytime Loc L L90

Figure 2 Long Term Evening L_{A90} Noise Levels

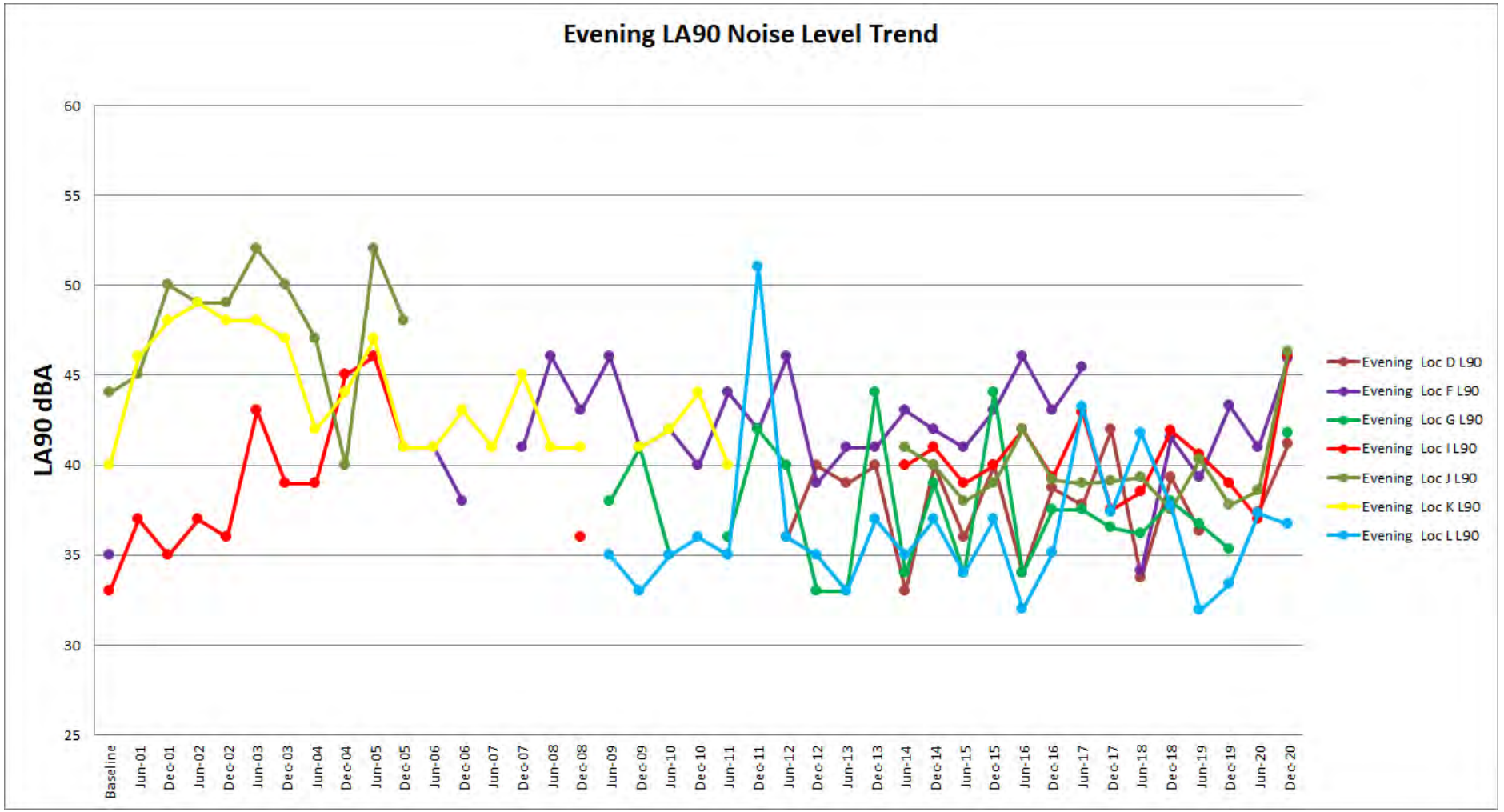
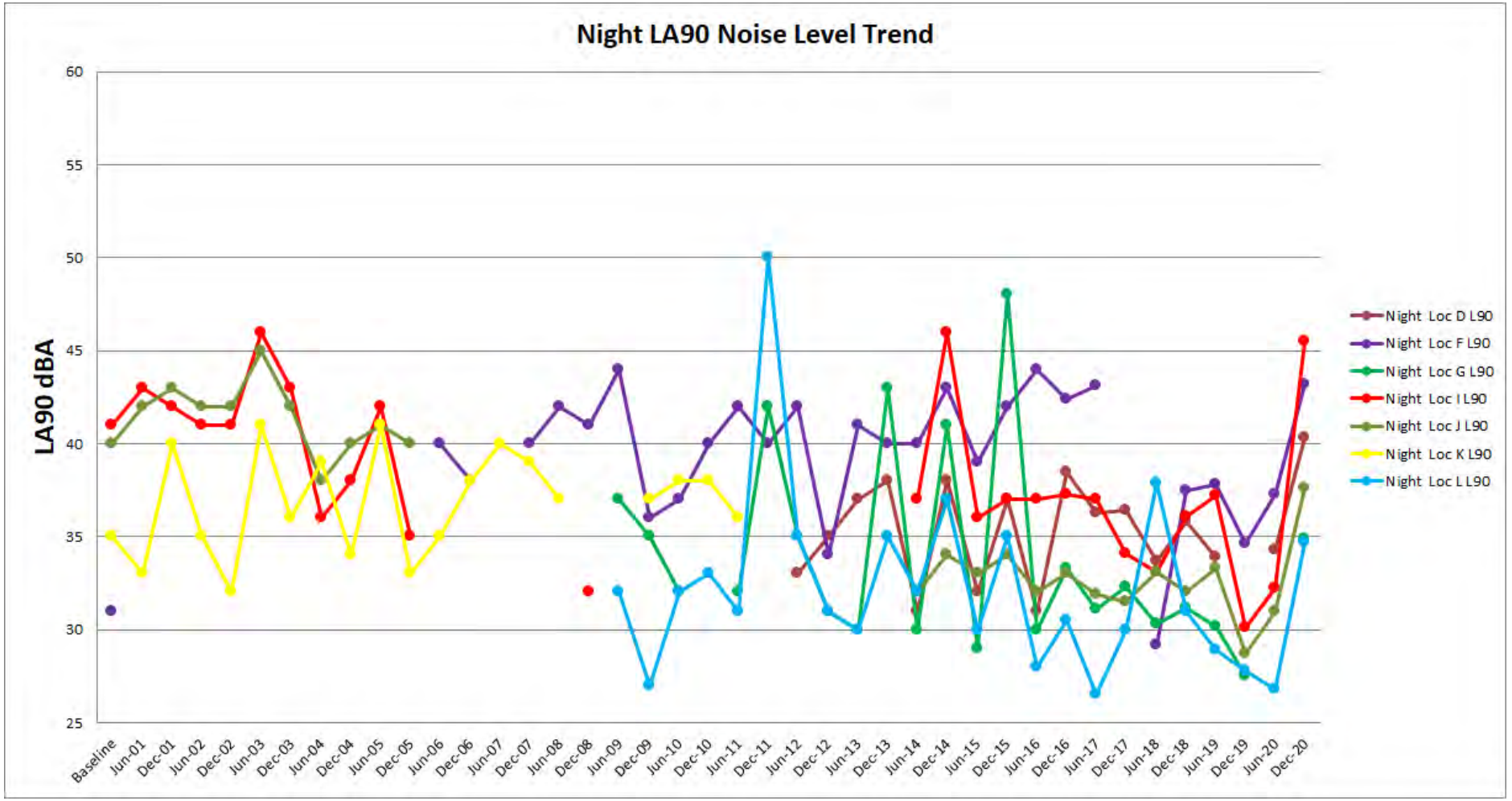


Figure 3 Long Term Night-time L_{A90} Noise Levels



5.2.1.1 Baseline

The summary of results in **Table 12** shows the ambient L_{A90} noise levels recorded for the current monitoring period compared to the levels recorded during the baseline monitoring process (ie. prior to commencement of mining operation at Donaldson).

Table 12 L_{A90} Results Comparison - Baseline

Monitoring Location	Period[1]	Long term Night-time L_{A90} Noise Levels		Difference dB[3]
		Baseline	December 2020	
D Black Hill School, Black Hill	Day	N/A[2]	43	N/A[2]
	Evening	N/A[2]	41	N/A[2]
	Night	N/A[2]	40	N/A[2]
F Lot 684 Black Hill Road, Black Hill	Day	39	49	10
	Evening	35	46	11
	Night	31	43	12
G 156 Buchanan Road, Buchanan	Day	N/A[2]	56	N/A[2]
	Evening	N/A[2]	42	N/A[2]
	Night	N/A[2]	35	N/A[2]
I 49 Magnetic Drive, Ashtonfield	Day	48	50	2
	Evening	33	46	13
	Night	41	46	5
L 65 Tipperary Drive, Ashtonfield	Day	N/A[2]	38	N/A[2]
	Evening	N/A[2]	37	N/A[2]
	Night	N/A[2]	35	N/A[2]
J 220 Parish Drive, Thornton	Day	39	45	6
	Evening	44	46	2
	Night	40	38	-2

Note 1: Periods are as detailed the NPfI and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.1.2 Previous Half-year

presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the previous monitoring period.

Table 13 L_{A90} Results Comparison – Previous Half-year

Monitoring Location	Period[1]	Long term Night-time L_{A10} Noise Levels		Difference dB[2]
		June 2020	December 2020	
D Black Hill School, Black Hill	Day	39	43	4
	Evening	37	41	4
	Night	34	40	6
F Lot 684 Black Hill Road, Black Hill	Day	45	49	4
	Evening	41	46	5
	Night	37	43	6
G 156 Buchanan Road, Buchanan	Day	0	56	56
	Evening	0	42	42
	Night	0	35	35
I 49 Magnetic Drive, Ashtonfield	Day	40	50	10
	Evening	37	46	9
	Night	32	46	13
L 65 Tipperary Drive, Ashtonfield	Day	40	38	-2
	Evening	37	37	-1
	Night	27	35	8
J 220 Parish Drive, Thornton	Day	39	45	6
	Evening	39	46	8
	Night	31	38	7

Note 1: 1. Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.1.3 Coinciding Period last Year

Table 14 presents the ambient L_{A90} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 14 L_{A90} Results Comparison – Coinciding Period Last Year

Monitoring Location	Period[1]	Long term Night-time L_{A90} Noise Levels		Difference dB[2]
		December 2019	December 2020	
D Black Hill School, Black Hill	Day	No result	43	-
	Evening	No result	41	-
	Night	No result	40	-
F Lot 684 Black Hill Road, Black Hill	Day	49	49	0
	Evening	43	46	3
	Night	35	43	9
G 156 Buchanan Road, Buchanan	Day	39	56	17
	Evening	35	42	7
	Night	28	35	7
I 49 Magnetic Drive, Ashtonfield	Day	42	50	9
	Evening	39	46	7
	Night	30	46	15
L 65 Tipperary Drive, Ashtonfield	Day	33	38	5
	Evening	33	37	3
	Night	28	35	7
J 220 Parish Drive, Thornton	Day	39	45	6
	Evening	38	46	9
	Night	29	38	9

Note 1: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2 Ambient L_{A10} Noise Comparison

The long term ambient L_{A10} noise levels collected from each monitoring location are presented graphically in **Figure 4**, **Figure 5** and **Figure 6** for the daytime, evening and night-time respectively.

Figure 4 Long Term Daytime L_{A10} Noise Levels

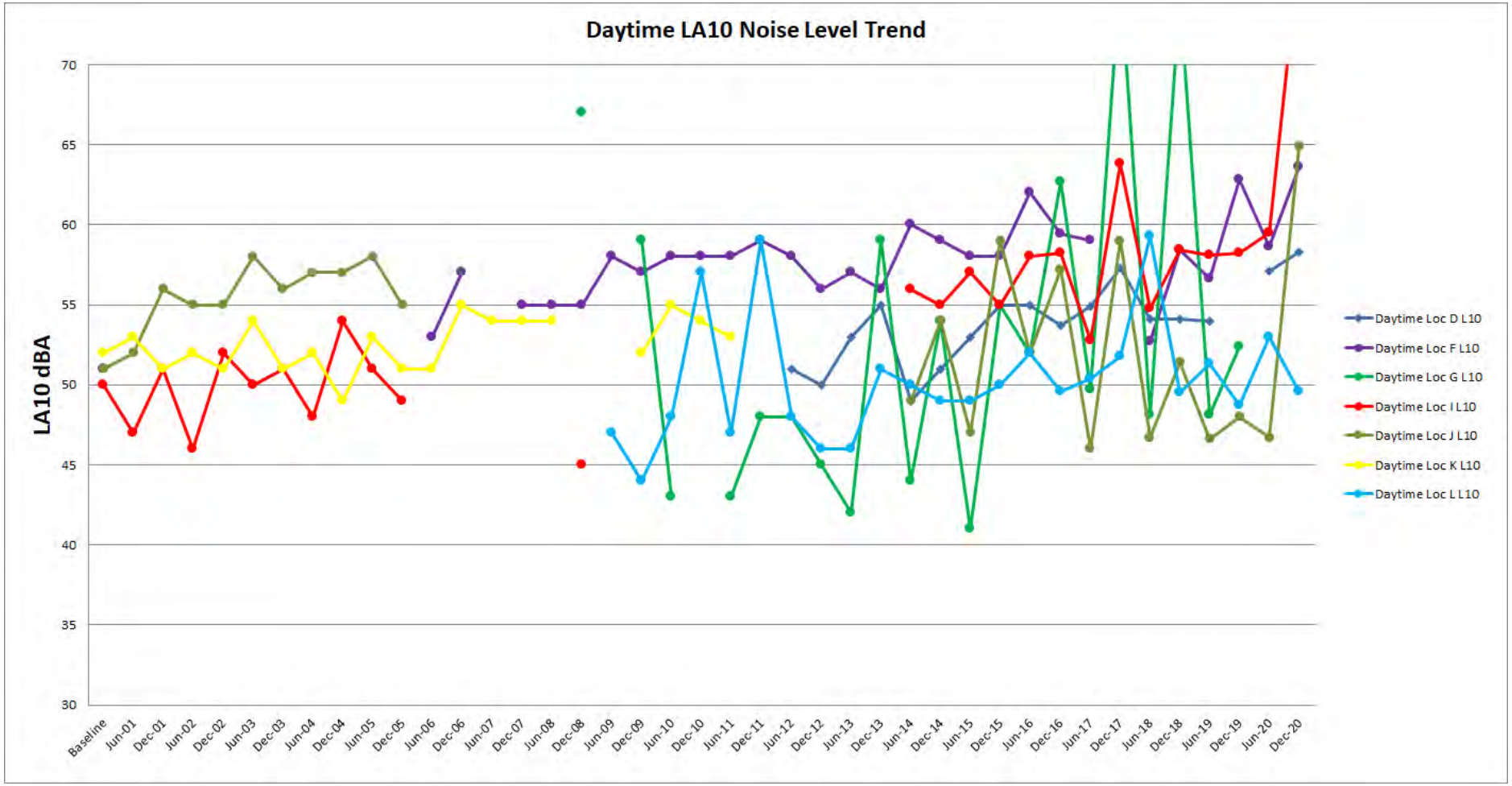


Figure 5 Long term Evening L_{A10} Noise Levels

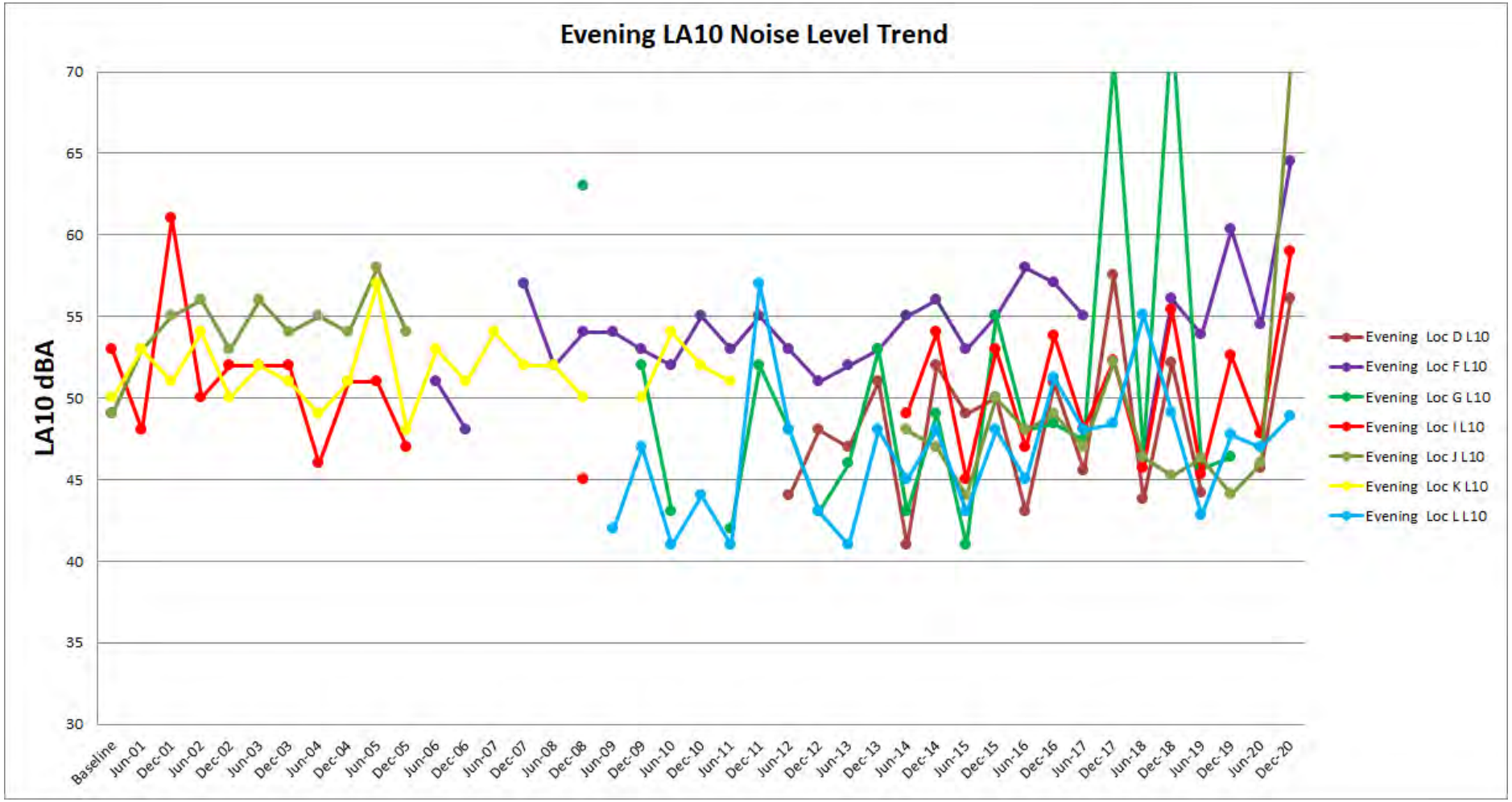
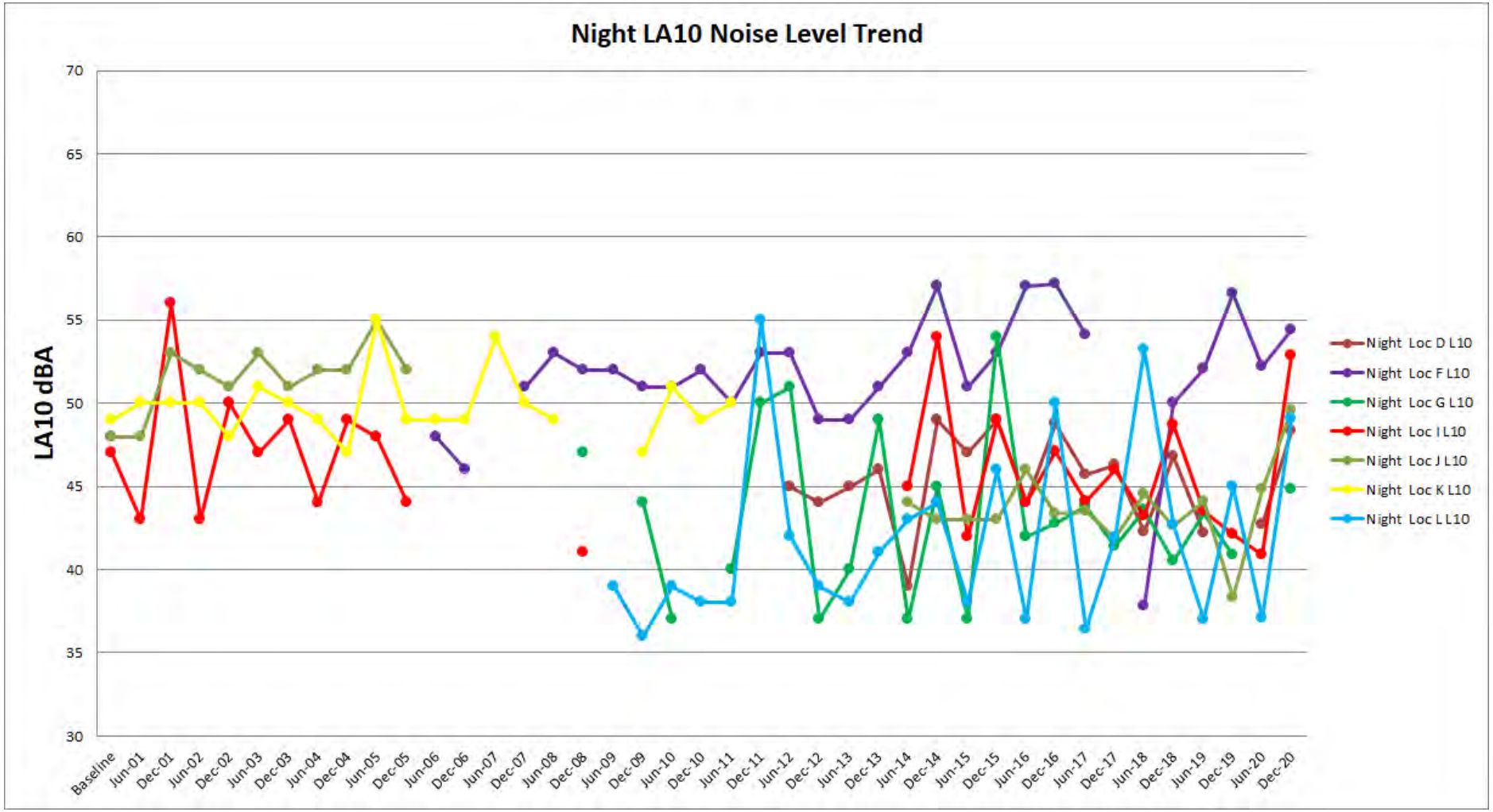


Figure 6 Long term Night L_{A10} Noise Levels



5.2.2.1 Baseline

Table 15 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to the levels recorded during the baseline monitoring period.

Table 15 L_{A10} Results Comparison – Baseline

Monitoring Location	Period[1]	Long term Night-time L_{A10} Noise Levels		Difference dB[3]
		Baseline	December 2020	
D Black Hill School, Black Hill	Day	N/A[2]	58	N/A
	Evening	N/A[2]	56	N/A
	Night	N/A[2]	48	N/A
F Lot 684 Black Hill Road, Black Hill	Day	51	64	13
	Evening	49	65	16
	Night	48	54	6
G 156 Buchanan Road, Buchanan	Day	N/A[2]	75	N/A
	Evening	N/A[2]	74	N/A
	Night	N/A[2]	45	N/A
I 49 Magnetic Drive, Ashtonfield	Day	50	77	27
	Evening	53	59	6
	Night	47	53	6
L 65 Tipperary Drive, Ashtonfield	Day	N/A[2]	50	N/A
	Evening	N/A[2]	49	N/A
	Night	N/A[2]	49	N/A
J 220 Parish Drive, Thornton	Day	51	65	14
	Evening	49	71	22
	Night	48	50	2

Note 1: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: No data was available during baseline measurements, no comparisons can be made.

Note 3: Rounded to the nearest whole dB.

5.2.2.2 Previous Half-year

Table 16 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the previous monitoring period.

Table 16 L_{A10} Results Comparison – Previous Half-year

Monitoring Location	Period[1]	Long term Night-time L_{A10} Noise Levels		Difference dB[2]
		June 2020	December2020	
D Black Hill School, Black Hill	Day	57	58	1
	Evening	46	56	10
	Night	43	48	6
F Lot 684 Black Hill Road, Black Hill	Day	59	64	5
	Evening	55	65	10
	Night	52	54	2
G 156 Buchanan Road, Buchanan	Day	0	75	75
	Evening	0	74	74
	Night	0	45	45
I 49 Magnetic Drive, Ashtonfield	Day	60	77	17
	Evening	48	59	11
	Night	41	53	12
L 65 Tipperary Drive, Ashtonfield	Day	53	50	-3
	Evening	47	49	2
	Night	37	49	12
J 220 Parish Drive, Thornton	Day	47	65	18
	Evening	46	71	25
	Night	45	50	5

Note 1: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.2.2.3 Coinciding Period Last Year

Table 17 presents the ambient L_{A10} noise levels recorded for the current monitoring period compared to those measured during the coinciding monitoring period last year.

Table 17 L_{A10} Result Comparison – Coinciding Period Last Year

Monitoring Location	Period[1]	Long term Night-time L_{A10} Noise Levels		Difference dB[2]
		June 2019	June 2020	
D Black Hill School, Black Hill	Day	No result	58	-
	Evening	No result	56	-
	Night	No result	48	-
F Lot 684 Black Hill Road, Black Hill	Day	63	64	1
	Evening	60	65	4
	Night	57	54	-2
G 156 Buchanan Road, Buchanan	Day	52	75	23
	Evening	46	74	27
	Night	41	45	4
I 49 Magnetic Drive, Ashtonfield	Day	58	77	19
	Evening	53	59	6
	Night	42	53	11
L 65 Tipperary Dr, Ashtonfield	Day	49	50	1
	Evening	48	49	1
	Night	45	49	4
J 220 Parish Drive, Thornton	Day	48	65	17
	Evening	44	71	26
	Night	38	50	11

Note 1: Periods are as detailed in the Industrial Noise Policy (INP) and are Daytime - 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening - 6.00 pm 10.00 pm; Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: Rounded to the nearest whole dB.

5.3 Rail Noise Monitoring

In order to determine compliance with the rail noise criteria, a noise logger was positioned at Location J. The train loading times during the noise monitoring period are presented in **Table 18**.

Table 18 Coal Train Loading Operations Log

Date	Coal Train Loading Time	Period
21/12/2020	06:53-13:15	Night and Day
22/12/2020	11:41-16:20	Day

The measured $L_{Aeq(period)}$ noise level for each period from rail traffic at Location J are presented in **Table 19.**

Table 19 Rail Noise Impact Monitoring Results

Location	Date	Period	Measured $L_{Aeq(period)}$	Criteria $L_{Aeq(period)}$	Compliance
J	21/12/2020[1]	Night	30	40	Yes
	21/12/2020	Day	37	55	Yes
	22/12/2020	Day	44	55	Yes

Note 1 Movement occurred coinciding the night period of the 20/12/20 (i.e 22:00 20/12/2020 to 07:00 21/12/2020

Results presented in **Table 19** indicate that rail noise levels from the Bloomfield Rail Spur were in compliance with the Abel Mine Project Approval during the noise monitoring period.

6 Conclusion

SLR was engaged by Donaldson Coal Pty Ltd to conduct half-yearly noise monitoring surveys for Donaldson Coal Mine and Abel Coal Mine in accordance with the NMP, dated 3 June 2019.

Abel mine was placed in Care & Maintenance on 28th April 2016 and there were no operations onsite, excluding that from the Bloomfield CHPP which operates under the Abel Coal Mine project consent conditions.

Operator-attended and unattended noise measurements were conducted for the December 2020 half at six focus locations surrounding the mine.

Abel portal operations were not observed to be audible at any locations during the monitoring period with CHPP operations audible at Location L during the daytime attended noise survey. Contributed noise levels from Abel Mine did not exceed noise emission goals and compliance with the Abel Mine *Project Approval* was indicated at all locations.

A comparison of ambient L_{A10} and L_{A90} noise levels recorded during the current monitoring period (December 2020), the baseline monitoring period, the last monitoring period (June 2020), and the coinciding monitoring period from last year (December 2019) has been conducted.

Rail noise levels from the Bloomfield Rail Spur were considered to be in compliance with the Abel Mine Project Approval during the noise monitoring period.

APPENDIX A

Acoustic Terminology

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2 x 10^{-5} Pa.

2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3. Sound Power Level

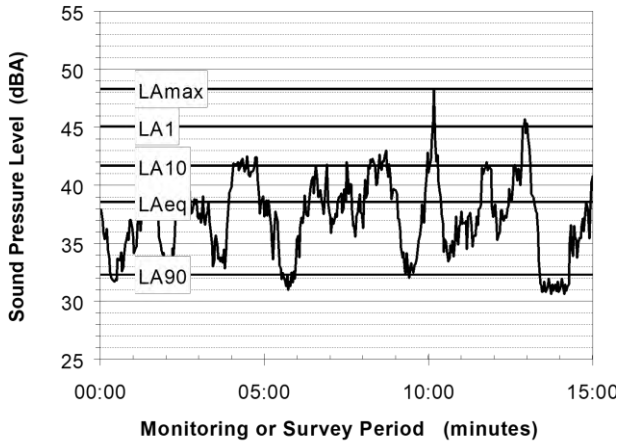
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

5. Frequency Analysis

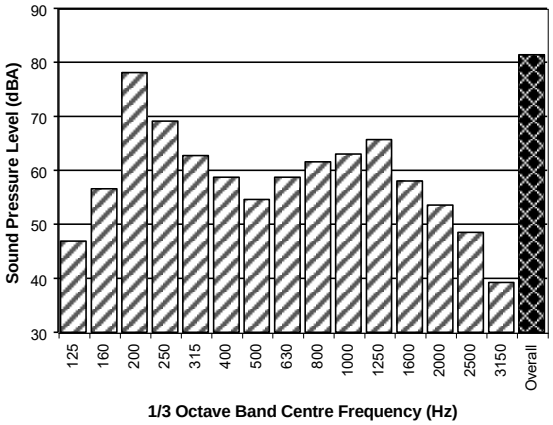
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/Vo), where Vo is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

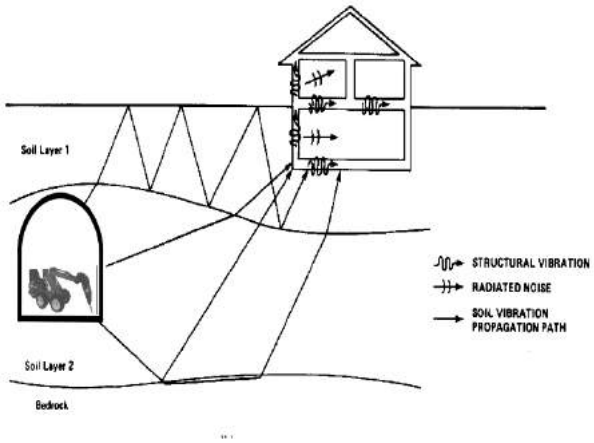
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

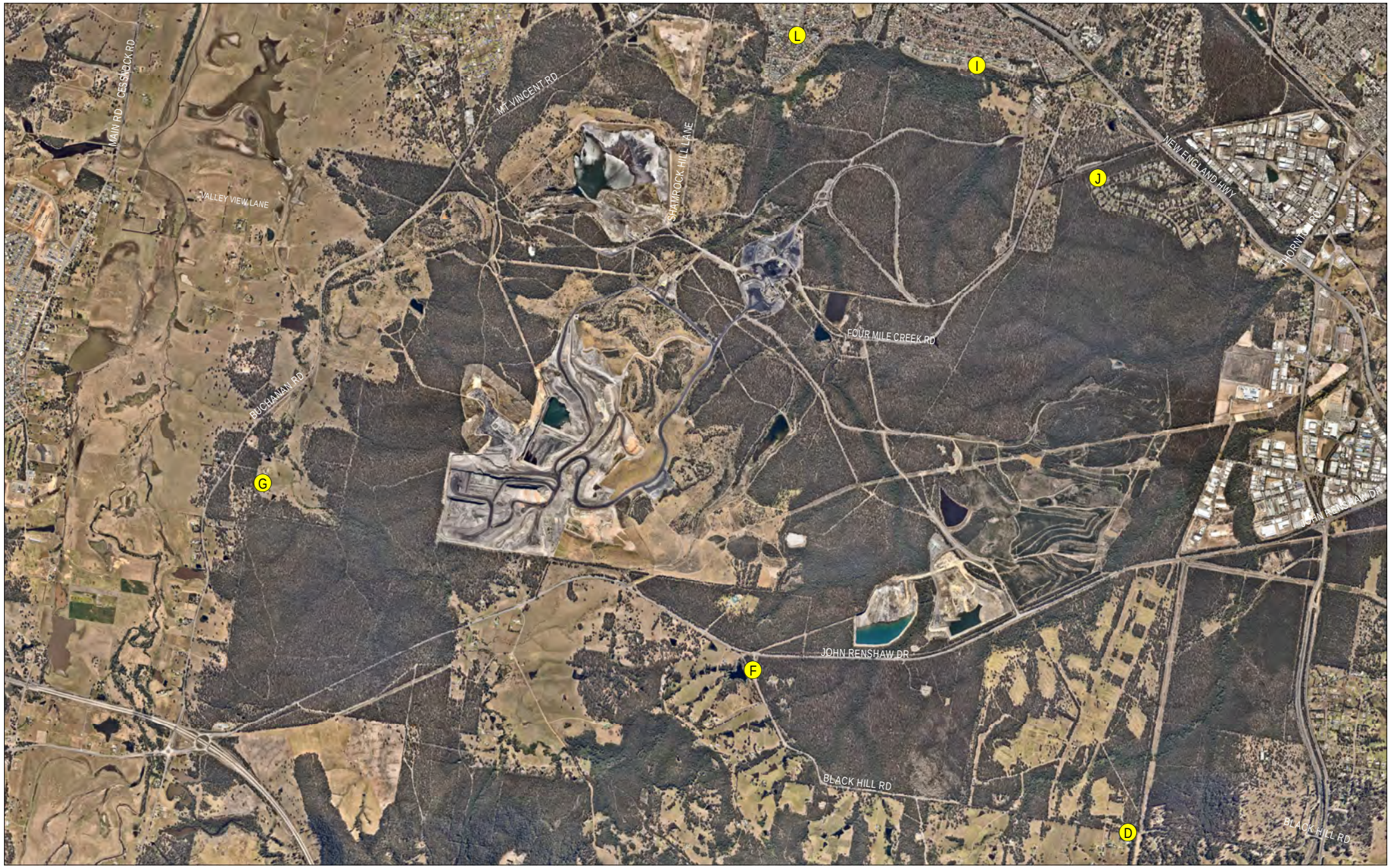
The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

APPENDIX B

Noise Monitoring Locations



D:\Quick Jobs\Martin Davenport\Donaldson\SLR630\01053\01200_AB_MonitoringLocations_01.mxd

SLR
10 KINGS ROAD
NEW LAMBTON
NEW SOUTH WALES 2305
AUSTRALIA
T: 61 2 4037 3200
F: 61 2 4037 3201
www.slrconsulting.com

Project No.:	630.01053.01200
Date:	11/01/2018
Drawn by:	NT
Scale:	1:45,000
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 56

LEGEND

Noise Monitoring Locations

N
W
E
S

0 500 1,000 1,500 2,000 m

Donaldson Coal

Noise Monitoring

Noise Monitoring Locations

APPENDIX B

APPENDIX C

Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 25532 & FILT 5408

Equipment Description:	Sound Level Meter		
Manufacturer:	B & K		
Model No:	2270	**Serial No:**	2679354
Microphone Type:	4189	**Serial No:**	2695417
Preamplifier Type:	ZC0032	**Serial No:**	12254
Filter Type:	1/3 Octave	**Serial No:**	2679354
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	998 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	26% ±5%
Date of Calibration:	09/09/2019	**Issue Date:**	09/09/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: IKB **AUTHORISED SIGNATURE:** ..... Jack Kielt

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

NATA
WORLD RECOGNISED ACCREDITATION

ACU-VIB ELECTRONICS
HEAD OFFICE
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02)96808233
Mobile: 0413 809806
web site: www.acu-vib.com.au

Accredited Lab. No. 9262
Acoustic and Vibration Measurements

CERTIFICATE NO.: SLM 25532 & FILT 5408

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Entered
Electrical Noise	11.2	Entered
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	NA
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 09/09/2019 **Issue Date:** 09/09/2019

Checked by: KB

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

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web site: www.acu-vib.com.au

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 25534

EQUIPMENT TESTED:	1/2" Microphone
Manufacturer:	B & K
Type No:	4197 **Serial No:** 3077697 (Part 2)
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066
Tests Performed:	Acoustic Microphone Frequency Response with Inverse A Weighting

CONDITION OF TEST:

Ambient Pressure:	997 hPa ±1.5 hPa	**Relative Humidity:**	24 % ±5%
Temperature:	23 °C ±2° C		
Date of Calibration:	09/09/2019	**Issue Date**	09/09/2019
Acu-Vib Test Procedure:	AVP05 (Microphone Acoustic Frequency Response)		

CHECKED BY: VKB . **AUTHORISED SIGNATURE:** .....
Jack Kelt

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.
The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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Mobile: 0413 809806
Web site: www.acu-vib.com.au

Acoustic Tests, Microphone response

Job No: 13678 Test No: 255334

Microphone type: B&K 4197 Serial No,: 3077697 (Part 2)

Preamplifier type: 2683 Serial No. : 2792513

SLM body (if appropriate): SVAN 912 AE Serial No: 4396

Ambient Temperature: 23C ±2° C, Relative Humidity: 997 RH ±5% RH,

Ambient Pressure: 24 hPa ±1.5 hPa

Frequency Hz	Deviation re 1 kHz	Type 2 Tol.	Type 1 Tol.	U95 dB	P/F
31.5 Hz	0.11dB	± 3.0 dB	± 1.5 dB dB	0.12	P
63 Hz	-0.01dB	± 2.0 dB	± 1.5 dB dB	0.10	P
125 Hz	-0.08dB	± 1.5 dB	± 1.0 dB dB	0.09	P
250 Hz	-0.15dB	± 1.5 dB	± 1.0 dB dB	0.09	P
500 Hz	-0.14dB	± 1.5 dB	± 1.0 dB dB	0.09	P
1 kHz Ref	0.00dB	± 1.5 dB	± 1.0 dB dB	0.09	P
2 kHz	0.05dB	± 2.0 dB	± 1.0 dB dB	0.07	P
4 kHz	-0.25dB	± 3.0 dB	± 1.0 dB dB	0.13	P
8 kHz	-0.21dB	± 5.0 dB	+1.5;-3.0 dB	0.13	P
12.5 kHz	-0.10dB	+ 5.0; - ∞ dB	+3.0;-6.0 dB	0.19	P
16 kHz	0.61dB	+ 5.0; - ∞ dB	+ 3.0; - ∞ dB	0.30	P

Tolerances from AS1259-1990 part 1, (IEC 60651).

Notes:

Signed (Testing Officer) _____ Date:09/09/2019

Checked by: _____ Date:09/09/2019

Acoustic test WS 1 results

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 25533

EQUIPMENT TESTED:	1/2" Microphone
Manufacturer:	B & K
Type No:	4197 **Serial No:** 3077697 (Part 1)
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066
Tests Performed:	Acoustic Microphone Frequency Response with Inverse A Weighting

CONDITION OF TEST:

Ambient Pressure:	997 hPa ±1.5 hPa **Relative Humidity:** 24% ±5%
Temperature:	23 °C ±2° C
Date of Calibration:	09/09/2019 **Issue Date** 09/09/2019
Acu-Vib Test Procedure:	AVP05 (Microphone Acoustic Frequency Response)

CHECKED BY: JKB **AUTHORISED SIGNATURE:** .....
Jack Rielt

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.
The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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Acoustic and Vibration Measurements

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Mobile: 0413 809806
Web site: www.acu-vib.com.au

Acoustic Tests, Microphone response

Job No: 13678 Test No: 25533

Microphone type: B&K 4197 Serial No,: 3077697 (Part 1)

Preamplifier type: 2683 Serial No. : 2792513

SLM body (if appropriate): SVAN 912 AE Serial No: 4396

Ambient Temperature: 23C ±2° C, Relative Humidity: 997 RH ±5% RH,

Ambient Pressure: 24 hPa ±1.5 hPa

Frequency Hz	Deviation re 1 kHz	Type 2 Tol.	Type 1 Tol.	U95 dB	P/F
31.5 Hz	0.11dB	± 3.0 dB	± 1.5 dB dB	0.12	P
63 Hz	-0.11dB	± 2.0 dB	± 1.5 dB dB	0.10	P
125 Hz	-0.18dB	± 1.5 dB	± 1.0 dB dB	0.09	P
250 Hz	-0.25dB	± 1.5 dB	± 1.0 dB dB	0.09	P
500 Hz	-0.24dB	± 1.5 dB	± 1.0 dB dB	0.09	P
1 kHz Ref	0.00dB	± 1.5 dB	± 1.0 dB dB	0.09	P
2 kHz	0.05dB	± 2.0 dB	± 1.0 dB dB	0.07	P
4 kHz	-0.25dB	± 3.0 dB	± 1.0 dB dB	0.13	P
8 kHz	-0.31dB	± 5.0 dB	+1.5;-3.0 dB	0.13	P
12.5 kHz	-0.20dB	+ 5.0; - ∞ dB	+3.0;-6.0 dB	0.19	P
16 kHz	0.51dB	+ 5.0; - ∞ dB	+ 3.0; - ∞ dB	0.30	P

Tolerances from AS1259-1990 part 1, (IEC 60651).

Notes:

Signed (Testing Officer) _____ Date:09/09/2019

Checked by: _____ Date:09/09/2019

Acoustic test WS 1 results

CERTIFICATE OF CALIBRATION

COPY

CERTIFICATE NO.: **SLM 42286**

Equipment Description:	Noise Logger		
Manufacturer:	ARL		
Model No:	EL-316	**Serial No:**	16-203-508
Microphone Type:	MP-201	**Serial No:**	550504
Preamplifier Type:	NH-17	**Serial No:**	27474
Comments:	All tests passed for type 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd 120 High Street North Sydney, NSW 2060		
Ambient Pressure:	1010 hPa ±1.5 hPa		
Temperature:	23°C ±2° C	**Relative Humidity:**	42% ±5%
Date of Calibration:	15/06/2020	**Issue Date:**	16/06/2020

Acu-Vib Test Procedure: AVP05 (SLM)

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....

Jack Kielt

Accredited for compliance with ISO/IEC 17025 - Calibration

Results of the tests, calibration and/or measurements included in this document are traceable to SI units. Reference equipment has been calibrated by the Australian National Measurement Institute or NATA accredited laboratories.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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web site: www.acu-vib.com.au

CERTIFICATE NO.: SLM 42286

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1.	RMS Performance	clause 10.4.5
2.	Time Weighting Response, F&S	clause 10.4.2
3.	Time Weighting I	clause 10.4.3 **N/A**
4.	Time Weighting P	clause 10.4.4 **N/A**
5.	Input Attenuator Accuracy	clause 10.3.3
6.	Detector & Differential Linearity	clause 10.4.1
7.	Weighting Networks & Linearity	clause 10.2.3
8.	Overload Indication	clause 10.3.2
9.	AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10.	Time Averaging	clause 9.3.2
11.	Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 94.0 dB and adjusted to 94.0 dB
Uncertainty: ±0.13dB (at 95% c.l.) k=2

Date of Calibration: 15/06/2020 **Issue Date:** 16/06/2020

Checked by: ..IK..

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Results of the tests, calibration and/or measurements included in this document are traceable to SI units. Reference equipment has been calibrated by the Australian National Measurement Institute or NATA accredited laboratories.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 26637 & FILT 5714

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	20674
Microphone Type:	7052E	**Serial No:**	62914
Preamplifier Type:	SV12L	**Serial No:**	49862
Filter Type:	1/3 Octave	**Serial No:**	20674
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	1012 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	60% ±5%
Date of Calibration:	26/03/2020	**Issue Date:**	30/03/2020
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: MRB **AUTHORISED SIGNATURE:** ..... Hein Soe .....

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Accredited Lab. No. 9262
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CERTIFICATE NO.: SLM 26637 & FILT 5714

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Observed
Electrical Noise	11.2	Observed
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Pass
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 26/03/2020 **Issue Date:** 30/03/2020

Checked by: MKB

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 24613 & FILT 5164

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	23241
Microphone Type:	7052H	**Serial No:**	43035
Preamplifier Type:	SV12L	**Serial No:**	29858
Filter Type:	1/3 Octave	**Serial No:**	23241
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	1003 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	65% ±5%
Date of Calibration:	03/05/2019	**Issue Date:**	09/05/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: MB ..... **AUTHORISED SIGNATURE:** ..... Jack Kielt

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Accredited Lab. No. 9262
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CERTIFICATE NO.: SLM 24613 & FILT 5164

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Entered
Electrical Noise	11.2	Entered
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Pass
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 03/05/2019 **Issue Date:** 09/05/2019

Checked by: .....

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 25252 & FILT 5338

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	23245
Microphone Type:	7052H	**Serial No:**	40560
Preamplifier Type:	SV12L	**Serial No:**	22154
Filter Type:	1/3 Octave	**Serial No:**	23245
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	1004 hPa ±1.5 hPa		
Temperature:	25 °C ±2° C	**Relative Humidity:**	33% ±5%
Date of Calibration:	29/07/2019	**Issue Date:**	29/07/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: LKB **AUTHORISED SIGNATURE:** ..... Jack Kiett .....

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Accredited Lab. No. 9262
Acoustic and Vibration Measurements

CERTIFICATE NO.: SLM 25252 & FILT 5338

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Entered
Electrical Noise	11.2	Entered
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Pass
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 29/07/2019 **Issue Date:** 29/07/2019

Checked by: .....

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 27362 & FILT 5903

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	27578
Microphone Type:	7052E	**Serial No:**	50612
Preamplifier Type:	SV12L	**Serial No:**	29834
Filter Type:	1/1 Octave	**Serial No:**	27578
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd 120 High Street North Sydney, NSW 2060		
Ambient Pressure:	1006 hPa ±1.5 hPa		
Temperature:	24 °C ±2° C	**Relative Humidity:**	38% ±5%
Date of Calibration:	17/07/2020	**Issue Date:**	20/07/2020

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....

Jack Kielt

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CERTIFICATE NO.: SLM 27362 & FILT 5903

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Observed
Electrical Noise	11.2	Observed
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Pass
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

A full technical report is available if required.

Date of Calibration: 17/07/2020 **Issue Date:** 20/07/2020

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 26806 & FILT 5766

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	27580
Microphone Type:	7052H	**Serial No:**	43253
Preamplifier Type:	SV12L	**Serial No:**	29842
Filter Type:	1/3 Octave	**Serial No:**	27580
Comments:	All tests passed for class 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd 120 High Street North Sydney, NSW 2060		
Ambient Pressure:	992 hPa ±1.5 hPa		
Temperature:	22 °C ±2° C	**Relative Humidity:**	63% ±5%
Date of Calibration:	30/04/2020	**Issue Date:**	30/04/2020

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....

Bruce Meldrum

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CERTIFICATE NO.: SLM 26806 & FILT 5766

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Observed
Electrical Noise	11.2	Observed
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Pass
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

A full technical report is available if required.

Date of Calibration: 30/04/2020 **Issue Date:** 30/04/2020

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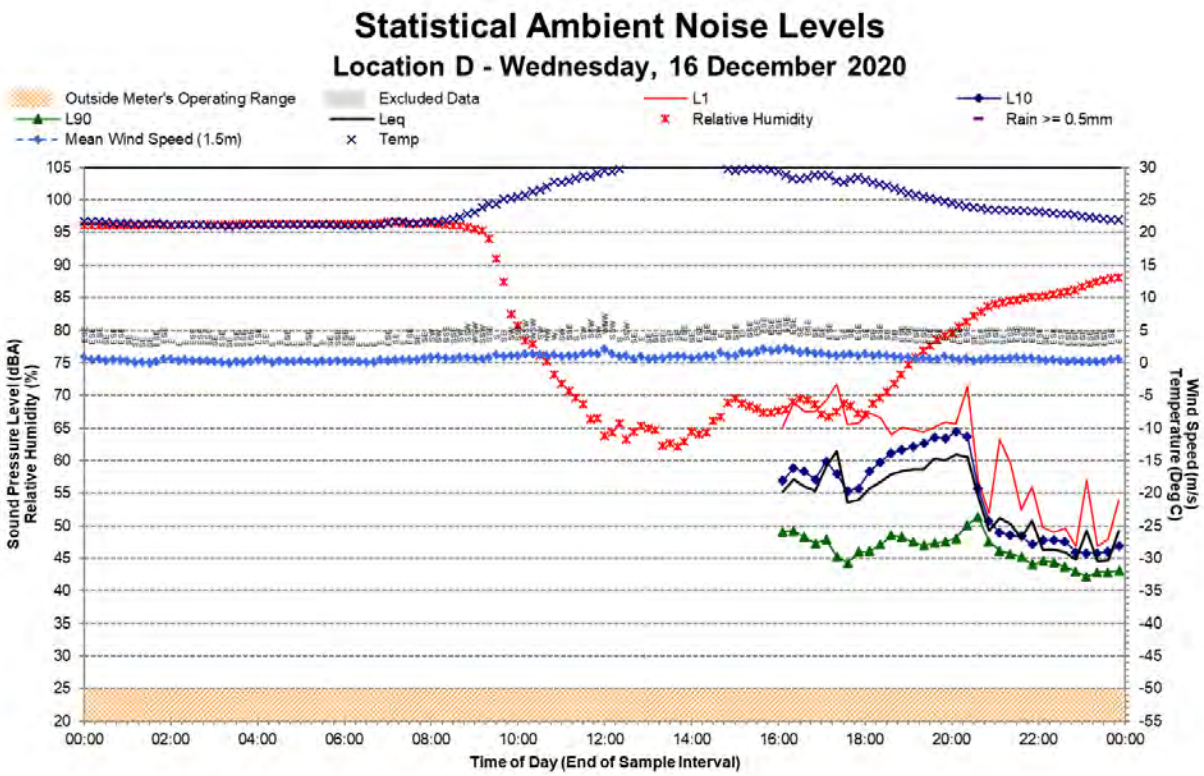
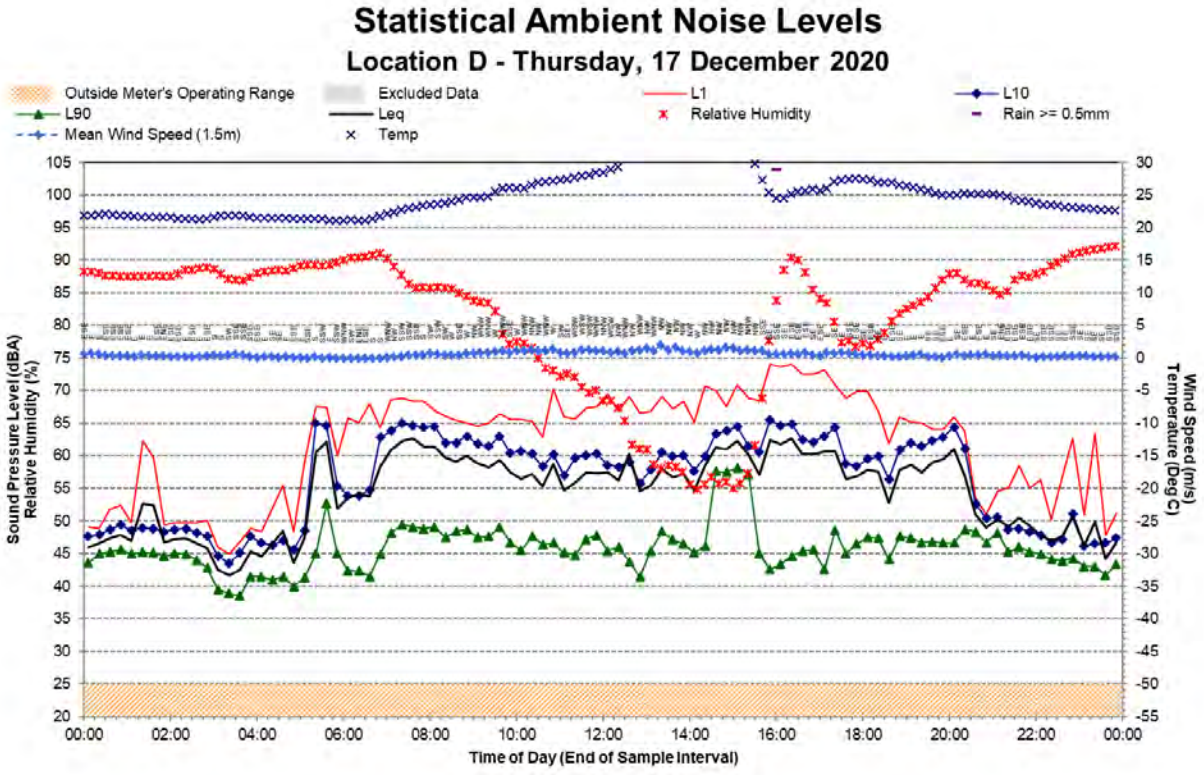
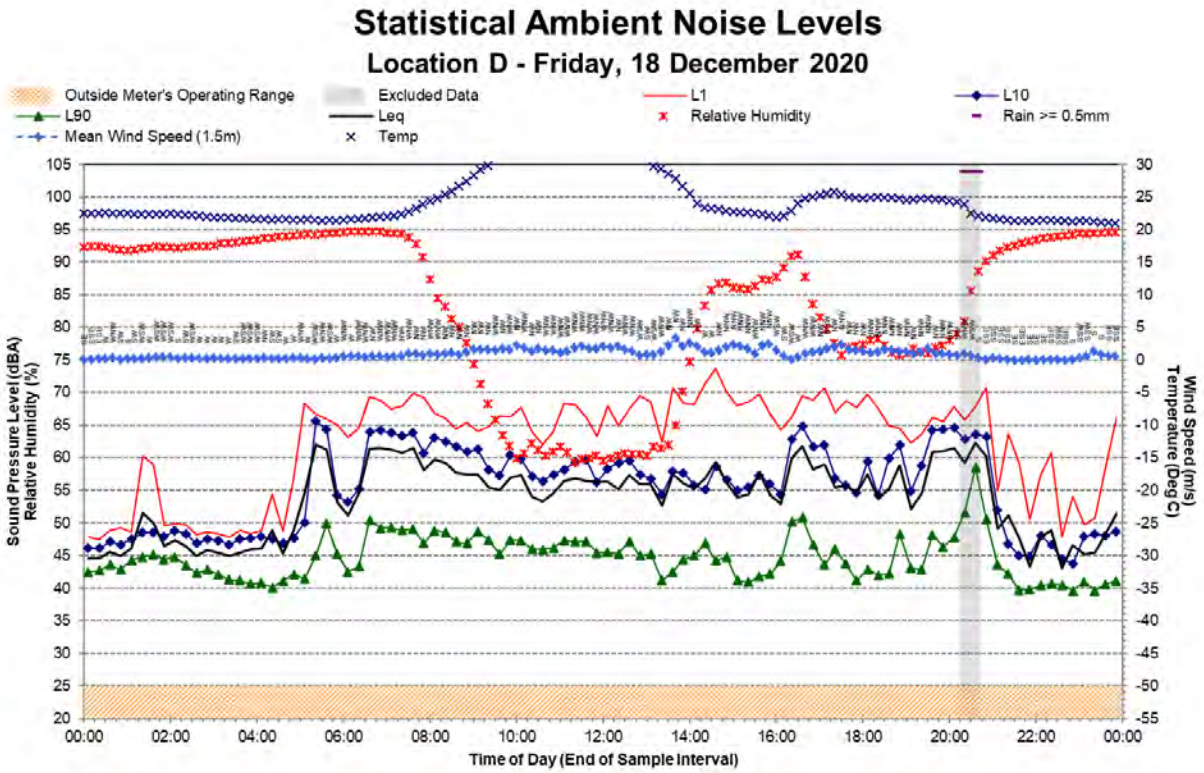
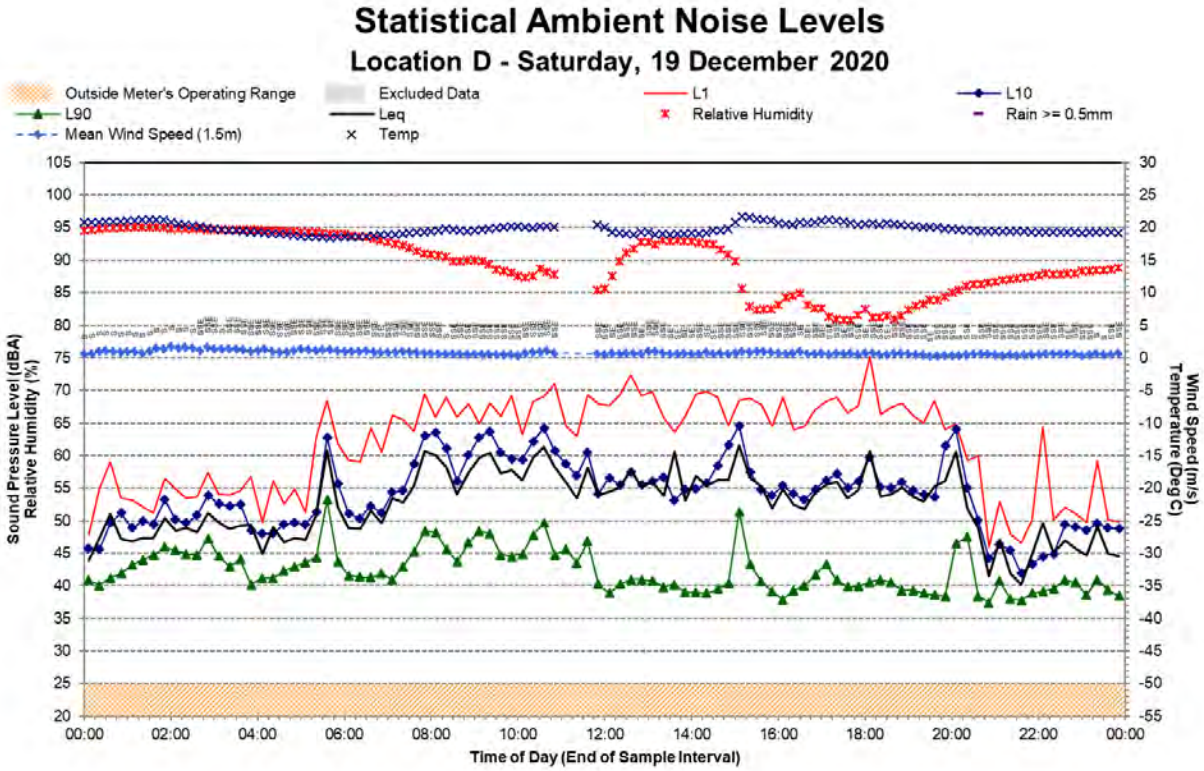
APPENDIX D

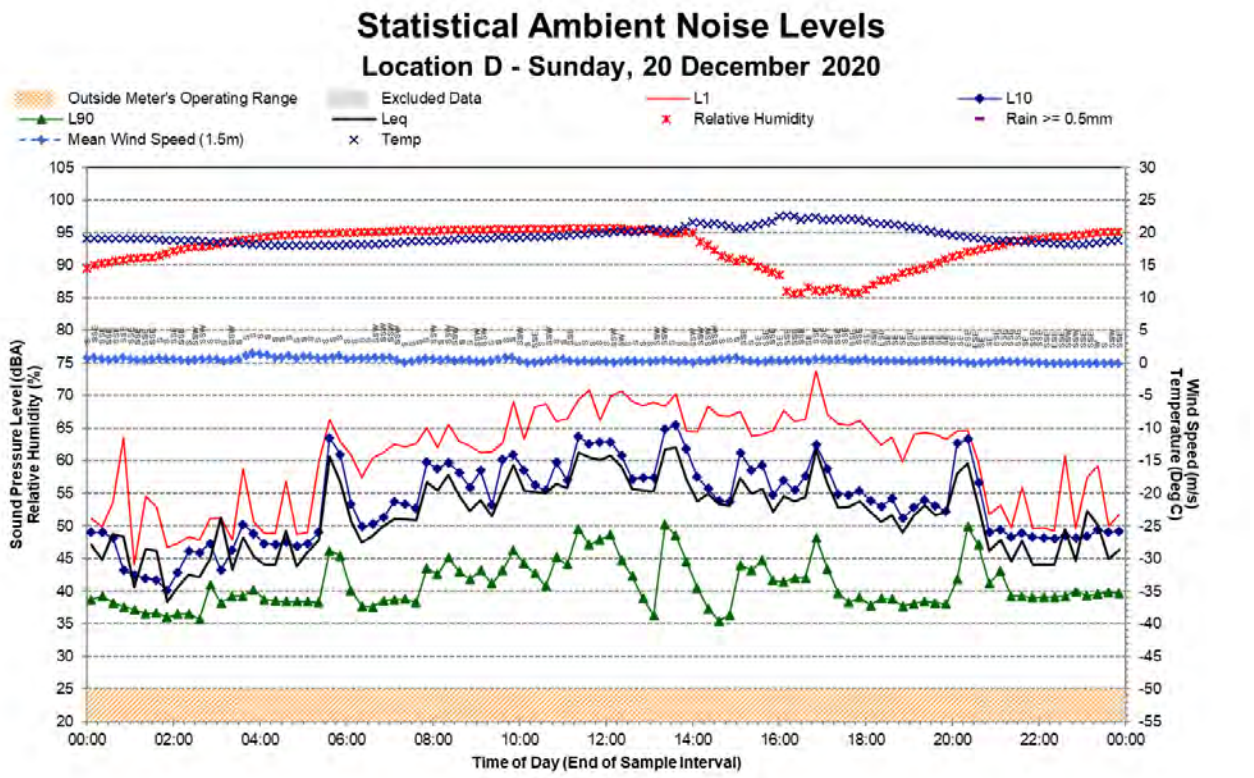
Statistical Ambient Noise Levels

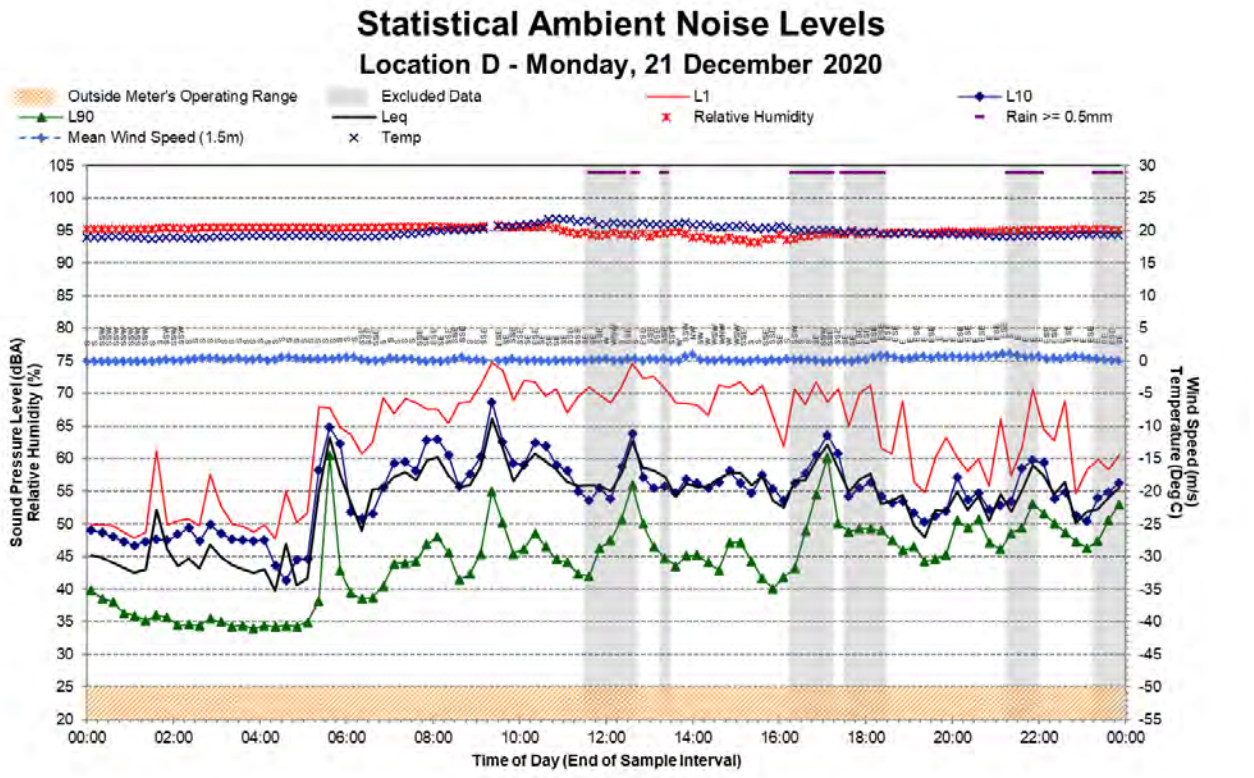

Statistical Ambient Noise Levels
Location D - Wednesday, 16 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

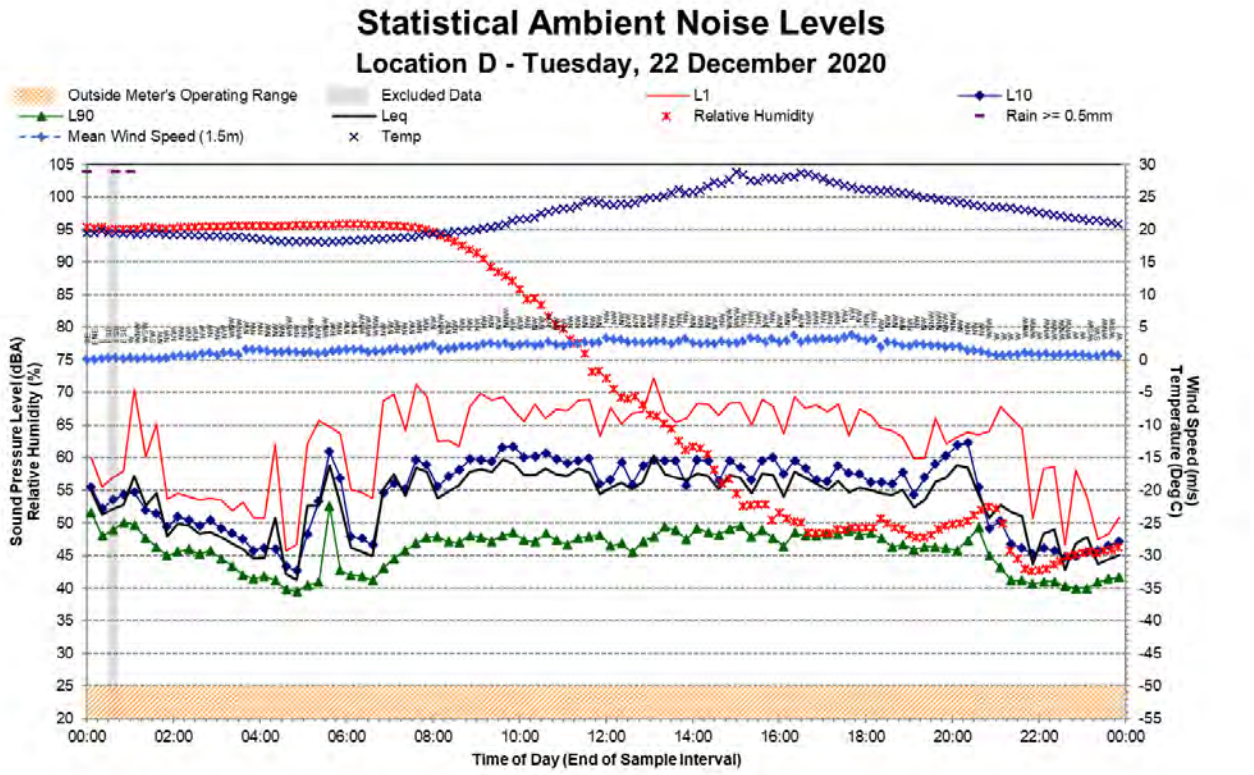

Statistical Ambient Noise Levels
Location D - Thursday, 17 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

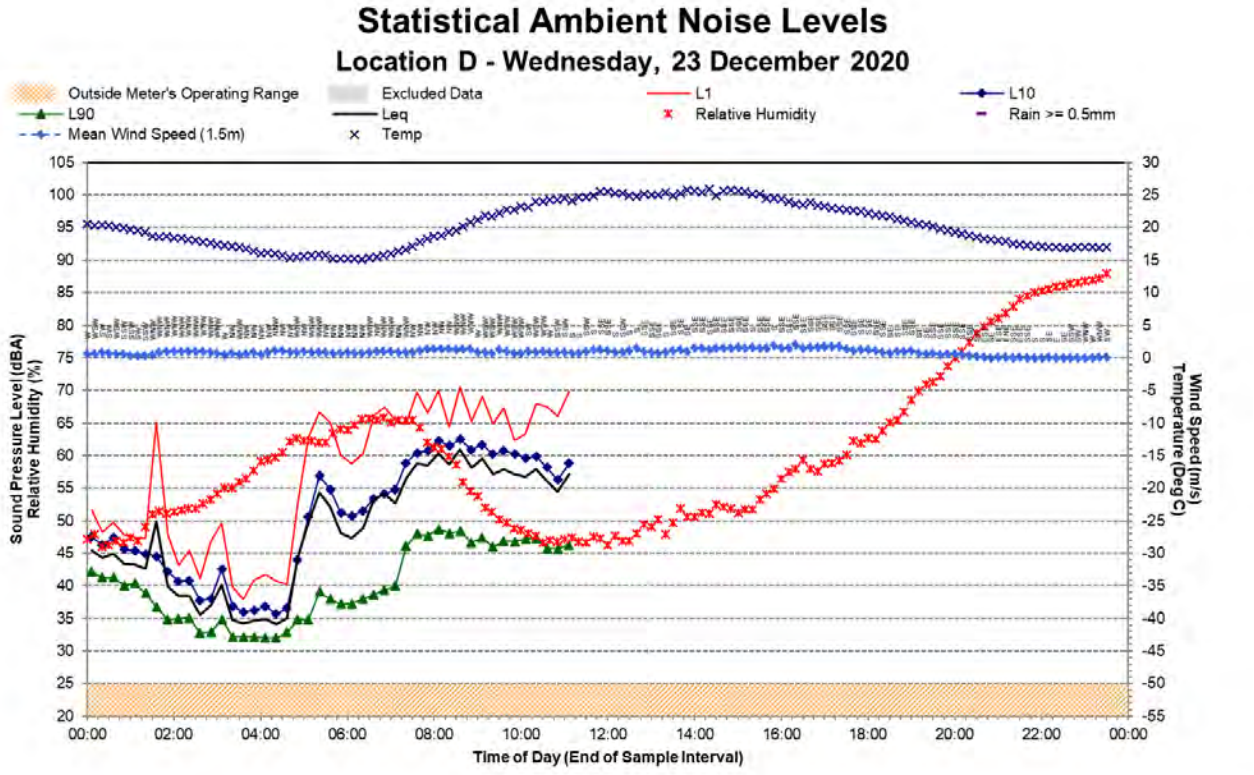

Statistical Ambient Noise Levels
Location D - Friday, 18 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

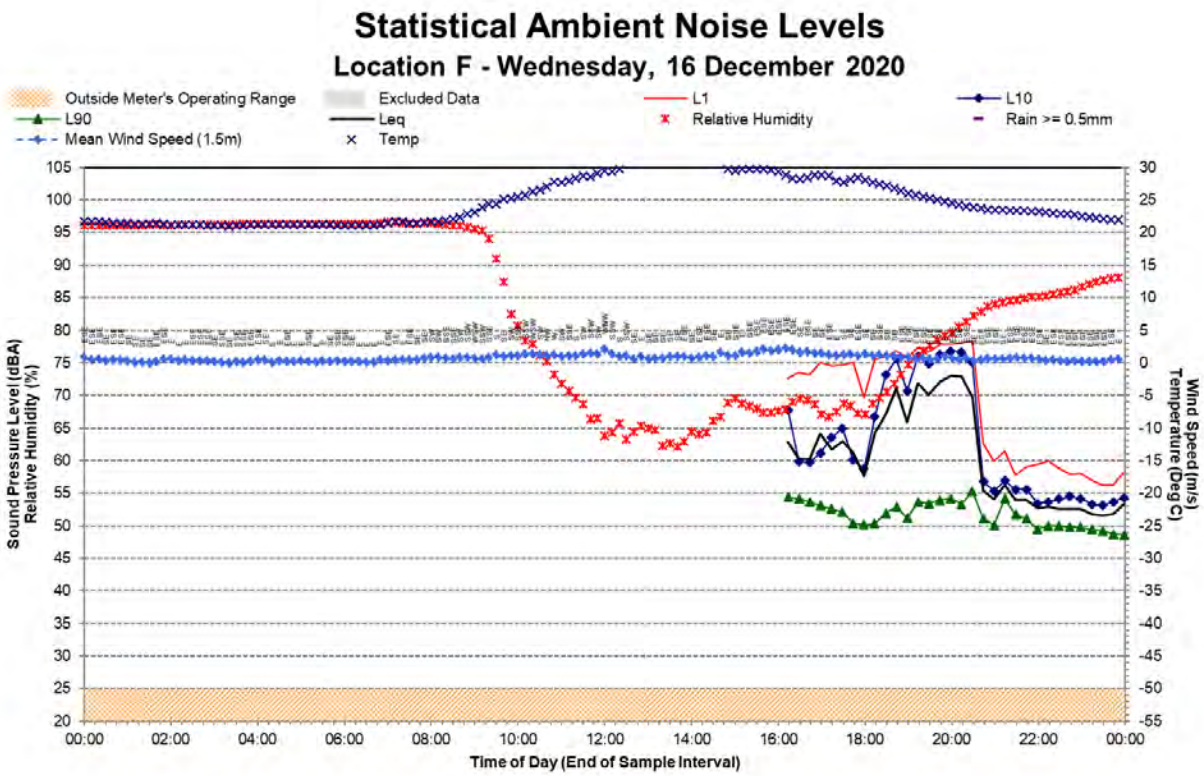

Statistical Ambient Noise Levels
Location D - Saturday, 19 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

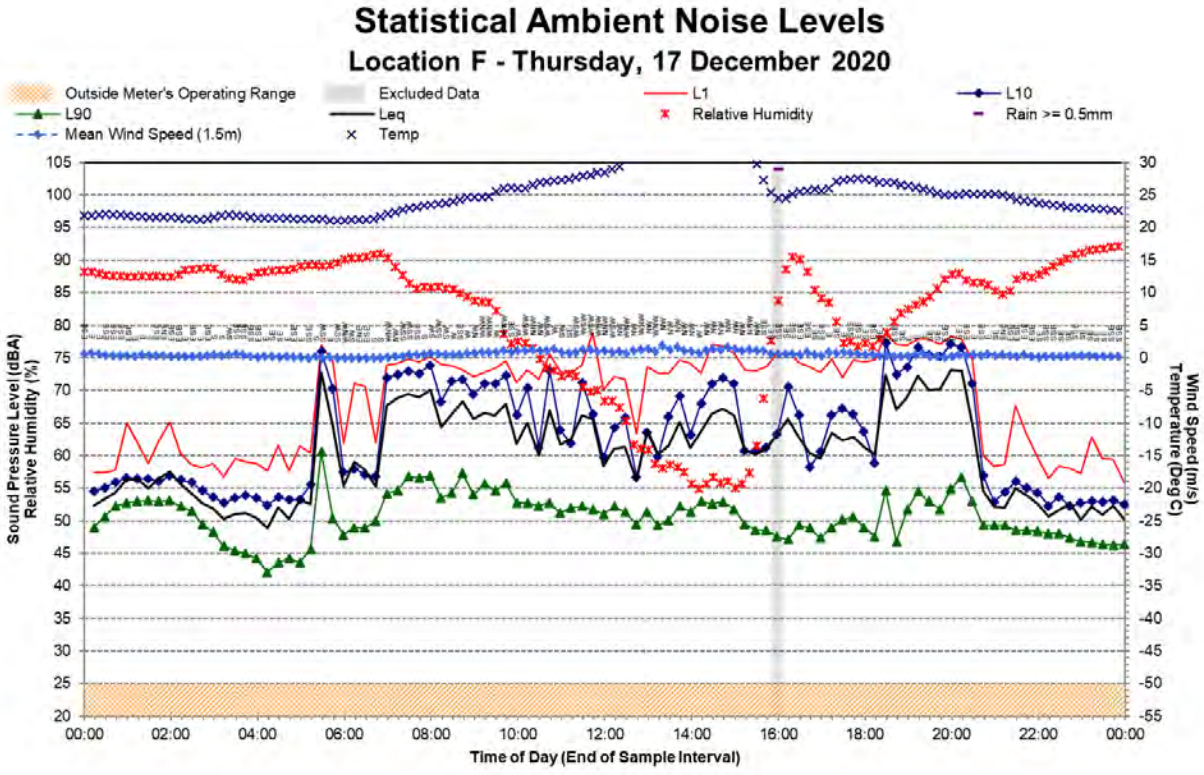

Statistical Ambient Noise Levels
Location D - Sunday, 20 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

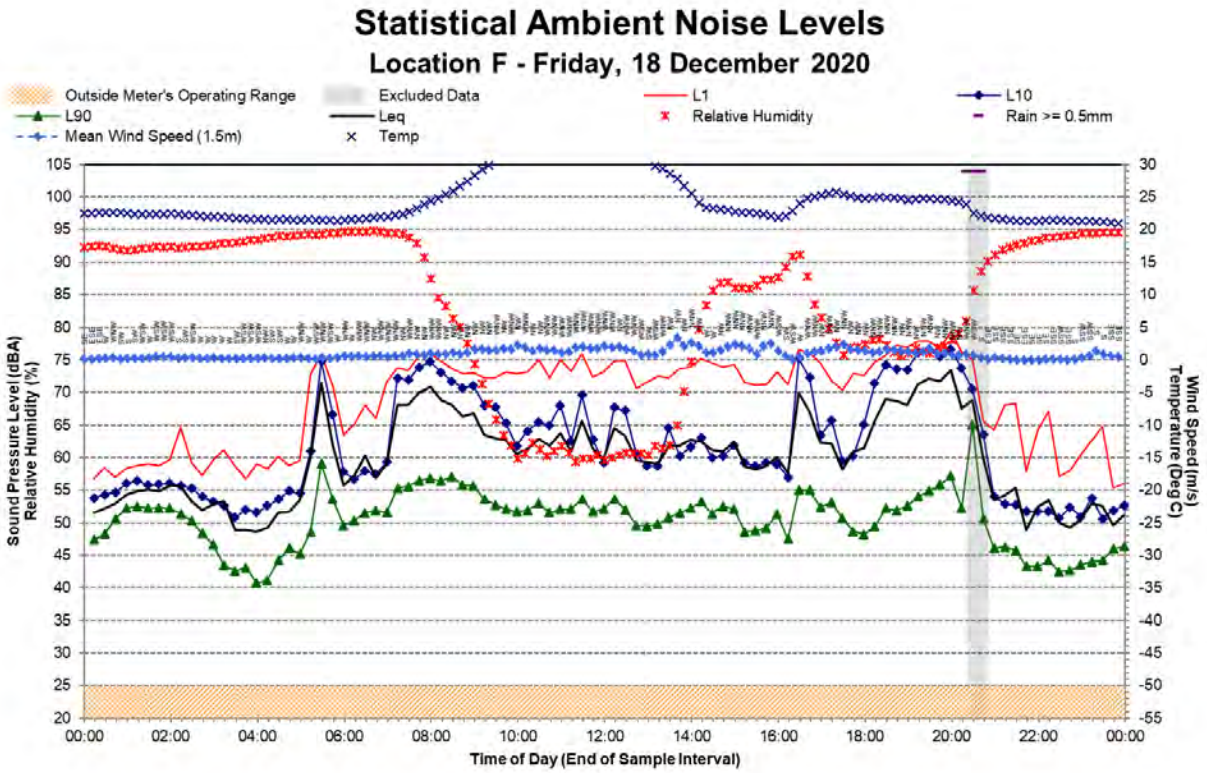

Statistical Ambient Noise Levels
Location D - Monday, 21 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

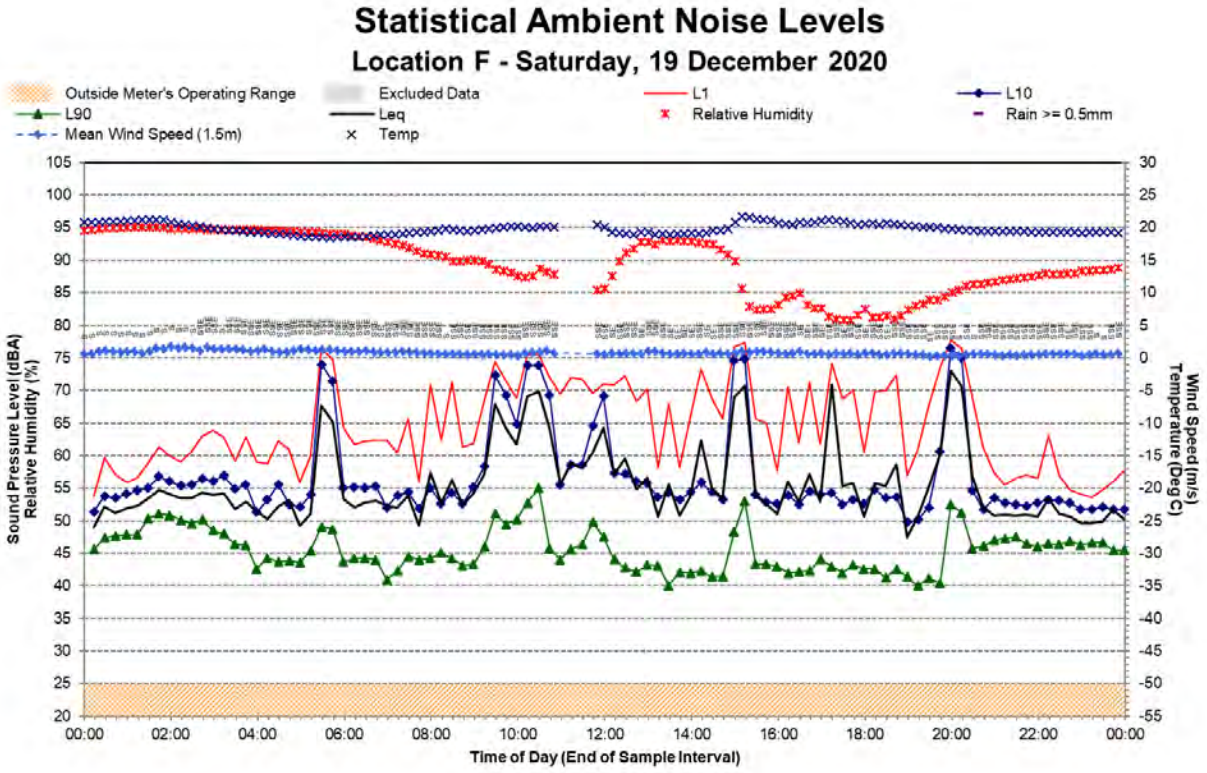

Statistical Ambient Noise Levels
Location D - Tuesday, 22 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

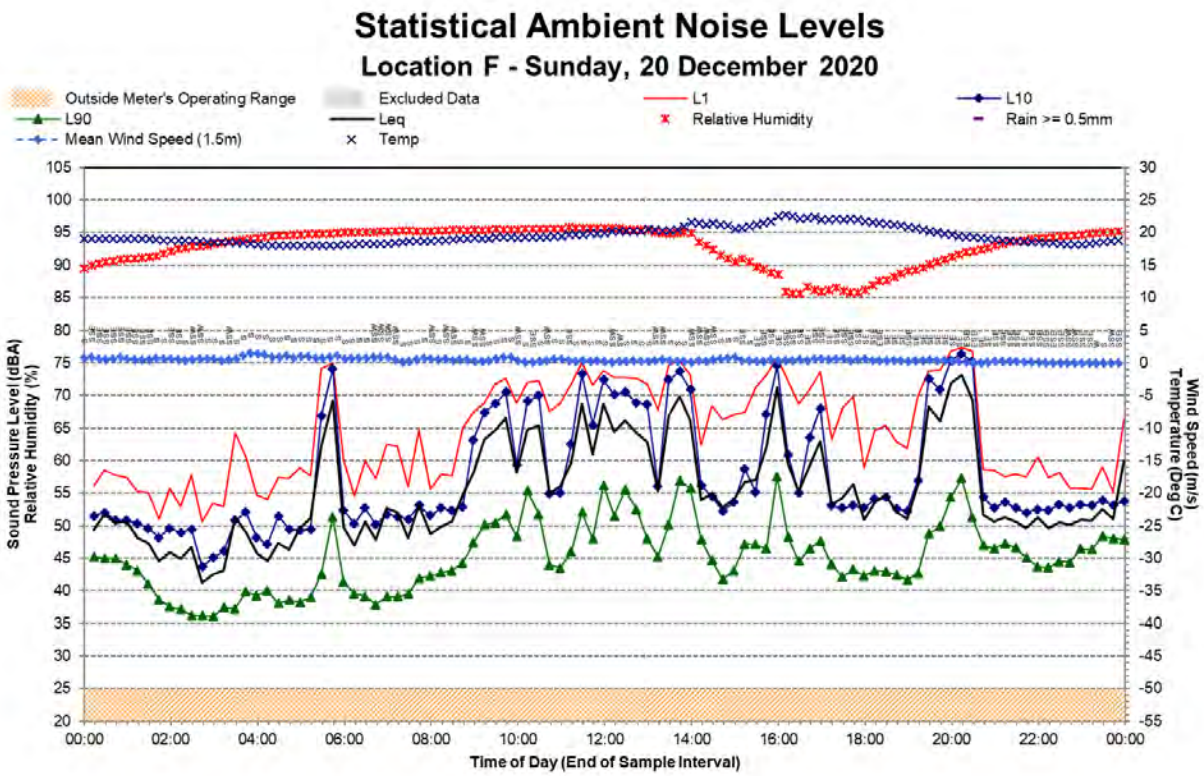

Statistical Ambient Noise Levels
Location D - Wednesday, 23 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

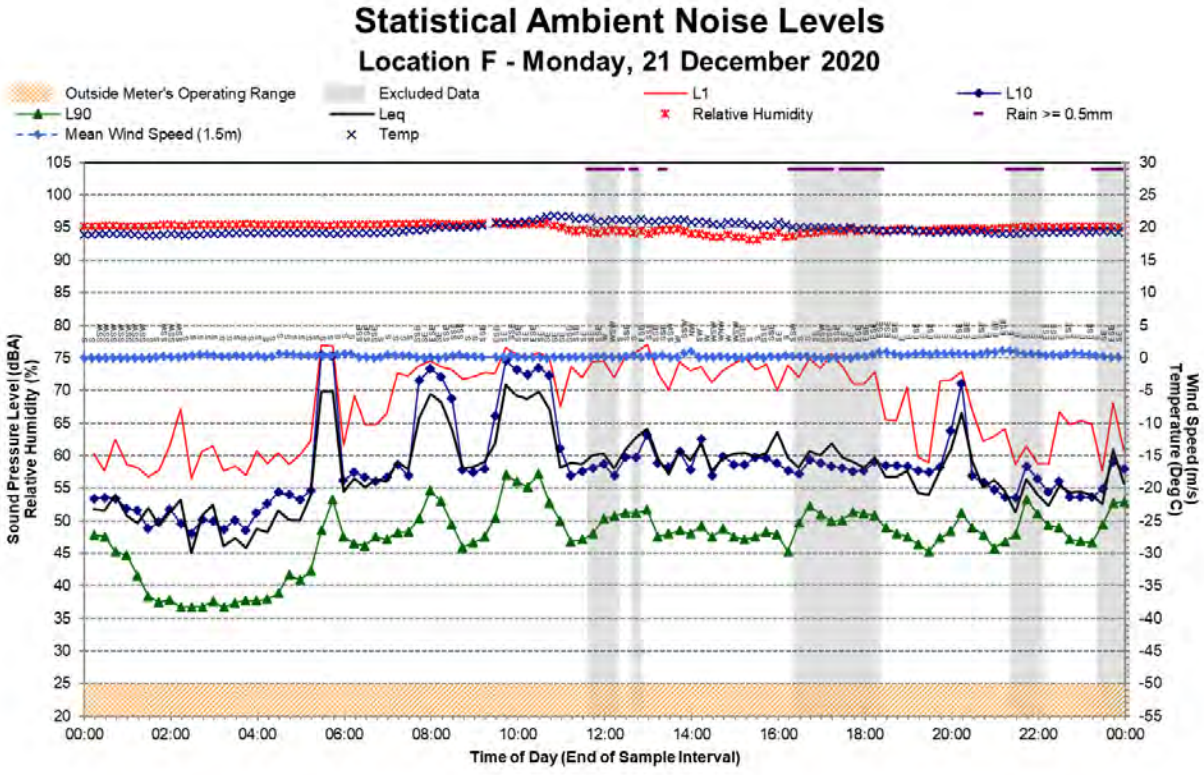

Statistical Ambient Noise Levels
Location F - Wednesday, 16 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

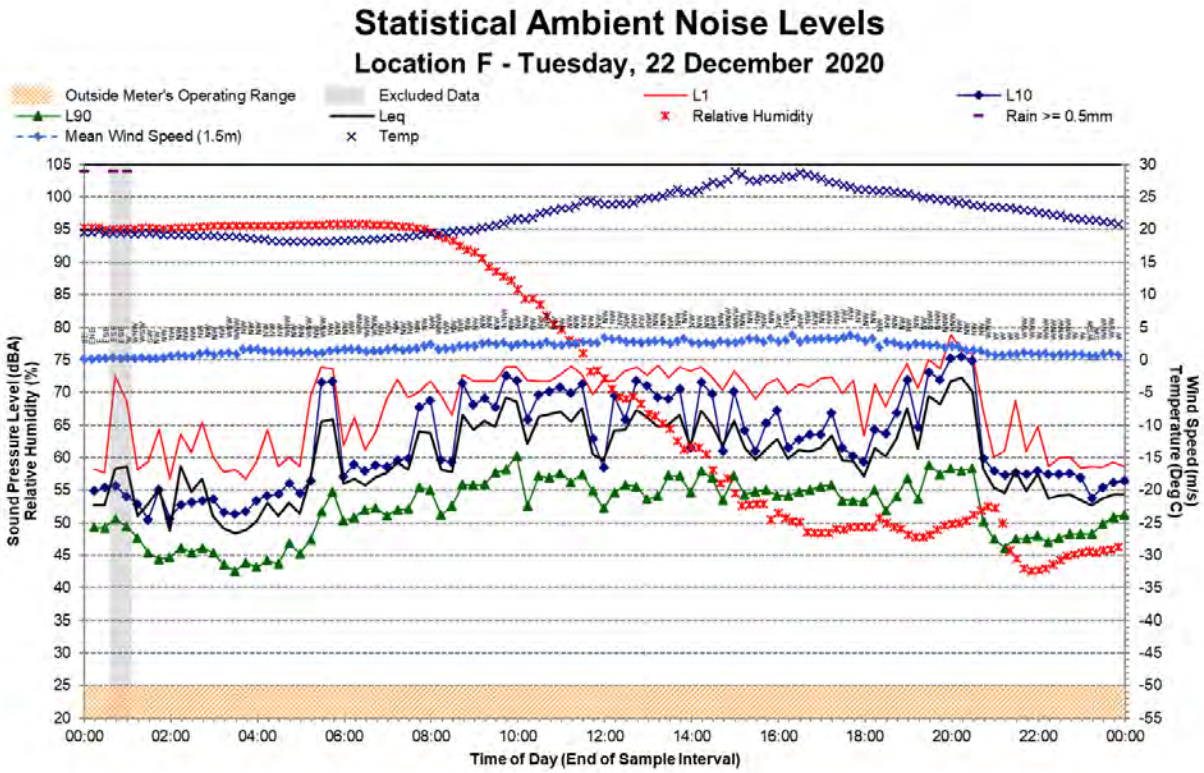

Statistical Ambient Noise Levels
Location F - Thursday, 17 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

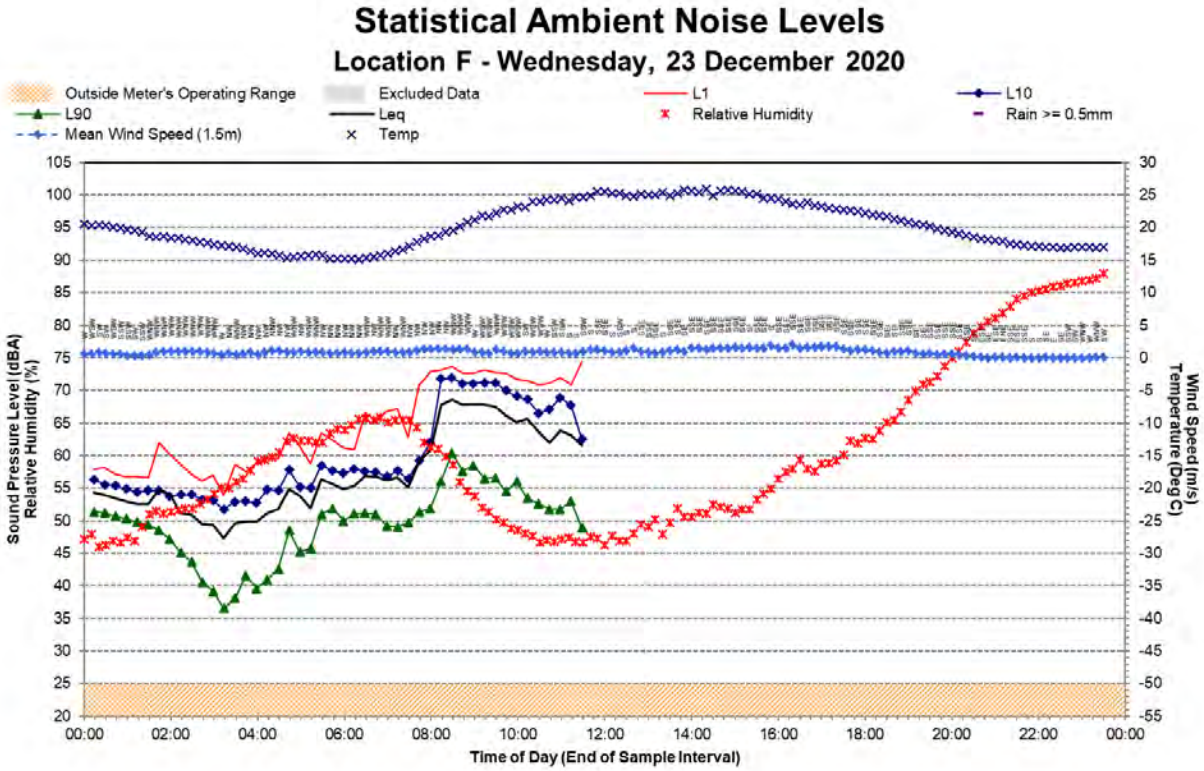

Statistical Ambient Noise Levels
Location F - Friday, 18 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

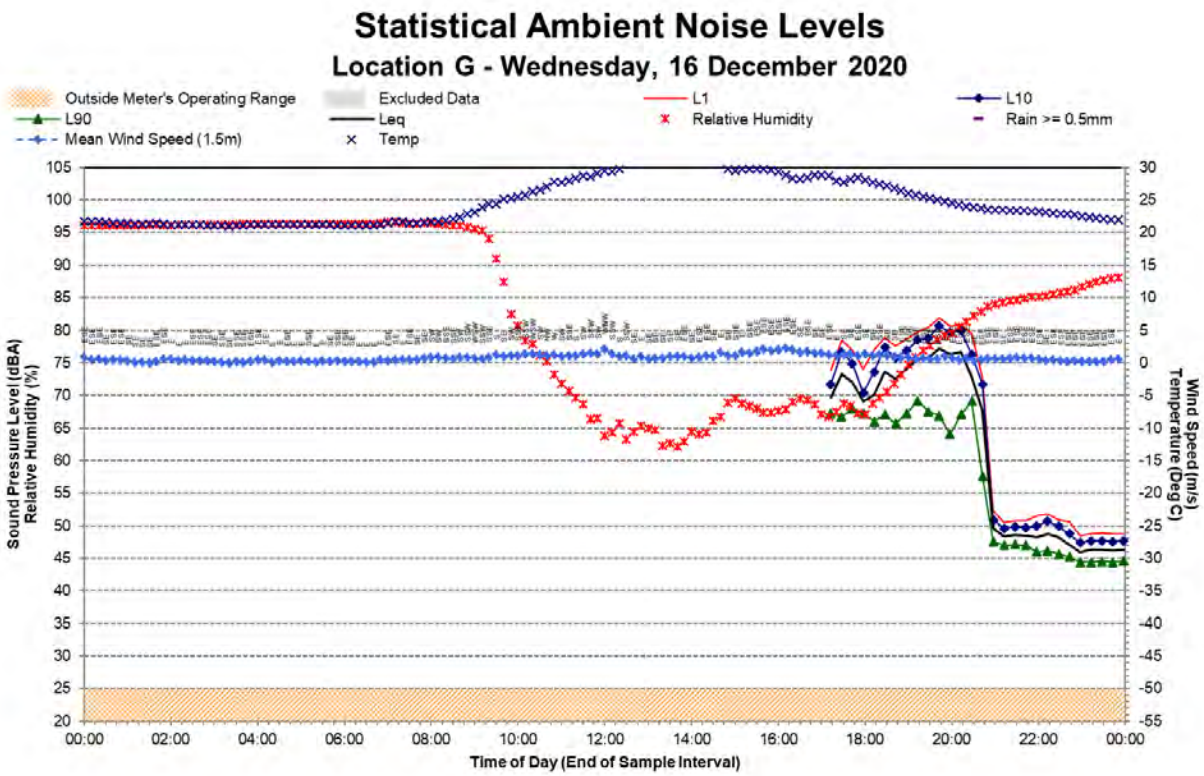

Statistical Ambient Noise Levels
Location F - Saturday, 19 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

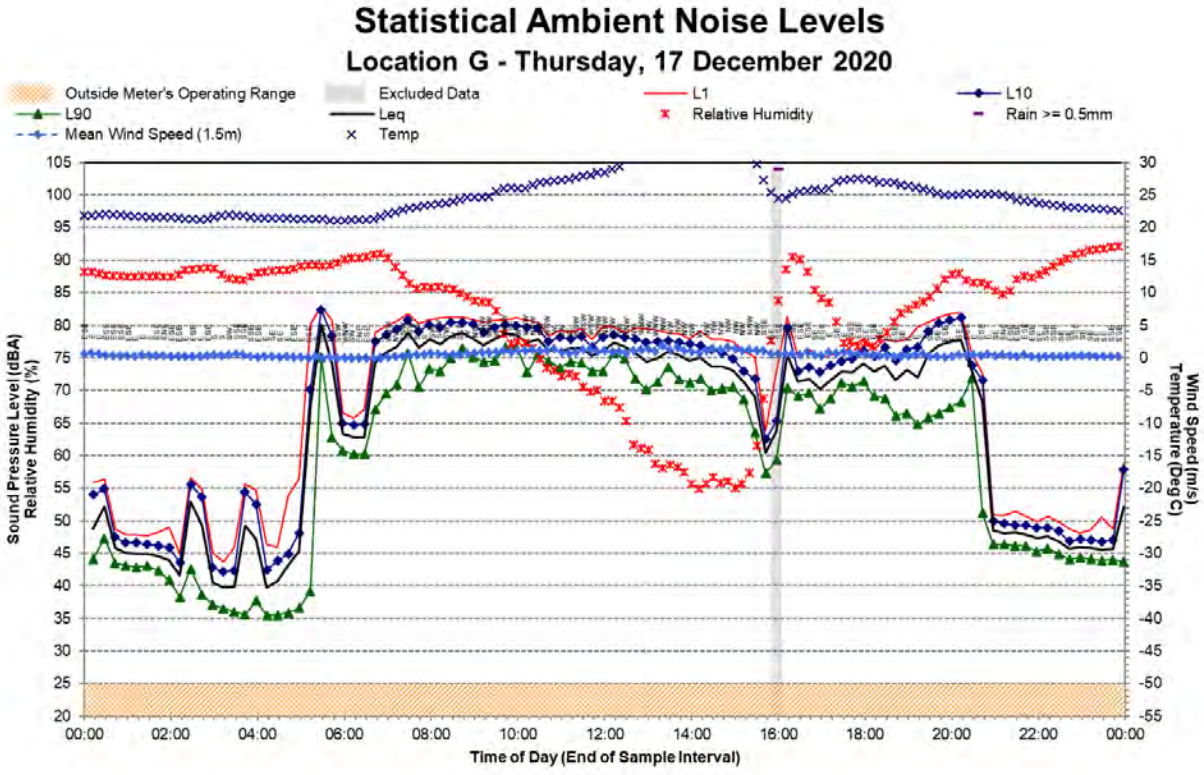

Statistical Ambient Noise Levels
Location F - Sunday, 20 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

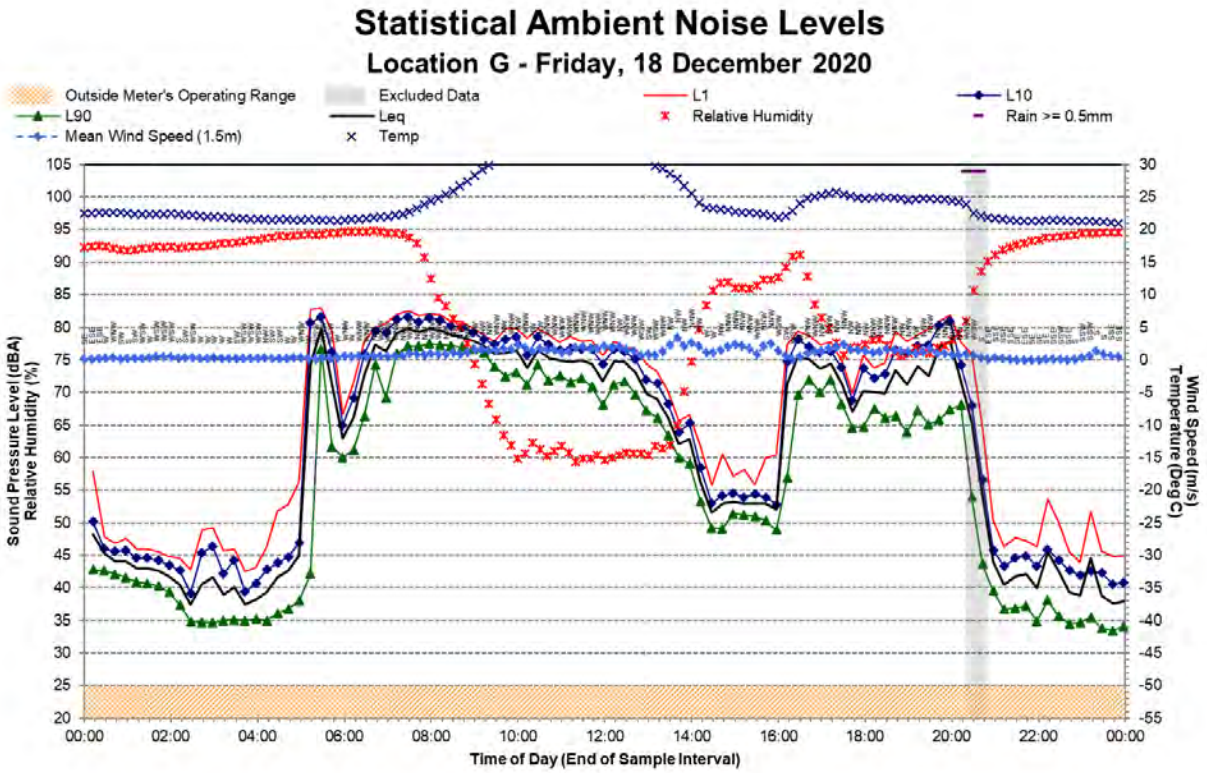

Statistical Ambient Noise Levels
Location F - Monday, 21 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

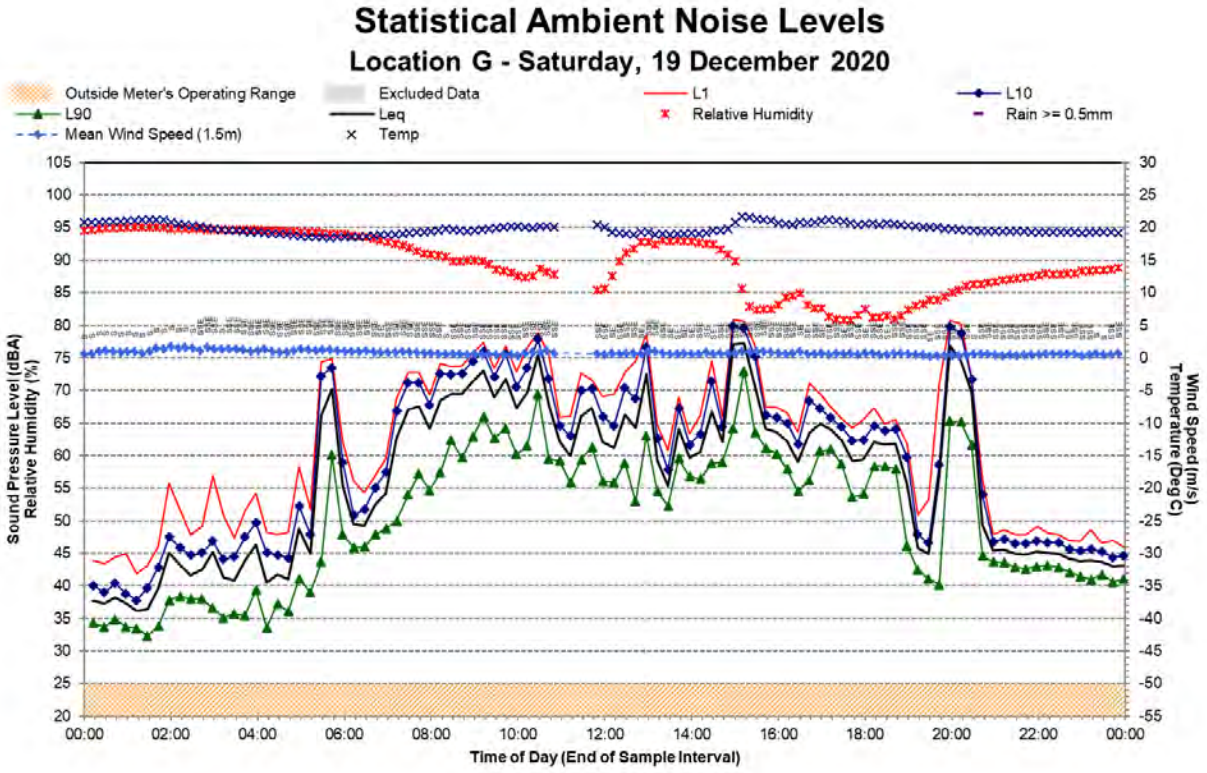

Statistical Ambient Noise Levels
Location F - Tuesday, 22 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

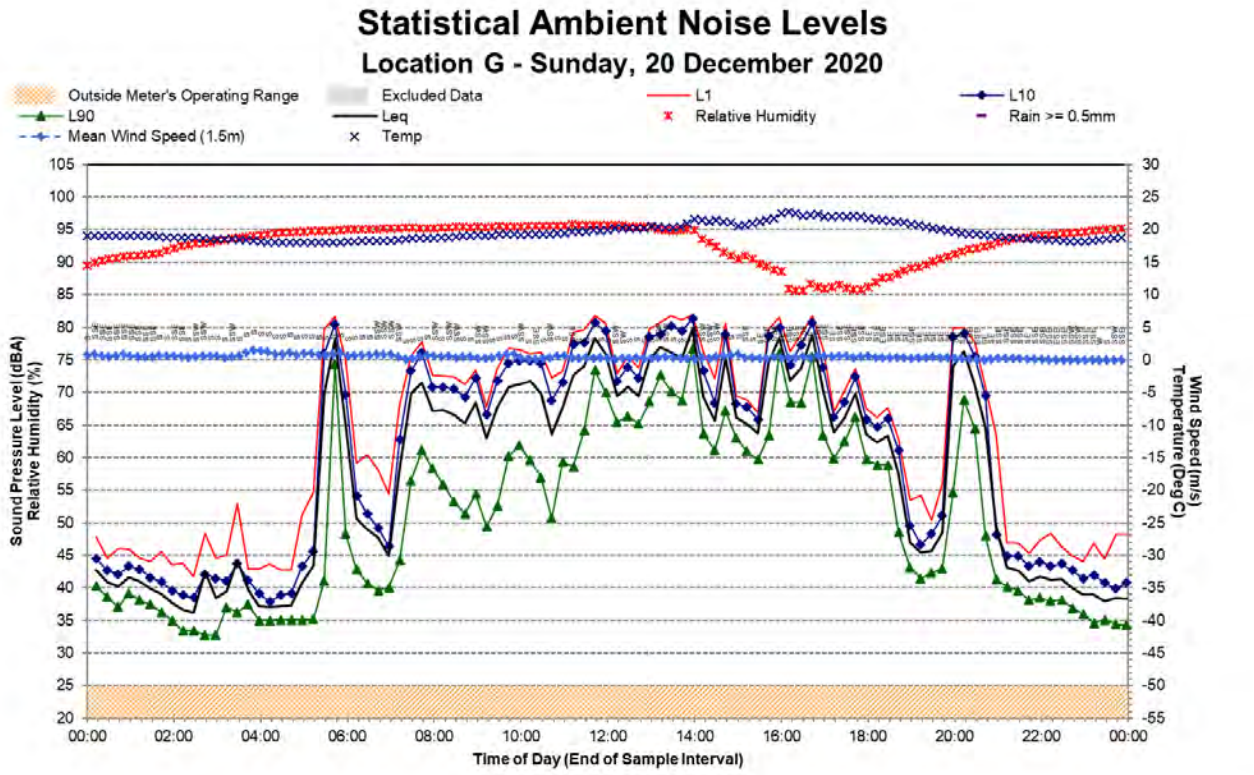

Statistical Ambient Noise Levels
Location F - Wednesday, 23 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

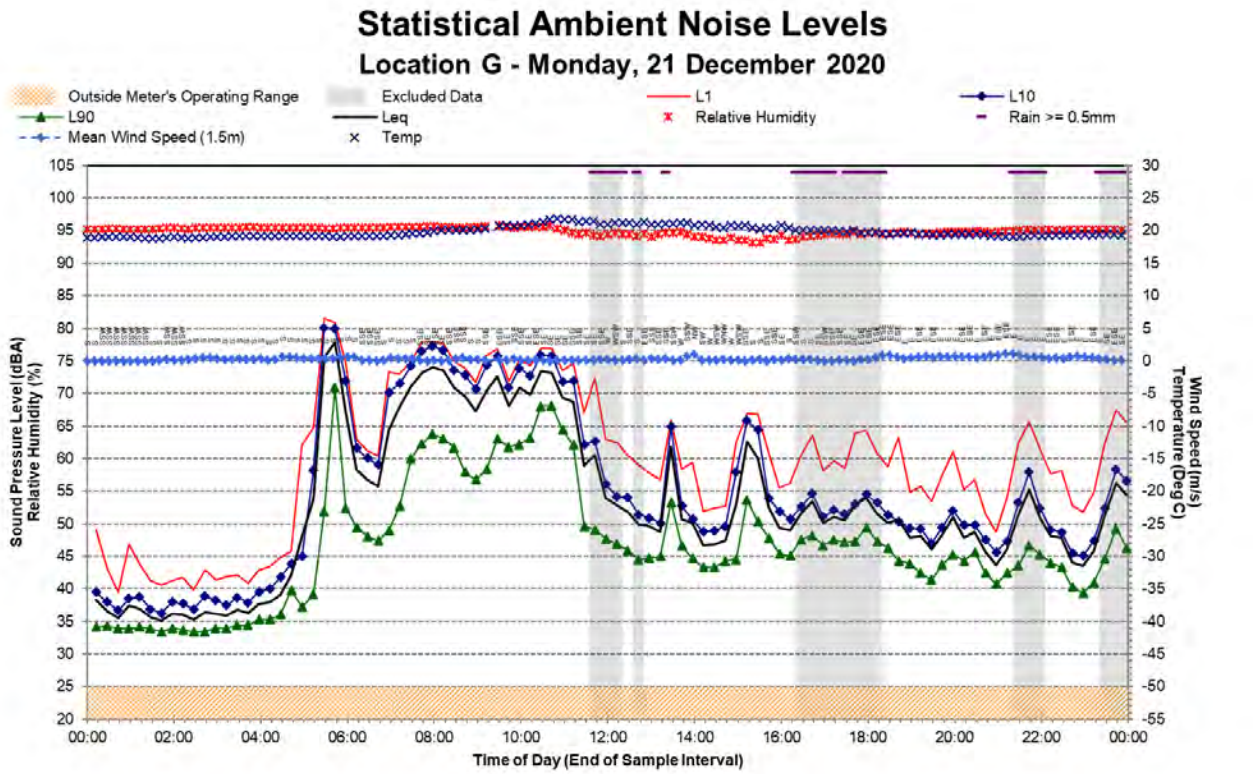

Statistical Ambient Noise Levels
Location G - Wednesday, 16 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

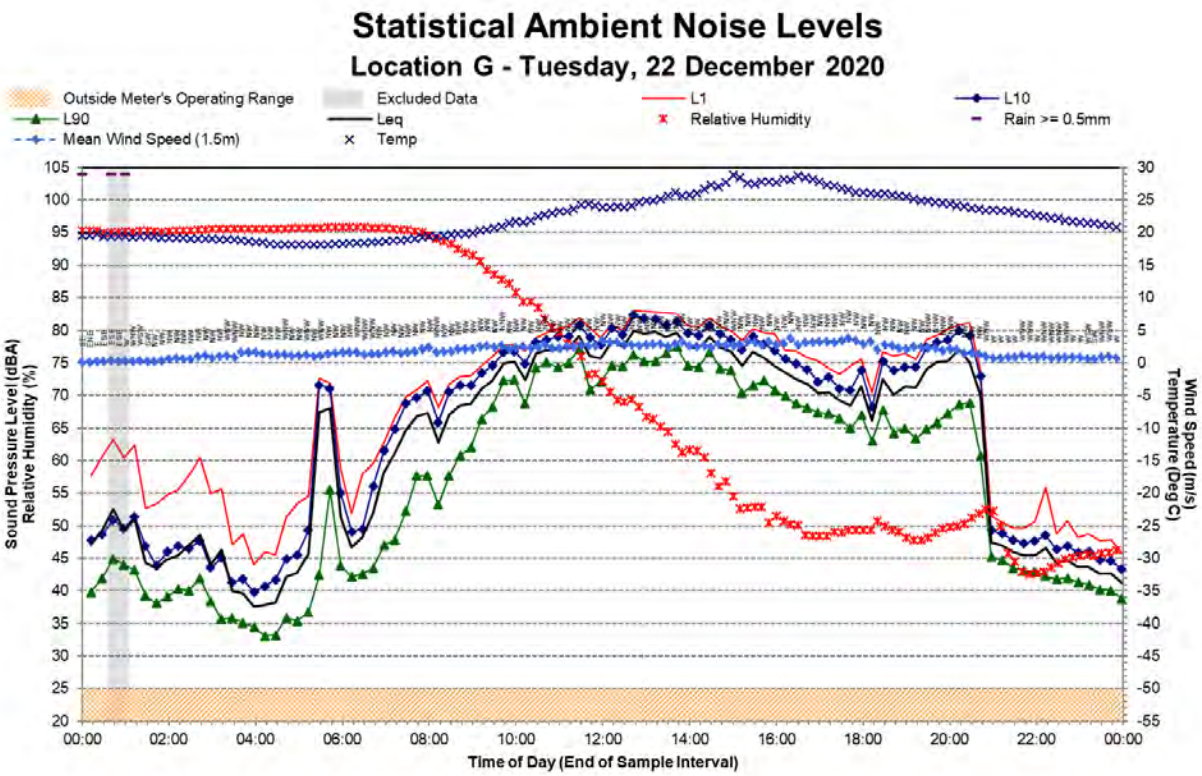

Statistical Ambient Noise Levels
Location G - Thursday, 17 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

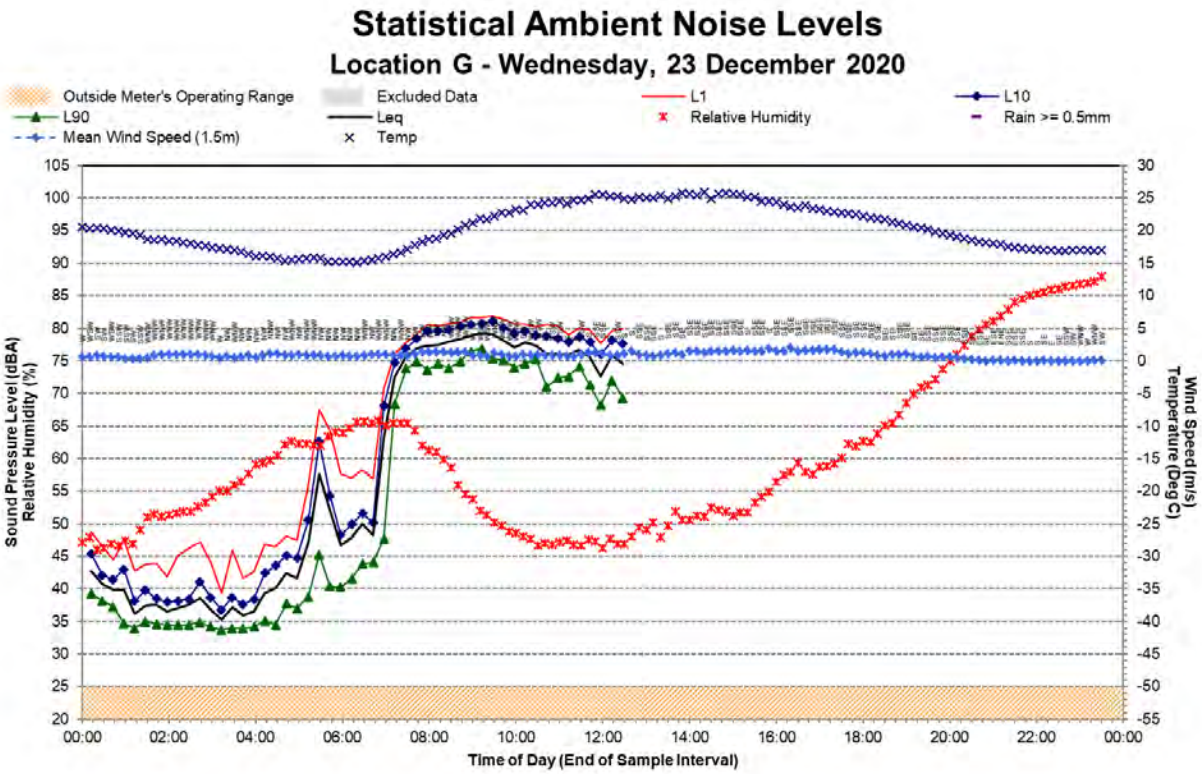

Statistical Ambient Noise Levels
Location G - Friday, 18 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

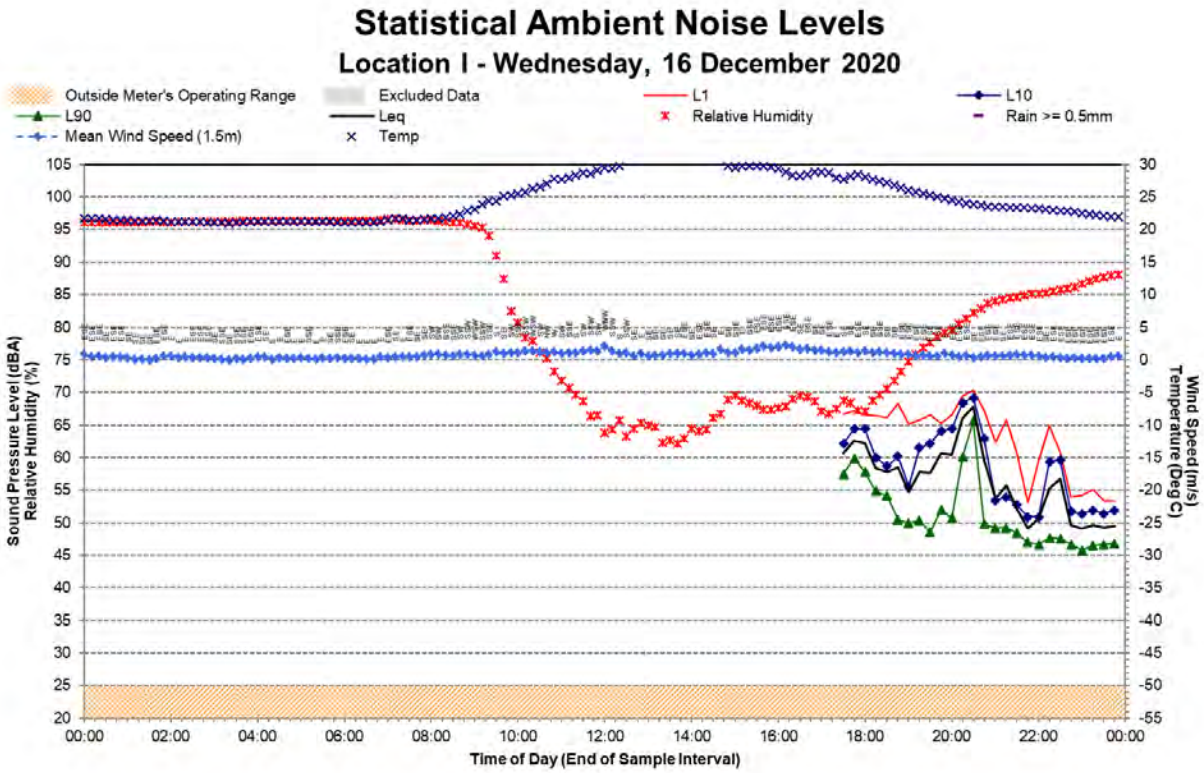

Statistical Ambient Noise Levels
Location G - Saturday, 19 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

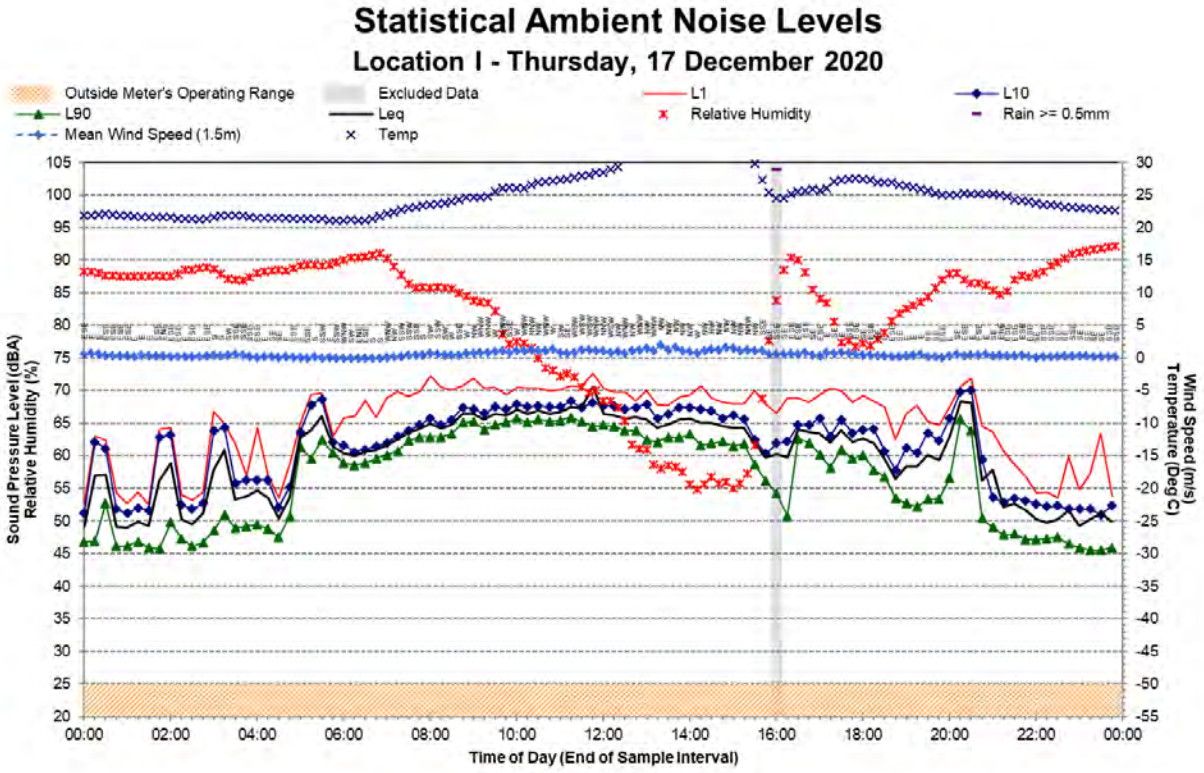

Statistical Ambient Noise Levels
Location G - Sunday, 20 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

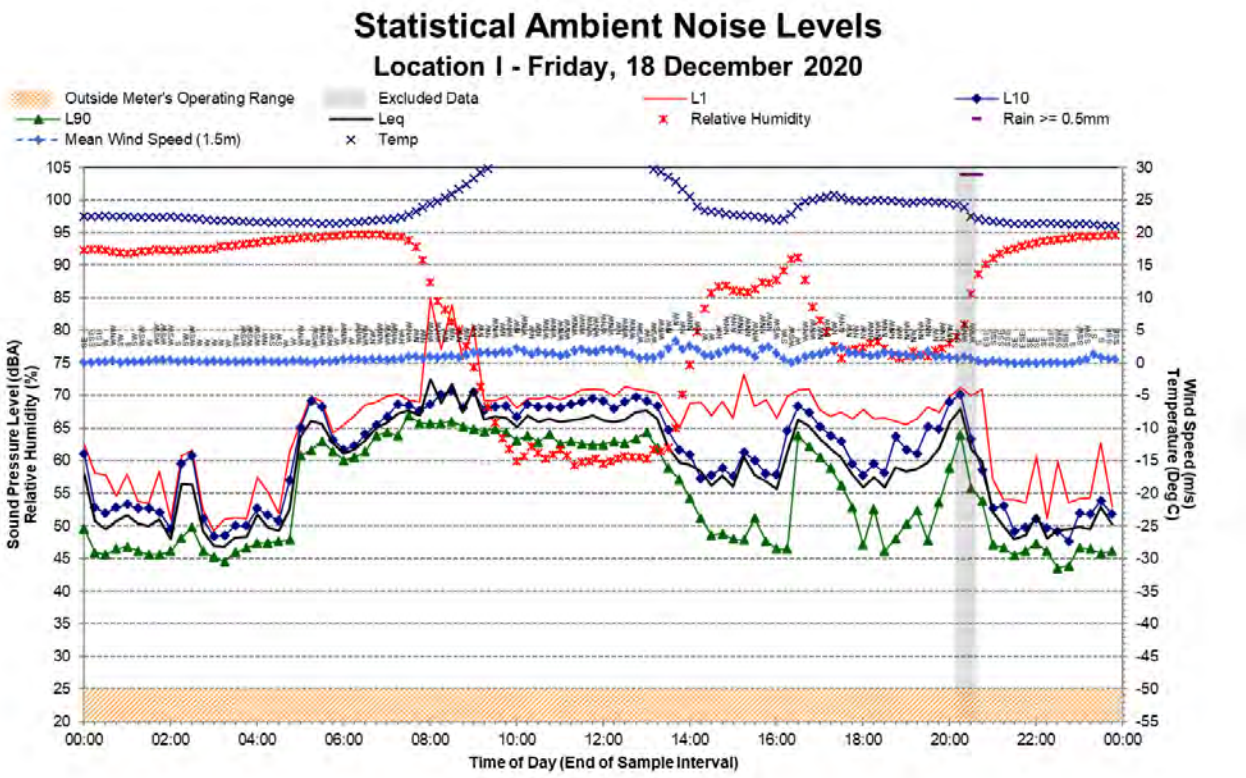

Statistical Ambient Noise Levels
Location G - Monday, 21 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

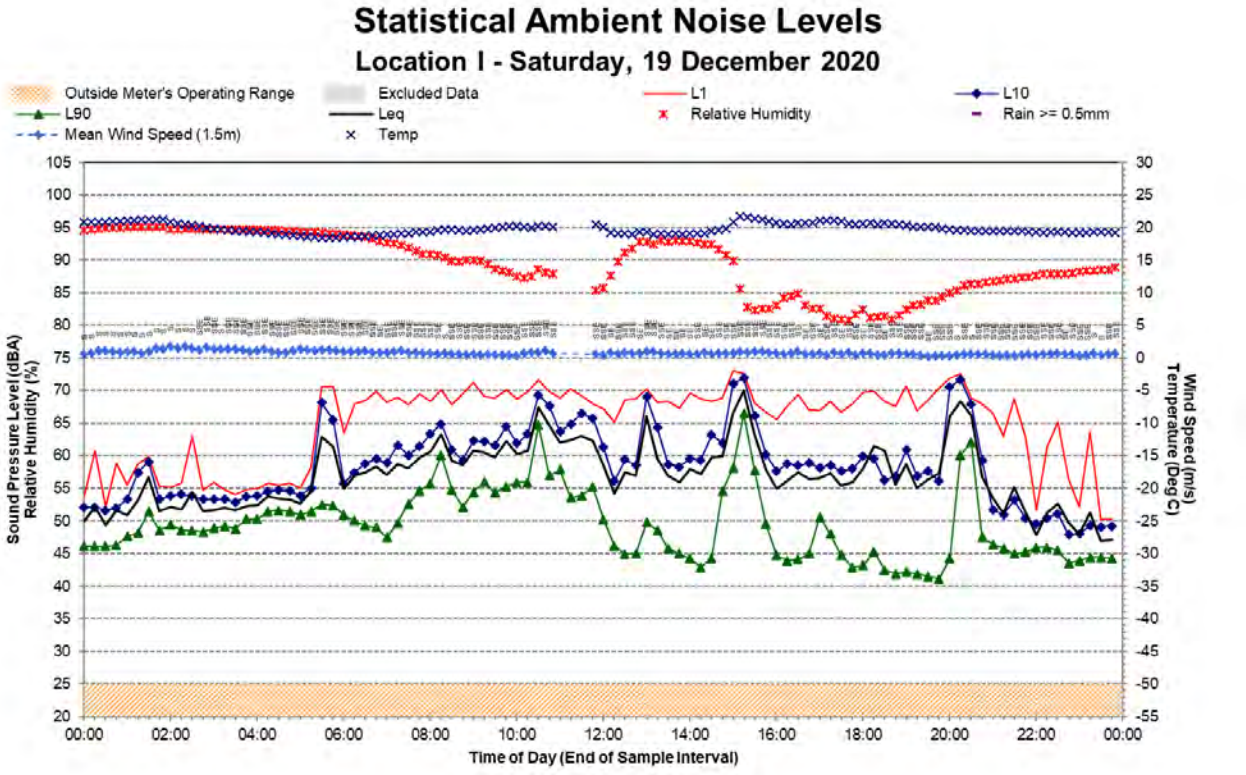

Statistical Ambient Noise Levels
Location G - Tuesday, 22 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

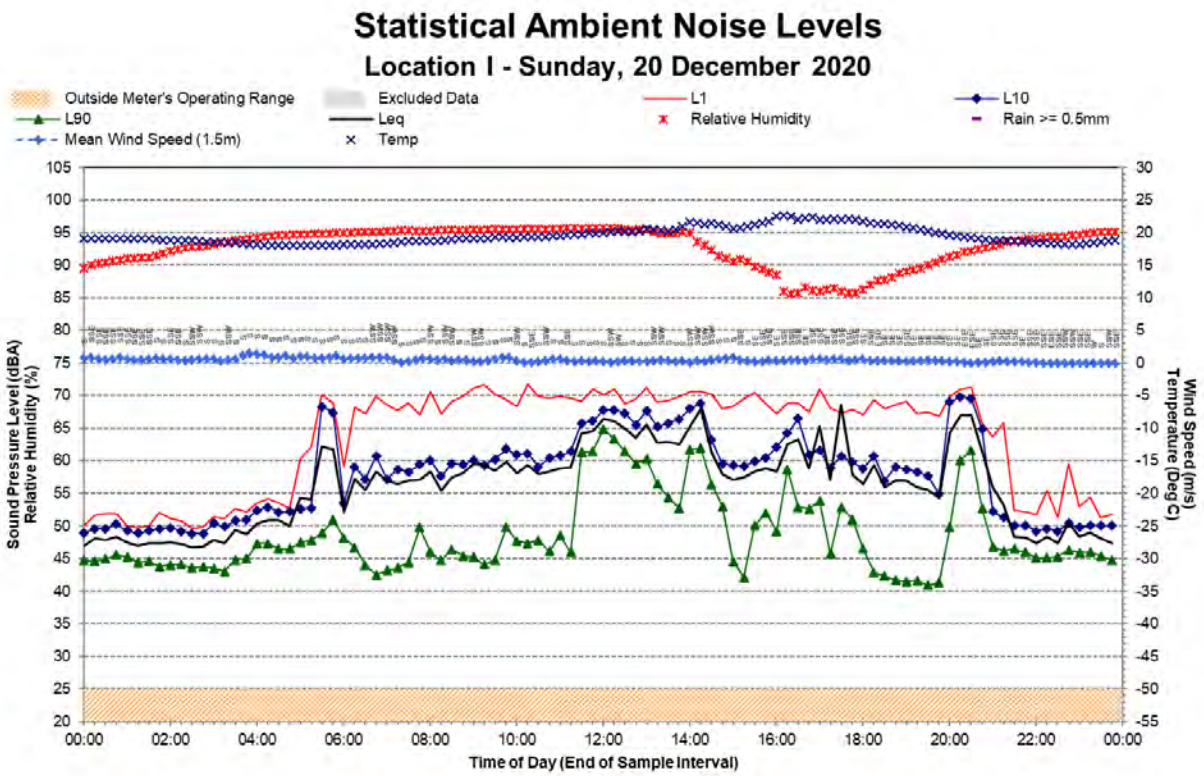

Statistical Ambient Noise Levels
Location G - Wednesday, 23 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

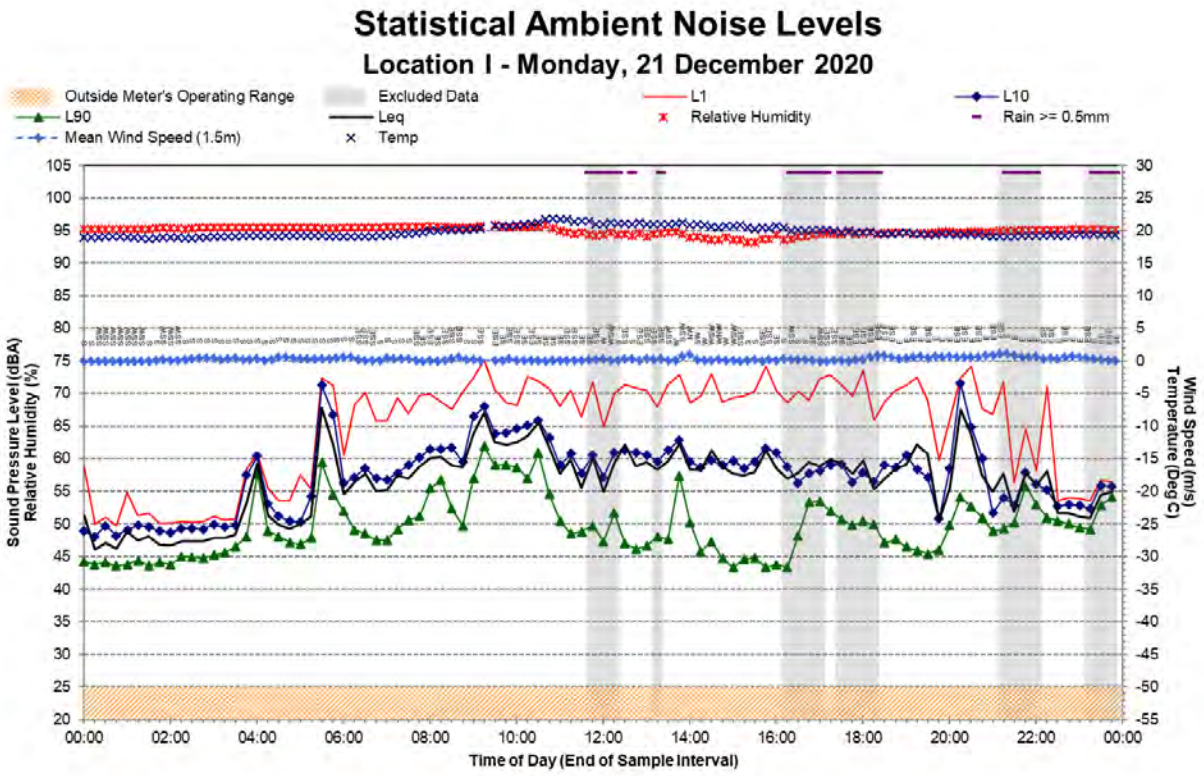

Statistical Ambient Noise Levels
Location I - Wednesday, 16 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

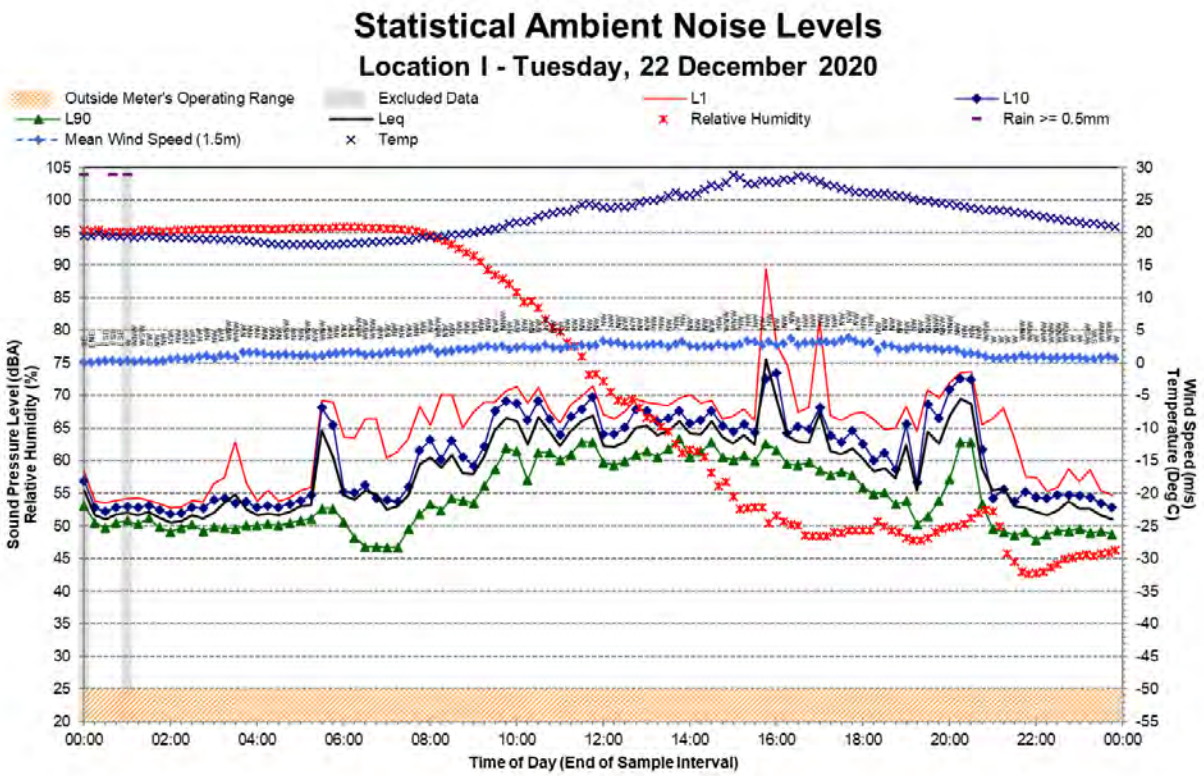

Statistical Ambient Noise Levels
Location I - Thursday, 17 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

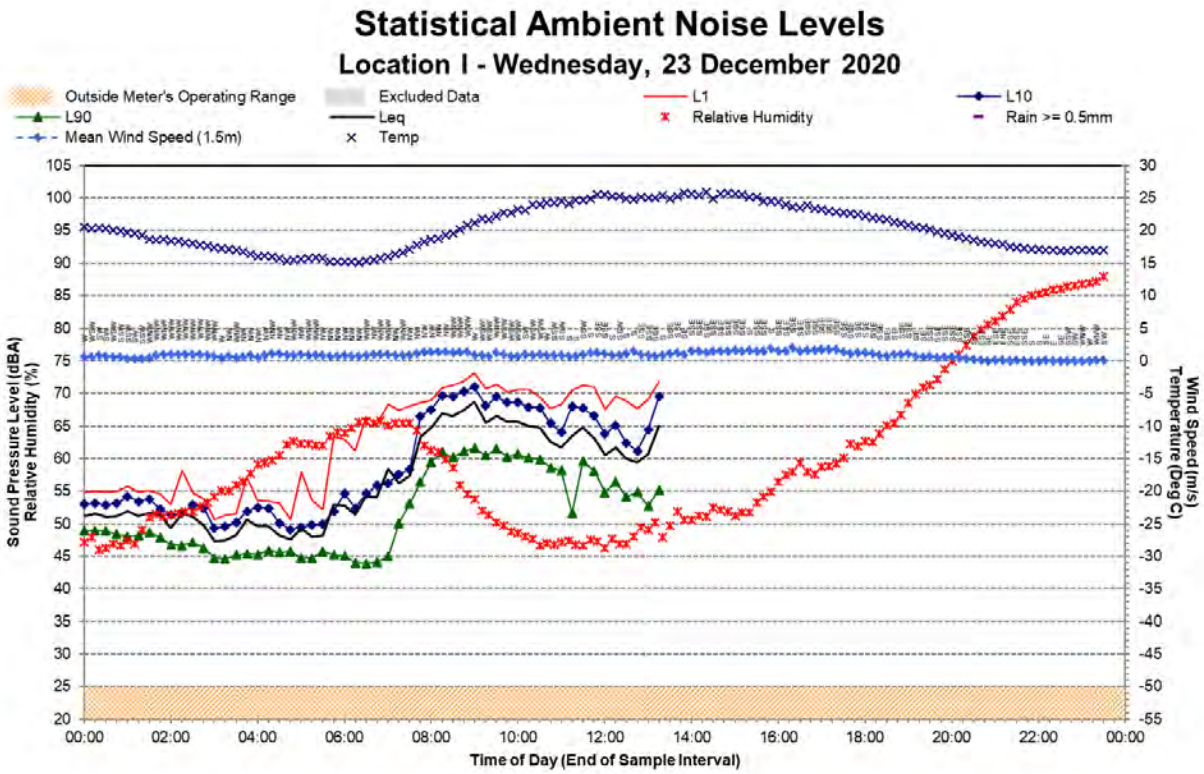

Statistical Ambient Noise Levels
Location I - Friday, 18 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

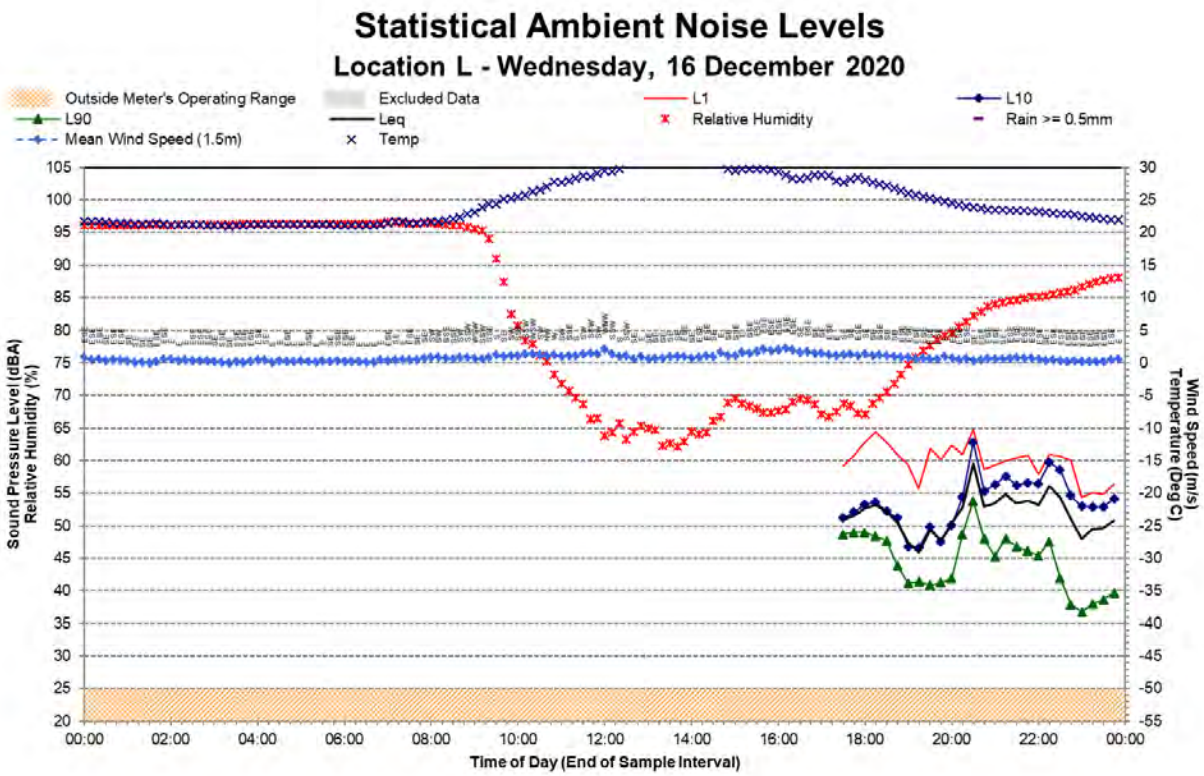

Statistical Ambient Noise Levels
Location I - Saturday, 19 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

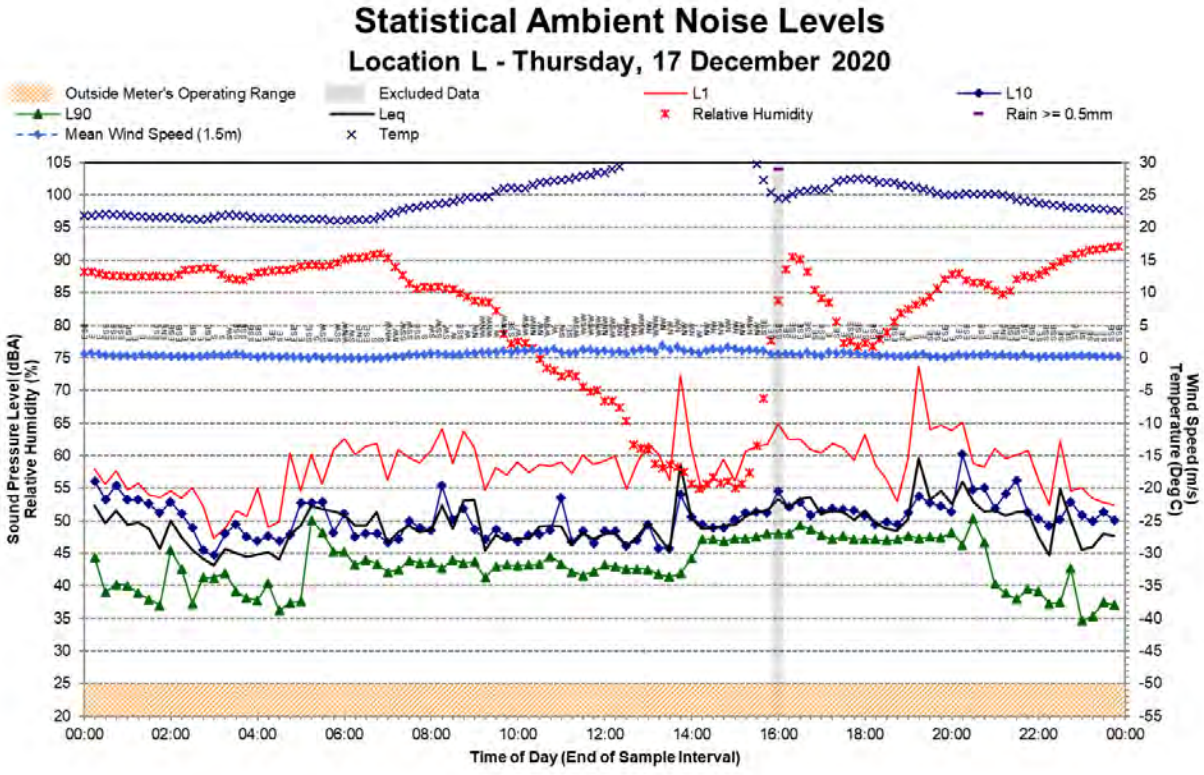

Statistical Ambient Noise Levels
Location I - Sunday, 20 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

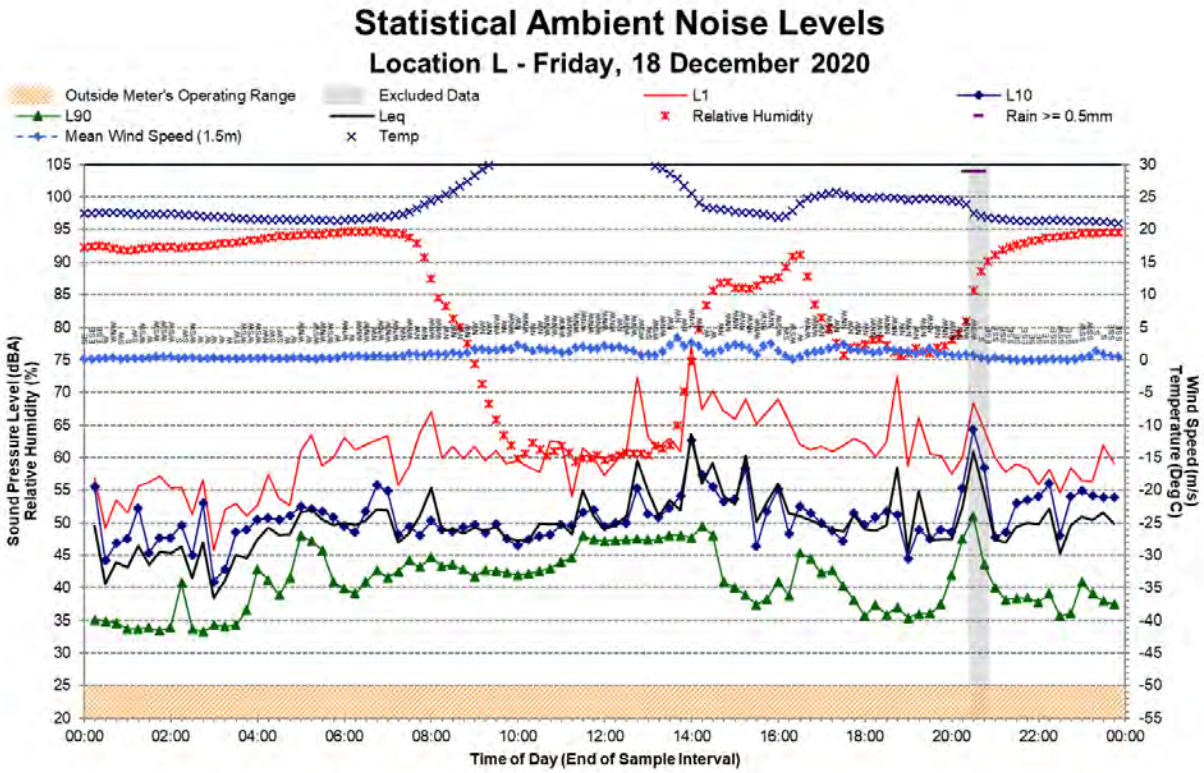

Statistical Ambient Noise Levels
Location I - Monday, 21 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

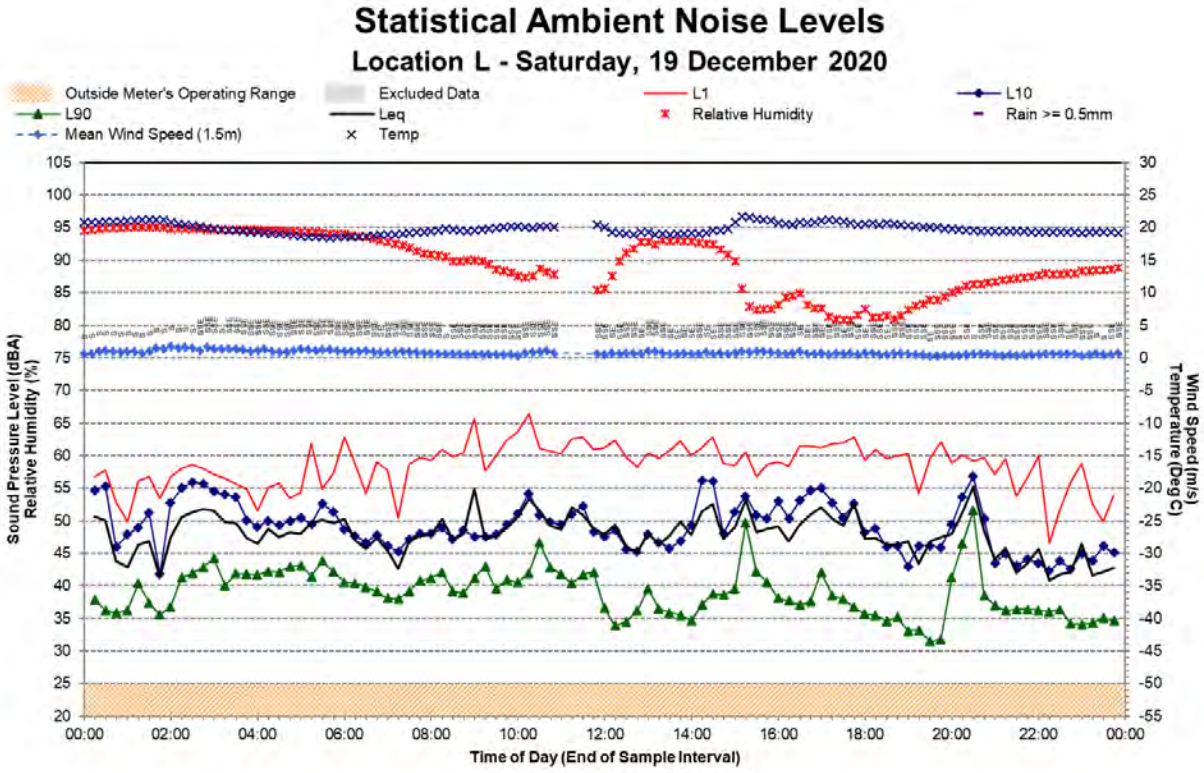

Statistical Ambient Noise Levels
Location I - Tuesday, 22 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

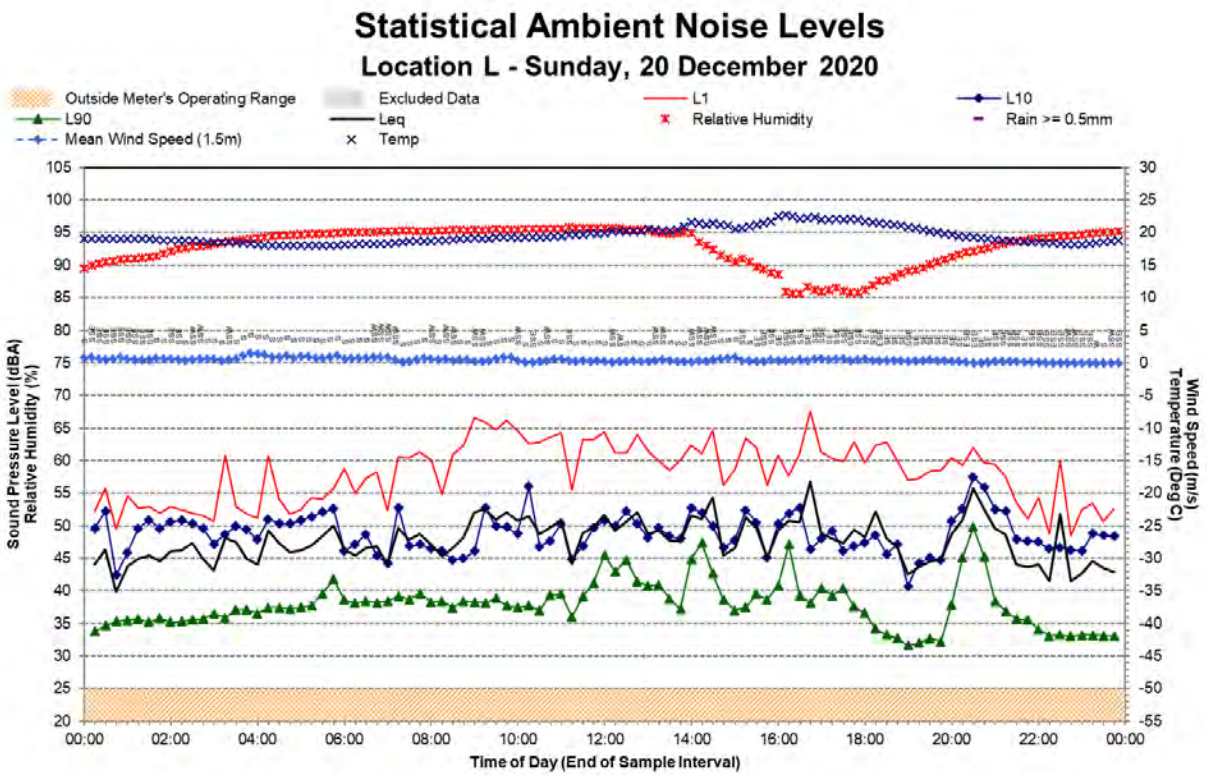

Statistical Ambient Noise Levels
Location I - Wednesday, 23 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

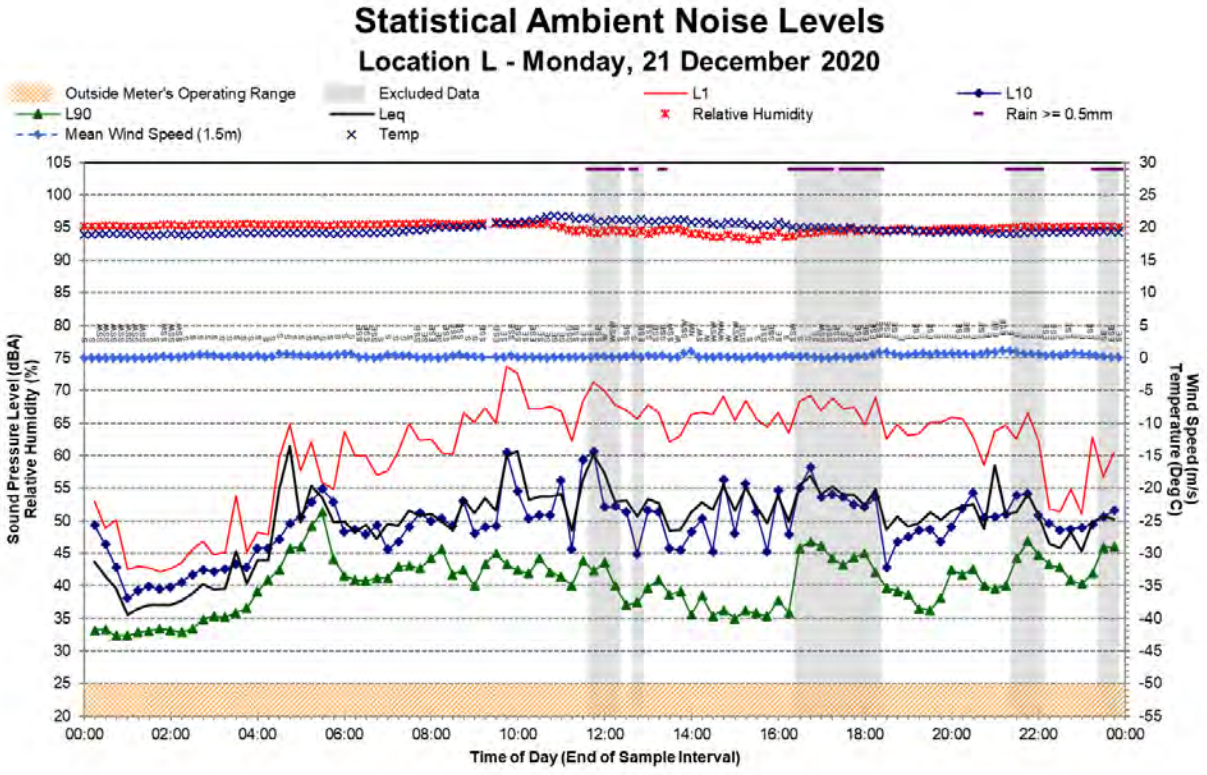

Statistical Ambient Noise Levels
Location L - Wednesday, 16 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

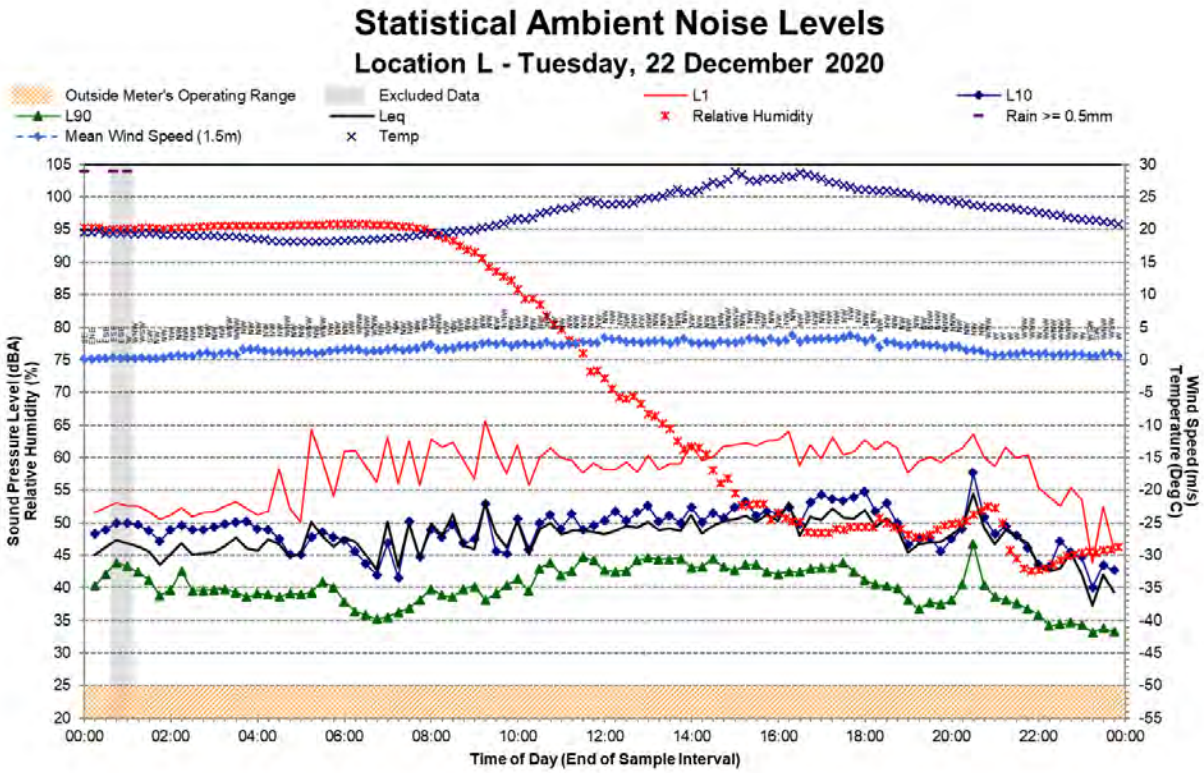

Statistical Ambient Noise Levels
Location L - Thursday, 17 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

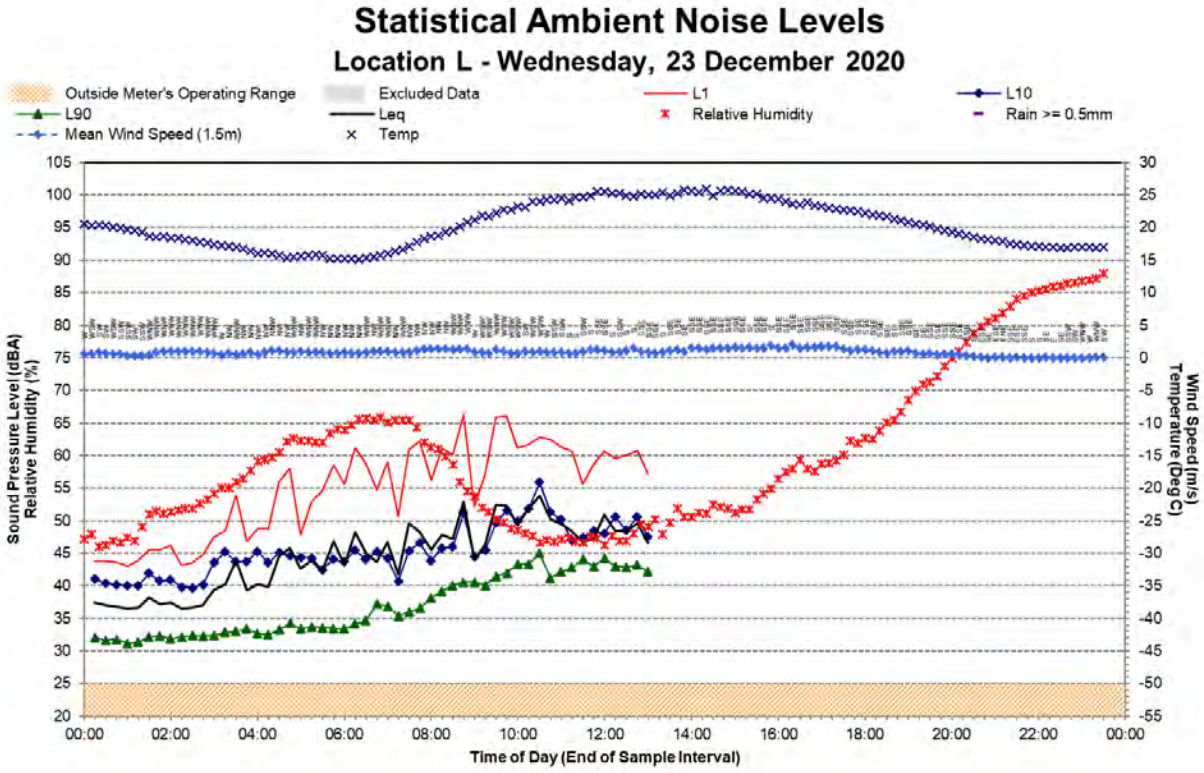

Statistical Ambient Noise Levels
Location L - Friday, 18 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

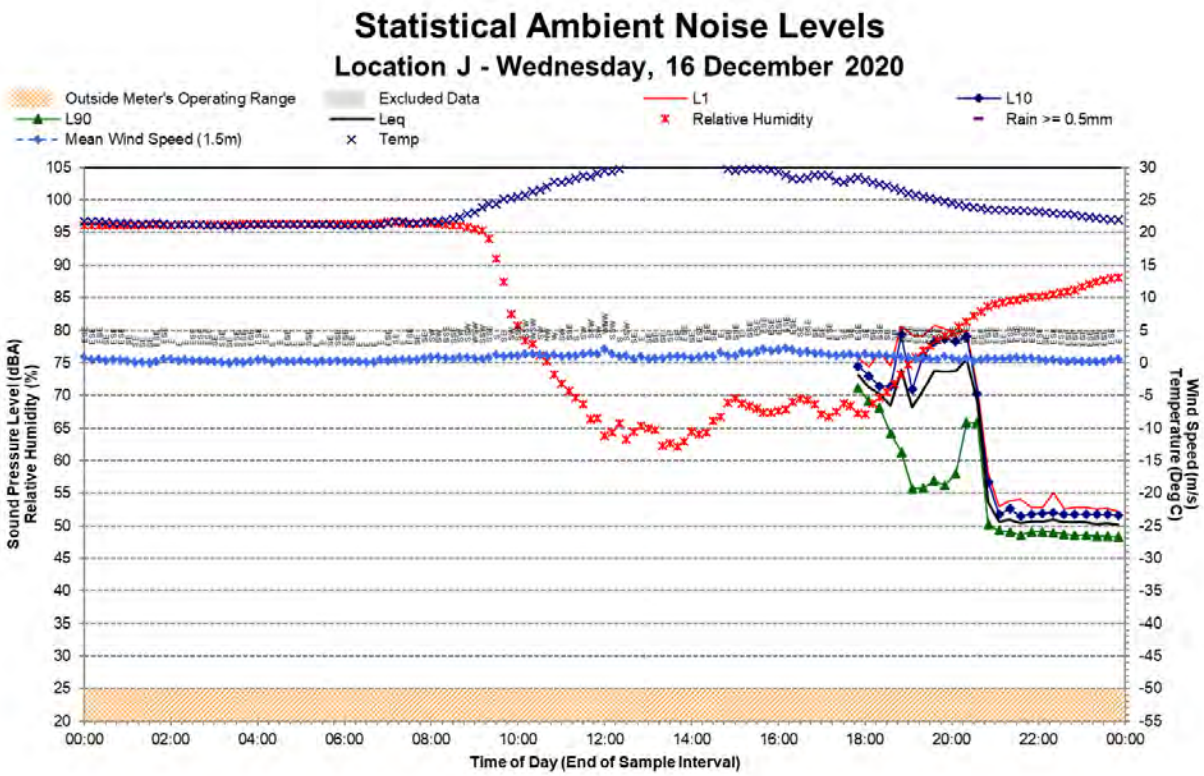

Statistical Ambient Noise Levels
Location L - Saturday, 19 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

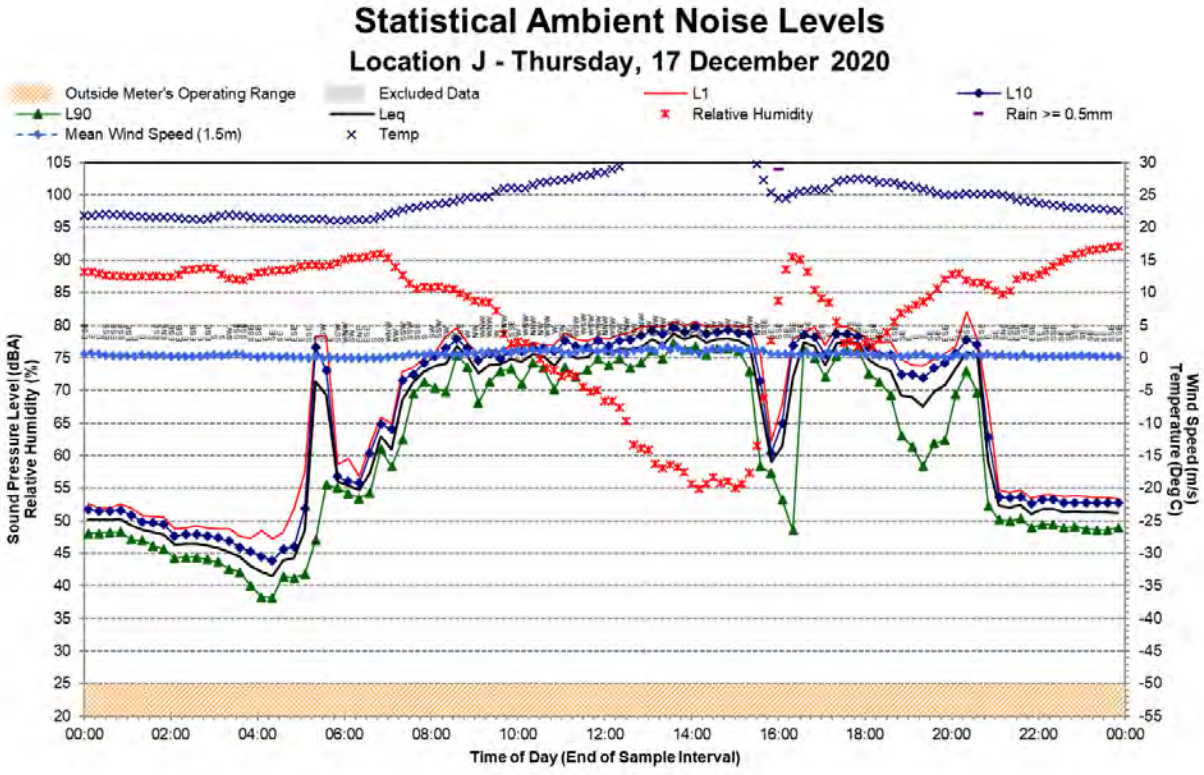

Statistical Ambient Noise Levels
Location L - Sunday, 20 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

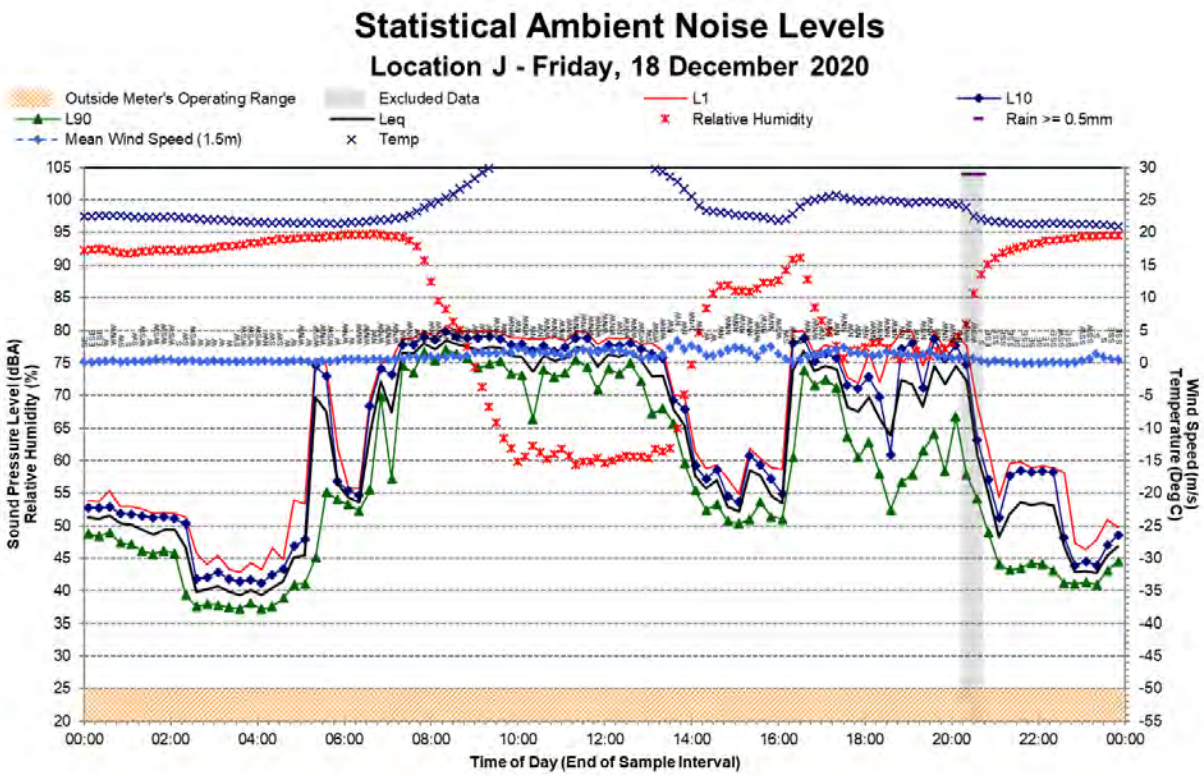

Statistical Ambient Noise Levels
Location L - Monday, 21 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

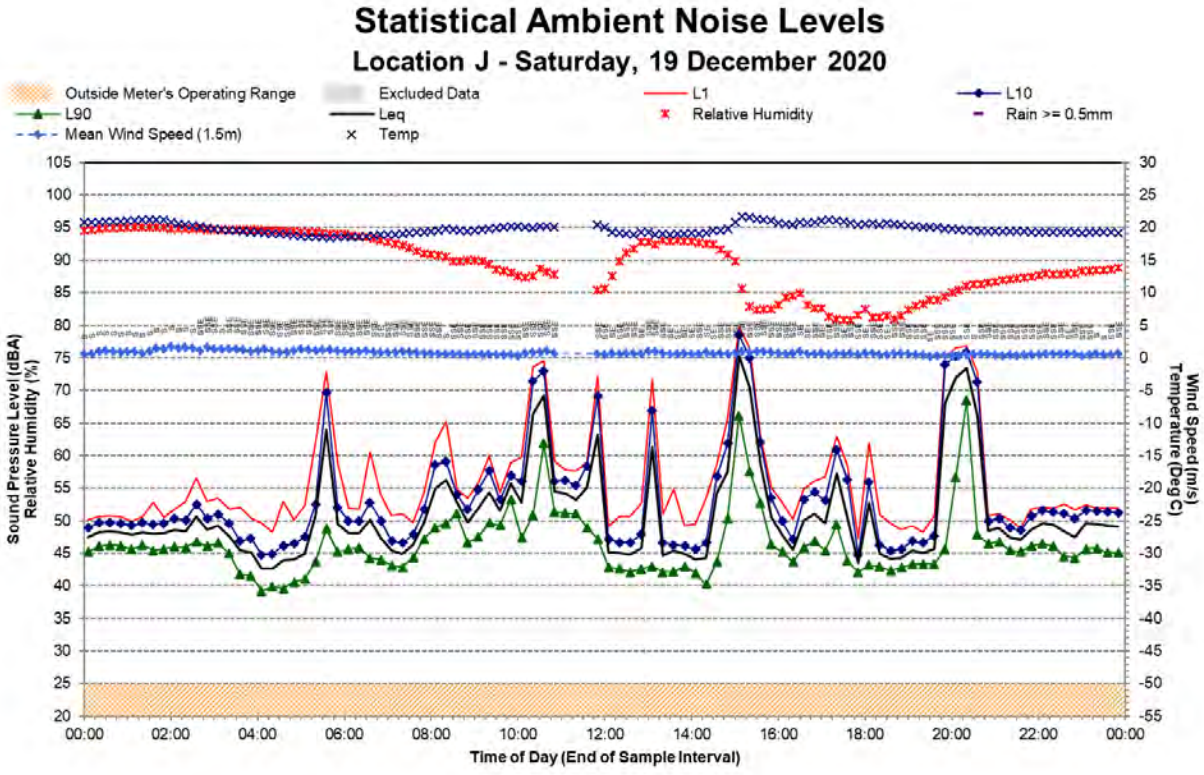

Statistical Ambient Noise Levels
Location L - Tuesday, 22 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

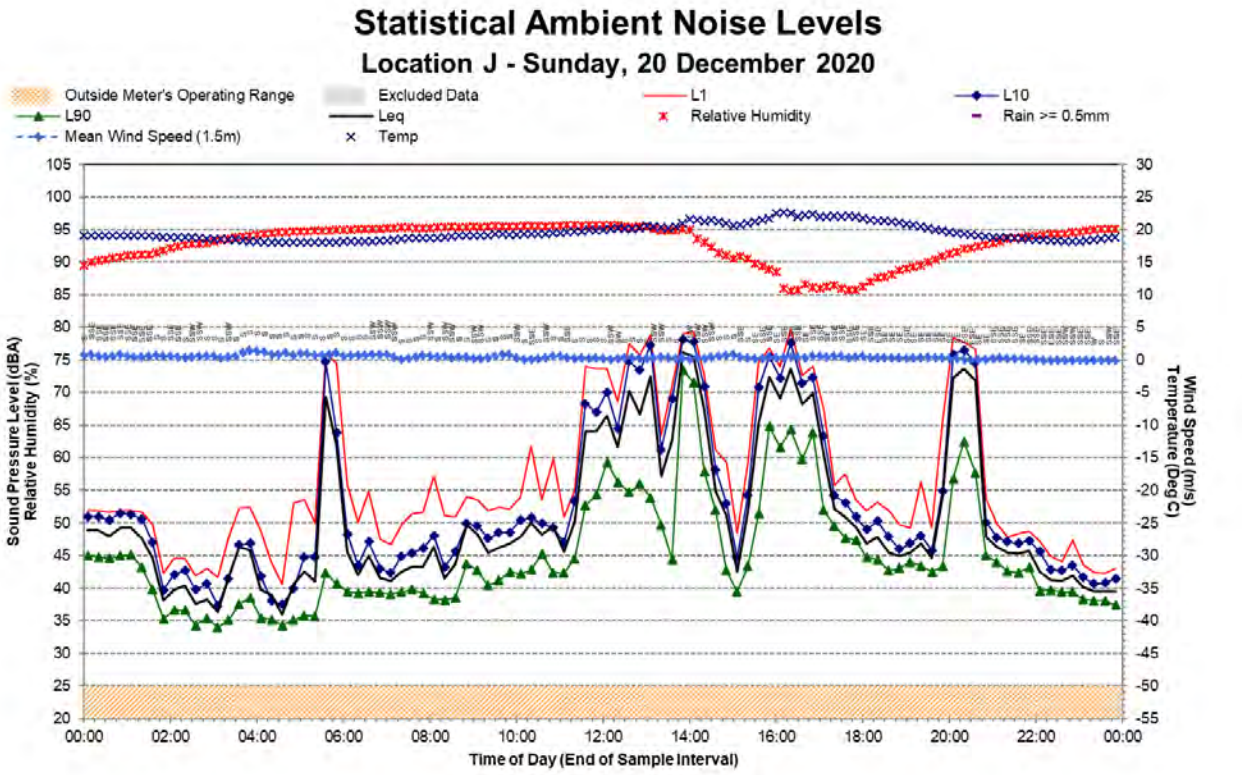

Statistical Ambient Noise Levels
Location L - Wednesday, 23 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

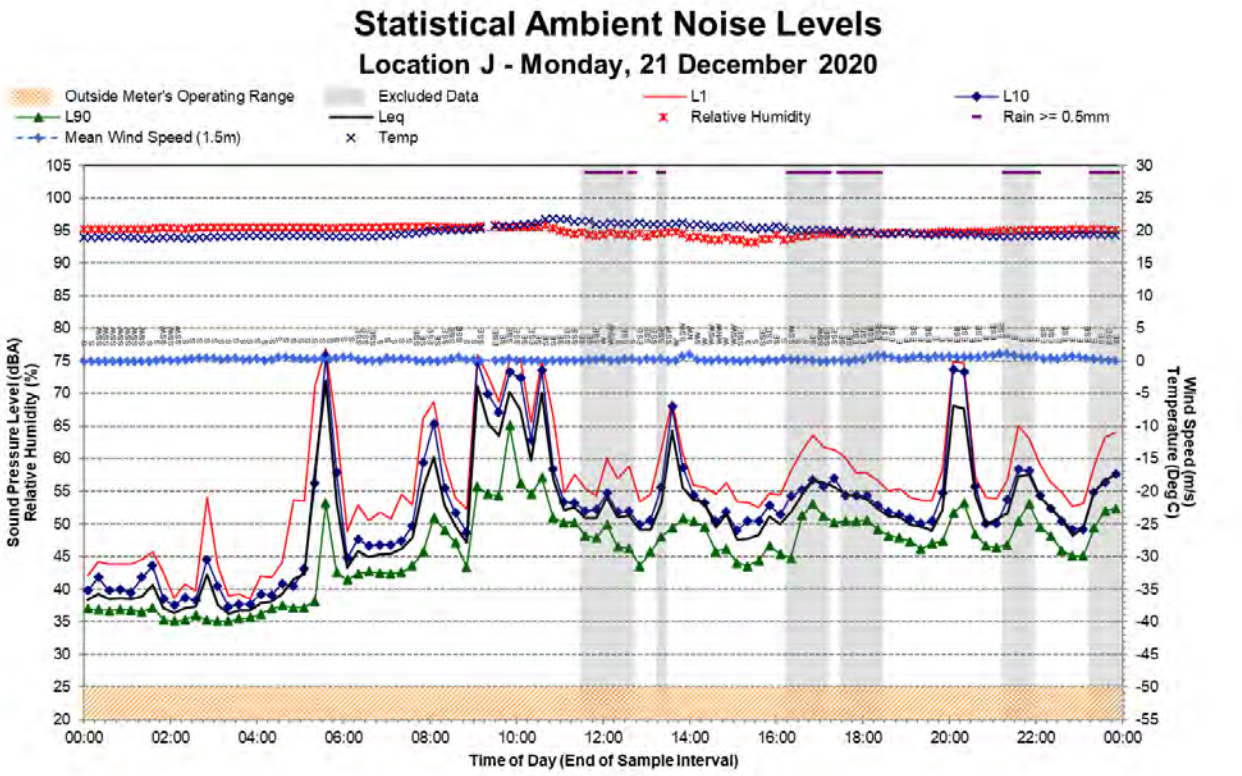

Statistical Ambient Noise Levels
Location J - Wednesday, 16 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

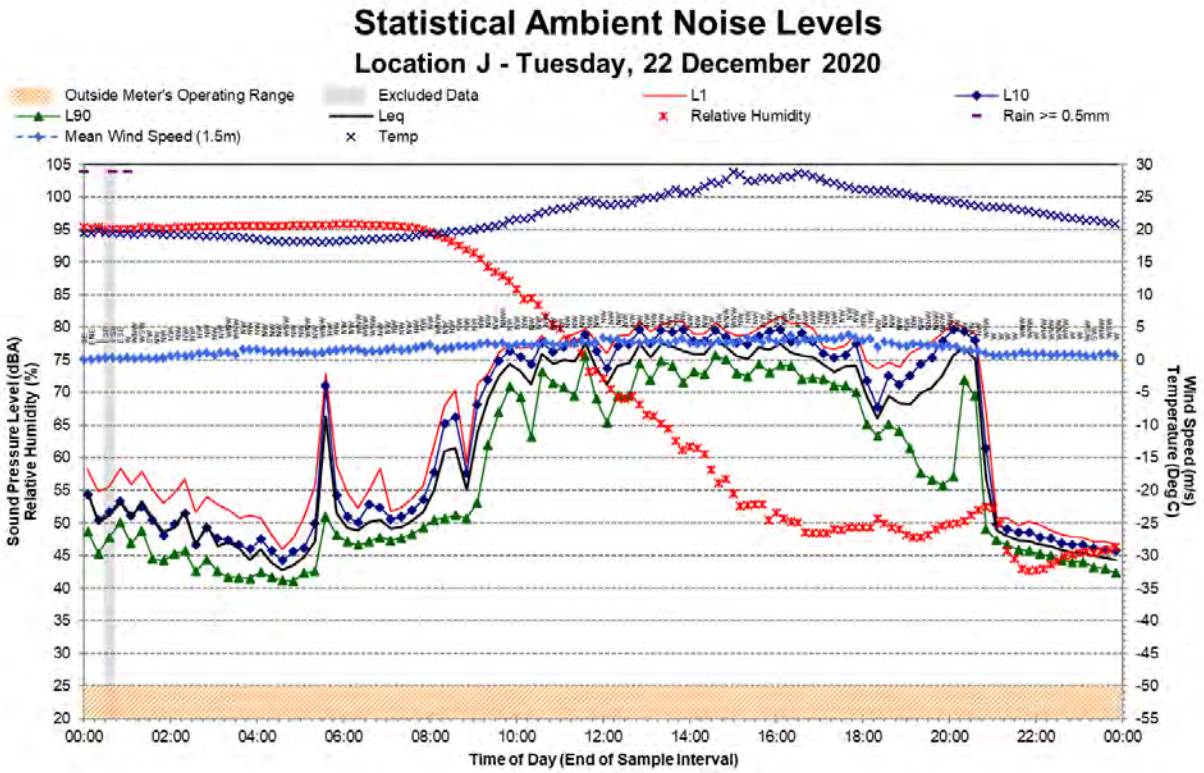

Statistical Ambient Noise Levels
Location J - Thursday, 17 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

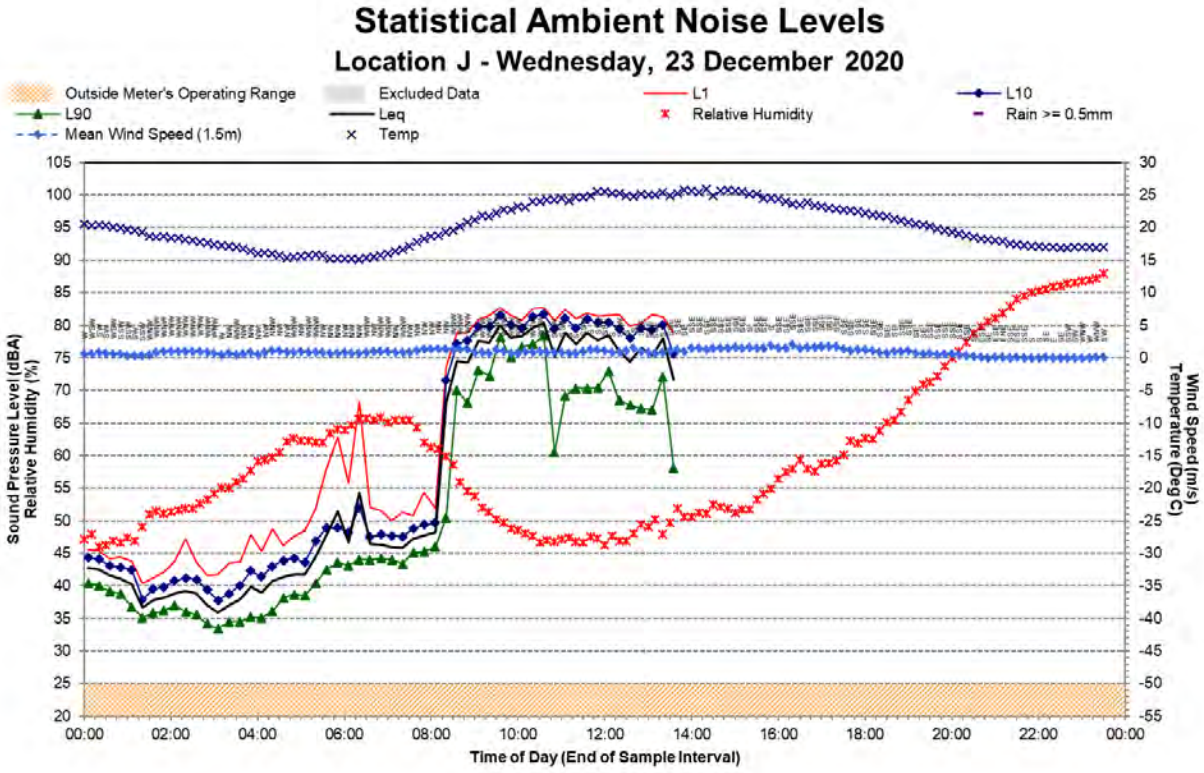

Statistical Ambient Noise Levels
Location J - Friday, 18 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location J - Saturday, 19 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location J - Sunday, 20 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location J - Monday, 21 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location J - Tuesday, 22 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location J - Wednesday, 23 December 2020
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

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Appendix 2

Air and Water Monitoring Results

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Deposited Dust 2008 to 2020

Month	D1			D2			D3		
	Insoluble Matter	Rolling Annual Average	Ash	Insoluble Matter	Rolling Annual Average	Ash	Insoluble Matter	Rolling Annual Average	Ash
Jan-08	0.4	1.4	0.01	0.1	0.6	<0.1	14	2.6	4.1
Feb-08	4.5	1.6	2.8	0.6	0.6	0.3	9.2	3.2	3.6
Mar-08	0.4	1.6	0.1	0.4	0.6	0.1	0.8	3.1	0.3
Apr-08	1.1	1.6	0.6	2.4	0.7	1.1	0.9	3.1	0.5
May-08	0.2	1.6	<0.1	0.4	0.7	<0.1	0.1	3.1	<0.1
Jun-08	0.4	1.6	0.3	0.7	0.7	0.4	1.3	3.1	0.6
Jul-08	1	1.5	0.6	0.5	0.7	0.3	0.7	3.1	0.4
Aug-08	0.6	1.5	0.3	1	0.8	0.4	1.3	3.1	0.7
Sep-08	1	1.2	0.6	5	1.1	<0.1	1	3.1	0.6
Oct-08	0.8	1.2	0.4	1.4	1.2	0.8	2.7	3.2	1
Nov-08	1.2	1.2	0.8	1.2	1.2	0.8	1.7	3.1	1.1
Dec-08	1.1	1.1	0.8	3	1.4	1.1	1.6	2.9	0.9
Jan-09	0.4	1.1	<0.1	4.4	1.8	0.7	1.5	1.9	0.9
Feb-09	2.8	0.9	2.1	5.8	2.2	2.8	2.7	1.4	2
Mar-09	2	1.1	1.2	0.8	2.2	0.3	0.8	1.4	0.4
Apr-09	0.6	1.0	0.5	1.6	2.2	0.7	0.8	1.4	0.5
May-09	0.4	1.0	<0.1	1.3	2.2	0.4	0.8	1.4	0.4
Jun-09	0.2	1.0	<0.1	1	2.3	0.3	0.6	1.4	0.3
Jul-09	0.8	1.0	0.5	3.6	2.5	0.8	0.8	1.4	0.5
Aug-09	1	1.0	0.7	18	3.9	9.6	1.8	1.4	1.1
Sep-09	4.3	1.3	3.6	9	4.3	4.6	5.2	1.8	4.3
Oct-09	0.8	1.3	0.5	1.7	4.3	0.6	1.4	1.6	0.9
Nov-09	1.4	1.3	1.1	4	4.5	2	1.6	1.6	1.1
Dec-09	0.6	1.3	0.3	0.8	4.3	0.4	5.6	2.0	4.8
Jan-10	1.9	1.4	0.9	**11.3	4.3	1.5	1.9	2.0	1.1
Feb-10	0.6	1.2	0.2	0.6	3.9	<0.1	3.2	2.0	1.5
Mar-10	0.8	1.1	0.2	1.8	3.9	0.4	2.4	2.2	1.8
Apr-10	0.8	1.1	0.3	4.9	4.2	1.8	3	2.4	2.1
May-10	0.3	1.1	<0.1	2.2	4.3	0.8	3	2.5	2.2
Jun-10	0.6	1.2	0.2	1.1	4.3	0.4	0.7	2.6	0.3
Jul-10	0.4	1.1	<0.1	0.5	4.1	0.2	1.9	2.6	1.1
Aug-10	0.6	1.1	0.3	2.6	2.7	0.4	1.6	2.6	1.2
Sep-10	0.9	0.8	0.3	1.6	2.0	0.2	0.9	2.3	0.5
Oct-10	0.9	0.8	0.3	3.5	2.1	1.5	0.9	2.2	0.4
Nov-10	1	0.8	0.2	0.7	1.8	0.2	0.9	2.2	0.3
Dec-10	1	0.8	0.5	0.7	1.8	0.3	1.8	1.9	1.1
Jan-11	0.7	0.7	0.3	4.1	2.0	0.9	0.9	1.8	0.5
Feb-11	0.5	0.7	0.2	2.9	2.2	0.7		1.6	
Mar-11	0.7	0.7	0.2	0.6	2.1	0.3	4.9	1.9	3.8
Apr-11	0.4	0.7	0.1	1.1	1.8	0.5	5.4	2.1	4.8
May-11	0.7	0.7	0.3	1.1	1.7	0.4	1.7	2.0	1.1
Jun-11	0.6	0.7	0.1	0.5	1.7	0.2	1.6	2.0	1
Jul-11	0.4	0.7	0.1	0.1	1.6	<0.1	0.6	1.9	0.3
Aug-11	1.3	0.8	0.8	0.4	1.4	0.2	0.8	1.9	0.5
Sep-11	1	0.8	0.5	1.2	1.4	0.5	0.6	1.8	0.3

Deposited Dust 2008 to 2020

Month	D1			D2			D3		
	Insoluble Matter	Rolling Annual Average	Ash	Insoluble Matter	Rolling Annual Average	Ash	Insoluble Matter	Rolling Annual Average	Ash
Oct-11	0.5	0.7	0.3	1	1.2	0.8	0.8	1.8	0.4
Nov-11	1.1	0.7	0.4	1.2	1.2	0.4	2	1.9	0.8
Dec-11	0.9	0.7	0.3	0.6	1.2	0.2	0.4	1.8	0.3
Jan-12	0.7	0.7	0.1	0.4	0.9	<0.1	0.4	1.7	0.1
Feb-12	0.8	0.8	<0.1	0.3	0.7	<0.1	0.7	1.7	<0.1
Mar-12	1.3	0.8	0.3	1.1	0.8	0.3	1	1.3	0.4
Apr-12	0.9	0.9	0.2	1.3	0.8	0.4	1.2	1.0	0.4
May-12	0.5	0.8	0.3	0.6	0.7	0.2	2.8	1.1	1
Jun-12	0.6	0.8	0.2	4.1	1.0	1.5	1.1	1.0	0.4
Jul-12	0.4	0.8	0.1	0.9	1.1	0.3	0.4	1.0	0.2
Aug-12	1	0.8	0.5	0.8	1.1	0.4	1.3	1.1	0.6
Sep-12	1.3	0.8	0.5		1.1		0.8	1.1	0.5
Oct-12	0.7	0.9	0.3	0.5	1.1	0.3	1.1	1.1	0.5
Nov-12	1	0.8	0.4	1.3	1.1	0.5	1.5	1.1	0.9
Dec-12	1.6	0.9	0.9	3.9	1.4	2.1	1.3	1.1	0.3
Jan-13	0.8	0.9	0.4	0.6	1.4	0.2	0.9	1.2	0.4
Feb-13	0.6	0.9	0.2	1	1.5	0.4	1	1.2	0.4
Mar-13	0.7	0.8	0.2	1.1	1.5	0.4	4.7	1.5	1
Apr-13	0.5	0.8	0.1	3.5	1.7	0.6	1.9	1.6	0.8
May-13	0.3	0.8	0.1	0.8	1.7	0.3	1	1.4	0.5
Jun-13	0.4	0.8	0.2	0.5	1.4	0.4	0.5	1.4	0.4
Jul-13	0.2	0.8	0.2	0.3	1.3	0.2	0.5	1.4	0.3
Aug-13	0.5	0.7	0.3	0.7	1.3	0.4	1.2	1.4	1
Sep-13	0.8	0.7	0.5	0.8	1.3	0.5	1.5	1.4	0.9
Oct-13	0.8	0.7	0.7	0.9	1.3	0.8	3.6	1.6	1.7
Nov-13	1.0	0.7	0.5	0.8	1.2	0.6	4.0	1.8	2.4
Dec-13	0.7	0.6	0.5	0.8	1.0	0.5	3.3	2.0	2.3
Jan-14	0.6	0.6	0.3	0.6	1.0	0.3	2.2	2.1	1.6
Feb-14	0.9	0.6	0.6	0.2	0.9	0.2	2	2.2	1.5
Mar-14	1.0	0.6	0.5	3.2	1.1	1	3.2	2.1	1.1
Apr-14	0.4	0.6	0.1	0.5	0.8	0.1	2.3	2.1	1.4
May-14	0.5	0.7	0.5	5.6	1.2	1.8	2.5	2.2	1.5
Jun-14	0.5	0.7	0.5	0.4	1.2	0.2	2.4	2.4	2
Jul-14	0.8	0.7	0.3	0.7	1.3	0.3	1.3	2.5	0.7
Aug-14	0.2	0.7	0.2	0.2	1.2	0.2	0.6	2.4	0.5
Sep-14	0.4	0.7	0.1	0.6	1.2	0.1	0.6	2.3	0.1
Oct-14	0.6	0.6	0.3	1.3	1.2	0.8	1.1	2.1	0.6
Nov-14	1.4	0.7	0.9	1.6	1.3	0.9	6.2	2.3	3.1
Dec-14	0.3	0.6	0.3	0.7	1.3	0.5	3.8	2.4	2.9
Jan-15	*16.2	0.6	13.1	0.8	1.3	0.4	2.2	2.4	1.2
Feb-15	0.6	0.6	0.4	6.5	1.8	1.9	3.2	2.5	1.5
Mar-15	0.5	0.6	0.5	0.5	1.6	0.3	0.9	2.3	0.6
Apr-15	0.7	0.6	0.3	0.8	1.6	0.3	5	2.5	3.5
May-15	0.2	0.6	0.2	1.5	1.3	0.9	2.9	2.5	2.2
Jun-15	0.2	0.5	0.1	0.2	1.3	0.2	1.8	2.5	1.2
Jul-15	0.2	0.5	0.2	0.3	1.3	0.2	1.8	2.5	1.4

Deposited Dust 2008 to 2020

Month	D1			D2			D3		
	Insoluble Matter	Rolling Annual Average	Ash	Insoluble Matter	Rolling Annual Average	Ash	Insoluble Matter	Rolling Annual Average	Ash
Aug-15	0.8	0.5	0.5	0.5	1.3	0.4	3	2.7	2.8
Sep-15	0.5	0.5	0.2	0.8	1.3	0.5	1.6	2.8	1.2
Oct-15	1	0.6	0.6	0.7	1.2	0.4	1.5	2.8	1.1
Nov-15	0.8	0.5	0.4	0.8	1.2	0.3	1.0	2.4	0.7
Dec-15	2.0	0.7	0.9	1.1	1.2	0.6	3.0	2.3	2.5
Jan-16	0.9	0.7	0.7	0.5	1.2	0.3	0.6	2.2	0.3
Feb-16	0.5	0.7	0.3	0.5	0.7	0.3	0.7	2.0	0.5
Mar-16	0.3	0.7	0.3	0.4	0.7	0.4	1.0	2.0	1
Apr-16	0.4	0.7	0.2	0.5	0.7	0.4	1.4	1.7	0.7
May-16	0.4	0.7	0.3	0.4	0.6	0.3	0.6	1.5	0.3
Jun-16	0.3	0.7	0.2	0.5	0.6	0.4	0.8	1.4	0.5
Jul-16	0.3	0.7	0.1	0.2	0.6	0.1	0.9	1.3	0.6
Aug-16	0.5	0.7	0.2	0.5	0.6	0.3	4.2	1.4	2.2
Sep-16	0.4	0.7	0.2	0.4	0.5	0.2	1.1	1.4	0.7
Oct-16	0.5	0.6	0.4	0.6	0.5	0.3	0.8	1.3	0.4
Nov-16	0.6	0.6	0.5	0.5	0.5	0.3	2.9	1.5	1.2
Dec-16	1.0	0.5	0.7	1.3	0.5	0.8	3.6	1.6	1.7
Jan-17	0.4	0.5	0.3	0.7	0.5	0.4	1	1.6	0.6
Feb-17	0.6	0.5	0.6	11	1.4	9	1.6	1.7	1.1
Mar-17	0.5	0.5	0.2	0.8	1.5	0.5	2.3	1.8	1.3
Apr-17	0.2	0.5	0.1	4.1	1.8	1.1	0.6	1.7	0.3
May-17	0.2	0.5	0.1	0.4	1.8	0.2	0.4	1.7	0.4
Jun-17	0.4	0.5	0.2	4.4	2.1	2.1	0.9	1.7	0.5
Jul-17	0.4	0.5	0.2	0.5	2.1	0.2	1.1	1.7	0.5
Aug-17	0.3	0.5	0.3	0.5	2.1	0.3	0.6	1.4	0.4
Sep-17	0.5	0.5	0.3	0.6	2.1	0.4	1.1	1.4	0.7
Oct-17	0.7	0.5	0.4	0.7	2.1	0.4	1	1.4	0.8
Nov-17	0.8	0.5	0.4	1.8	2.2	0.8	1.1	1.3	0.7
Dec-17	0.7	0.5	0.4	0.7	2.2	0.4	0.8	1.0	0.5
Jan-18	0.8	0.5	0.5	1.6	2.3	0.9	1.8	1.1	1.1
Feb-18	0.5	0.5	0.4	0.8	1.4	0.5	1.2	1.1	0.8
Mar-18	0.4	0.5	0.4	0.6	1.4	0.5	5.1	1.3	1.2
Apr-18	0.5	0.5	0.3	1	1.1	0.7	3.9	1.6	3.1
May-18	0.3	0.5	0.2	0.8	1.2	0.5	0.8	1.6	0.5
Jun-18	0.7	0.6	0.3	3.1	1.1	0.8	1	1.6	0.5
Jul-18	0.3	0.5	0.2	0.5	1.1	0.4	0.3	1.6	0.3
Aug-18	0.5	0.6	0.4	0.5	1.1	0.4	0.6	1.6	0.5
Sep-18	0.7	0.6	0.4	0.7	1.1	0.4	0.8	1.5	0.5
Oct-18	0.3	0.5	0.2	0.5	1.1	0.4	0.7	1.5	0.5
Nov-18	0.6	0.5	0.4	2.0	1.1	1.1	3.0	1.7	2.3
Dec-18	1.1	0.6	0.8	2.0	1.2	1.1	2.9	1.8	2
Jan-19	1.2	0.6	1	1.7	1.2	1.1	1.5	1.8	1.1
Feb-19	0.7	0.6	0.6	1.6	1.3	1.1	1.3	1.8	1
Mar-19	1.3	0.7	0.9	1.8	1.4	1.5	2	1.6	1.5
Apr-19	0.3	0.7	0.3	0.8	1.3	0.7	0.9	1.3	0.9

Deposited Dust 2008 to 2020

Month	D1			D2			D3		
	Insoluble Matter	Rolling Annual Average	Ash	Insoluble Matter	Rolling Annual Average	Ash	Insoluble Matter	Rolling Annual Average	Ash
May-19	0.4	0.7	0.2	0.9	1.3	0.5	0.8	1.3	0.5
Jun-19	0.5	0.7	0.3	1.7	1.2	0.8	0.7	1.3	0.5
Jul-19	0.3	0.7	0.2	0.4	1.2	0.3	0.4	1.3	0.3
Aug-19	0.4	0.7	0.2	0.5	1.2	0.4	0.7	1.3	0.4
Sep-19	0.5	0.6	0.3	0.6	1.2	0.5	0.6	1.3	0.4
Oct-19	1	0.7	0.6	2.9	1.4	1.3	1.5	1.4	1.1
Nov-19	0.4	0.7	0.2	0.9	1.3	0.5	0.8	1.3	0.5
Dec-19	0.5	0.7	0.3	1.7	1.2	0.8	0.7	1.3	0.5
Jan-20	1.4	0.9	1.1	1.6	1.5	1.4	3.7	1.6	2.3
Feb-20	1.9	1.0	1.5	2.5	1.6	1.7	3.0	1.8	1.7
Mar-20	0.4	1.0	0.1	1.2	1.6	0.5	0.8	1.7	0.4
Apr-20	0.4	0.9	0.3	0.4	1.5	0.3	0.5	1.6	0.5
May-20	0.6	0.9	0.2	1.0	1.5	0.3	1.0	1.5	0.4
Jun-20	0.3	0.9	0.2	0.5	1.4	0.2	0.9	1.5	0.5
Jul-20	0.3	0.9	0.2	0.3	1.3	0.3	0.6	1.6	0.4
Aug-20	0.7	0.9	0.4	0.7	1.4	0.4	1.0	1.6	0.7
Sep-20	0.5	0.9	0.3	0.9	1.4	0.4	1.0	1.6	0.5
Oct-20	0.9	0.9	0.5	0.9	1.2	0.5	1.2	1.6	0.7
Nov-20	1.2	0.9	0.7	1.8	1.3	1	1.6	1.6	1.1
Dec-20	0.5	0.8	0.2	2.4	1.2	0.9	1.0	1.4	0.5
Average*	**0.8**	**0.9**	**0.5**	**1.2**	**1.4**	**0.7**	**1.4**	**1.6**	**0.8**
Stnd Dev*	**0.5**	**0.1**	**0.4**	**0.7**	**0.1**	**0.5**	**1.0**	**0.1**	**0.6**
Min*	**0.3**	**0.8**	**0.1**	**0.3**	**1.2**	**0.2**	**0.5**	**1.4**	**0.4**
Max*	**1.9**	**1.0**	**1.5**	**2.5**	**1.6**	**1.7**	**3.7**	**1.8**	**2.3**

* Since 2008

** Contaminated sample (e.g. bird droppings)

Surface Water 2008 to 2020

Surface Water Quality Monitoring Results – 2008/2009

Sample Site	Date	pH	EC (µS/cm)	TSS (mg/L)	Flow
1	Jun-08	6.6	940	2	N
8	Jun-08	7.1	810	7	N
9	Jun-08	7.7	740	4	L
10	Jun-08	7.6	1230	5	L
11	Jun-08	7.1	1840	2	N
FMCU	Jun-08	6.9	620	11	VL
FMCD	Jun-08	7.2	300	6	N
1	Jul-08	6.8	1160	6	L
8	Jul-08	7.2	1100	4	L
9	Jul-08	7.6	1060	3	L
10	Jul-08	7.3	1400	4	M
11	Jul-08	6.8	2060	7	L
FMCU	Jul-08	7.4	820	10	N
FMCD	Jul-08	7.4	190	2	VL
1	Aug-08	6.9	1220	2	N
8	Aug-08	7.4	1140	4	L
9	Aug-08	7.7	1090	7	M
10	Aug-08	7.5	1410	5	N
11	Aug-08	7.0	2220	4	N
FMCU	Aug-08	8.3	730	14	N
FMCD	Aug-08	7.8	170	3	L
1	Sep-08	7.1	890	9	N
8	Sep-08	7.5	820	2	L
9	Sep-08	7.8	650	5	M
10	Sep-08	7.9	1250	8	M
11	Sep-08	7.3	1330	14	N
FMCU	Sep-08	7.3	460	96	L
FMCD	Sep-08	7.3	320	11	N
1	Oct-08	6.7	970	3	N
8	Oct-08	7.7	1150	2	L
9	Oct-08	7.5	910	2	M
10	Oct-08	7.1	1200	2	N
11	Oct-08	6.8	1930	2	N
FMCU	Oct-08	6.8	540	15	N
FMCD	Oct-08	7.1	200	31	M
1	Nov-08	7.1	1130	4	N
8	Nov-08	7.7	940	15	N
9	Nov-08	7.4	1050	3	H
10	Nov-08	7.4	510	2	L
11	Nov-08	7.2	2020	6	N
FMCU	Nov-08	7.0	570	11	N
FMCD	Nov-08	7.9	160	2	M

Sample Site	Date	pH	EC (µS/cm)	TSS (mg/L)	Flow
1	Dec-08	7.0	1210	6	N
8	Dec-08	7.3	980	16	N
9	Dec-08	6.8	1040	2	L
10	Dec-08	7.2	1390	2	N
11	Dec-08	6.8	1610	15	N
FMCU	Dec-08	7.0	450	2	N
FMCD	Dec-08	6.8	160	4	L
1	Jan-09	6.8	1130	39	N
8	Jan-09	6.8	870	22	N
9	Jan-09	7.0	1180	7	L
10	Jan-09	7.3	1350	7	L
11	Jan-09	6.8	1330	12	N
FMCU	Jan-09	7.0	230	9	N
FMCD	Jan-09	7.3	150	27	M
1	Feb-09	6.8	680	7	N
8	Feb-09	7.0	590	3	L
9	Feb-09	7.3	540	7	L
10	Feb-09	7.1	1270	3	L
11	Feb-09	6.8	910	11	N
FMCU	Feb-09	6.8	350	13	N
FMCD	Feb-09	7.4	260	11	M
1	Mar-09	6.8	650	4	N
8	Mar-09	7.2	700	3	N
9	Mar-09	7.5	820	2	M
10	Mar-09	7.4	1230	6	M
11	Mar-09	7.3	1060	7	N
FMCU	Mar-09	7.3	420	9	N
FMCD	Mar-09	7.6	150	7	M
1	Apr-09	7.0	740	4	N
8	Apr-09	7.4	500	4	N
9	Apr-09	7.5	1030	9	M
10	Apr-09	7.3	1050	10	M
11	Apr-09	7.7	1020	11	N
FMCU	Apr-09	6.7	340	17	M
FMCD	Apr-09	7.3	200	51	H
1	May-09	7.4	810	10	N
8	May-09	7.5	660	44	M
9	May-09	7.9	610	41	M
10	May-09	7.7	1070	5	M
11	May-09	7.3	940	3	N
FMCU	May-09	6.9	540	10	N
FMCD	May-09	8.0	180	2	M

N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow

Surface Water Quality Monitoring Results – 2009/2010

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jun-09	6.8	510	15	N
8	Jun-09	7.4	630	<2	M
9	Jun-09	7.7	390	22	H
10	Jun-09	7.4	680	23	M
11	Jun-09	7.1	560	8	N
FMCU	Jun-09	7.6	280	12	H
FMCD	Jun-09	7.2	240	20	H
1	Jul-09	7.8	880	9	N
8	Jul-09	7.6	820	<2	L
9	Jul-09	7.9	870	19	L
10	Jul-09	7.6	1290	9	L
11	Jul-09	NS	NS	NS	-
FMCU	Jul-09	6.6	510	23	L
FMCD	Jul-09	7.5	150	69	L
1	Aug-09	7.2	990	15	L
8	Aug-09	7.3	840	11	L
9	Aug-09	7.6	1180	25	L
10	Aug-09	7.3	1640	16	L
11	Aug-09	7.3	1720	18	L
FMCU	Aug-09	7.4	700	21	N
FMCD	Aug-09	7.8	140	2	L
1	Sep-09	7.8	1050	5	N
8	Sep-09	6.4	730	10	N
9	Sep-09	7.6	1770	14	N
10	Sep-09	7.5	1820	8	L
11	Sep-09	6.2	1680	10	N
FMCU	Sep-09	NS	NS	NS	N
FMCD	Sep-09	NS	NS	NS	N
1	Oct-09	8.6	1050	10	N
8	Oct-09	NS	NS	NS	N
9	Oct-09	8.4	1500	186	L
10	Oct-09	8.5	1770	3	L
11	Oct-09	8.3	1480	7	N
FMCU	Oct-09	NS	NS	NS	N
FMCD	Oct-09	NS	NS	NS	N
1	Nov-09	8.8	1580	22	L
8	Nov-09	NS	NS	NS	N
9	Nov-09	NS	NS	NS	N
10	Nov-09	8.5	2610	10	L
11	Nov-09	8.8	2230	26	L
FMCU	Nov-09	NS	NS	NS	N
FMCD	Nov-09	NS	NS	NS	N

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Dec-09	NS	NS	NS	N
8	Dec-09	NS	NS	NS	N
9	Dec-09	NS	NS	NS	N
10	Dec-09	NS	NS	NS	N
11	Dec-09	7.4	1590	18	N
FMCU	Dec-09	NS	NS	NS	N
FMCD	Dec-09	NS	NS	NS	N
1	Jan-10	NS	NS	NS	N
8	Jan-10	NS	NS	NS	N
9	Jan-10	NS	NS	NS	N
10	Jan-10	NS	NS	NS	N
11	Jan-10	7.1	2220	37	L
FMCU	Jan-10	NS	NS	NS	N
FMCD	Jan-10	NS	NS	NS	N
1	Feb-10	NS	NS	NS	N
8	Feb-10	NS	NS	NS	N
9	Feb-10	NS	NS	NS	N
10	Feb-10	NS	NS	NS	N
11	Feb-10	7.1	1820	17	N
FMCU	Feb-10	NS	NS	NS	N
FMCD	Feb-10	NS	NS	NS	N
1	Mar-10	NS	NS	NS	N
8	Mar-10	NS	NS	NS	N
9	Mar-10	NS	NS	NS	N
10	Mar-10	NS	NS	NS	N
11	Mar-10	7.5	1500	8	L
FMCU	Mar-10	NS	NS	NS	N
FMCD	Mar-10	NS	NS	NS	N
1	Apr-10	NS	NS	NS	N
8	Apr-10	NS	NS	NS	N
9	Apr-10	NS	NS	NS	N
10	Apr-10	NS	NS	NS	N
11	Apr-10	7.2	1620	72	-
FMCU	Apr-10	NS	NS	NS	N
FMCD	Apr-10	NS	NS	NS	N
1	May-10	NS	NS	NS	N
8	May-10	NS	NS	NS	N
9	May-10	NS	NS	NS	N
10	May-10	NS	NS	NS	N
11	May-10	NS	NS	NS	N
FMCU	May-10	7.5	322.0	14.0	-
FMCD	May-10	7.9	165	360	-

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2010/2011

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jun-10	7.9	460	19	NS
8	Jun-10	NS	NS	NS	Dry
9	Jun-10	NS	NS	NS	Dry
10	Jun-10	7.3	880	8	NS
11	Jun-10	7.5	690	20	NS
FMCU	Jun-10	6.9	388	NS	NS
FMCD	Jun-10	0	0	0	0
1	Jul-10	6.22	504	18	Pond
8	Jul-10	7.16	1110	2	Pond
9	Jul-10	7.2	1300	27	Trickle
10	Jul-10	7.12	1350	8	Trickle
11	Jul-10	7.06	865	13	Pond
FMCU	Jul-10	7.9	590	8	Trickle
FMCD	Jul-10	7.99	128	1	Steady
1	Aug-10	6.55	492	12	Slow
8	Aug-10	6.75	988	1	Trickle
9	Aug-10	6.92	516	44	Trickle
10	Aug-10	6.67	1220	10	Trickle
11	Aug-10	6.89	602	13	Slow
FMCU	Aug-10	7.31	543	7	Still
FMCD	Aug-10	7.38	130	2	Steady
1	Sep-09	7.05	464	4	Still
8	Sep-10	7.14	947	3	Trickle
9	Sep-10	7.23	1410	6	Trickle
10	Sep-10	7.25	1700	2	Trickle
11	Sep-10	7	671	14	Still
FMCU	Sep-10	7.29	534	4	Pond
FMCD	Sep-10	7.44	121	1	Steady
1	Oct-10	7.19	484	5	Still
8	Oct-10	7.29	1010	2	Still
9	Oct-10	7.74	1570	7	Trickle
10	Oct-10	7.59	1840	6	Trickle
11	Oct-10	7.22	734	16	Still
FMCU	Oct-10	7.07	456	7	Still
FMCD	Oct-10	6.93	121	1	Steady
1	Nov-10	6.89	402	12	Still
8	Nov-10	7.13	461	2	Still
9	Nov-10	7.1	307	45	Trickle
10	Nov-10	7.09	751	32	Trickle
11	Nov-10	6.95	340	6	Still
FMCU	Nov-10	6.94	509	16	Trickle
FMCD	Nov-10	7.14	294	23	Steady

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Dec-10	6.7	436.0	28.0	Still
8	Dec-10	7.16	732	6	Still
9	Dec-10	7.32	1070	32	Still
10	Dec-10	7.17	1410	10	Trickle
11	Dec-10	6.85	493	36	Still
FMCU	Dec-10	6.8	465.0	7.0	Trickle
FMCD	Dec-10	7.21	1580	<5	Slow
1	Jan-11	6.9	536.0	36.0	Still
8	Jan-11	7.19	943	<5	Trickle
9	Jan-11	NS	NS	NS	-
10	Jan-11	7.41	1680	5	Still
11	Jan-11	7.05	568	18	Slow
FMCU	Jan-11	6.7	528.0	14.0	Still
FMCD	Jan-11	6.79	138	6	Slow
1	Feb-11	6.7	424.0	100	Still
8	Feb-11	7.25	624	49	Still
9	Feb-11	NS	NS	NS	-
10	Feb-11	7.16	519	31	Still
11	Feb-11	7.44	1570	20	Still
FMCU	Feb-11	6.7	488.0	16.0	Still
FMCD	Feb-11	6.85	139	<5	Slow
1	Mar-11	NS	NS	NS	Dry
8	Mar-11	7.29	151	20	Still
9	Mar-11	NS	NS	NS	-
10	Mar-11	NS	NS	NS	Dry
11	Mar-11	7.13	578	16	Still
FMCU	Mar-11	NS	NS	NS	Dry
FMCD	Mar-11	6.73	122	<5	Steady
1	Apr-11	NS	NS	NS	Dry
8	Apr-11	7.27	650	9	Still
9	Apr-11	NS	NS	NS	-
10	Apr-11	7.12	487	230	Trickle
11	Apr-11	6.82	577	48	Still
FMCU	Apr-11	7.1	292.0	20.0	Still
FMCD	Apr-11	7.26	133	<5	Steady
1	May-11	NS	NS	NS	Dry
8	May-11	7.22	717	5	Still
9	May-11	NS	NS	NS	-
10	May-11	6.99	1203	5	Still
11	May-11	6.87	320	22	Still
FMCU	May-11	6.5	278.0	12.0	Still
FMCD	May-11	6.78	120	6	Steady

NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2011/2012

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jun-11	6.55	607	25	Slow
8	Jun-11	6.63	771	20	Steady
9	Jun-11	NS	NS	NS	NS
10	Jun-11	6.69	854	25	Steady
11	Jun-11	6.56	757	14	Still
FMCU	Jun-11	7	460	8	Slow
FMCD	Jun-11	7.48	138	8	Steady
1	Jul-11	6.59	227	38	Steady
8	Jul-11	6.6	255	16	Fast
9	Jul-11	NS	NS	NS	NS
10	Jul-11	6.65	248	74	Fast
11	Jul-11	6.54	200	91	Steady
FMCU	Jul-11	6.87	639	5	Trickle
FMCD	Jul-11	7.03	146	16	Steady
1	Aug-11	6.93	527	24	Slow
8	Aug-11	6.81	301	14	Slow
9	Aug-11	NS	NS	NS	NS
10	Aug-11	7.11	821	102	Slow
11	Aug-11	6.93	1060	29	Slow
FMCU	Aug-11	7.74	611	NS	Trickle
FMCD	Aug-11	6.95	180	5	Steady
1	Sep-11	6.78	674	8	Trickle
8	Sep-11	6.81	770	7	Slow
9	Sep-11	NS	NS	NS	NS
10	Sep-11	7.18	1410	5	0
11	Sep-11	6.97	866	26	Trickle
FMCU	Sep-11	6.81	502	10	Still
FMCD	Sep-11	7.08	200	10	Steady
1	Oct-11	6.96	781	5	Trickle
8	Oct-11	7.09	932	5	Trickle
9	Oct-11	NS	NS	NS	NS
10	Oct-11	7.08	1150	6	Slow
11	Oct-11	7.13	606	624	Trickle
FMCU	Oct-11	6.78	597	12	Slow
FMCD	Oct-11	6.98	180	11	Steady
1	Nov-11	7.05	455	173	Slow
8	Nov-11	6.97	217	18	Fast
9	Nov-11	NS	NS	NS	NS
10	Nov-11	7.23	285	342	Fast
11	Nov-11	7.22	1180	16	Steady
FMCU	Nov-11	7.1	270	51	Still
FMCD	Nov-11	7.17	133	132	Steady

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Dec-11	7.0	545.0	30.0	Slow
8	Dec-11	7.49	615	10	Steady
9	Dec-11	NS	NS	NS	NS
10	Dec-11	7.32	752	24	Slow
11	Dec-11	7.31	526	49	Slow
FMCU	Dec-11	7.2	452.0	8.0	Trickle
FMCD	Dec-11	7.33	248	5	Steady
1	Jan-12	7.2	673.0	14.0	Still
8	Jan-12	7.33	296	60	Steady
9	Jan-12	NS	NS	NS	NS
10	Jan-12	7.36	1440	33	Steady
11	Jan-12	7.56	494	85	Still
FMCU	Jan-12	7.4	511.0	18.0	Still
FMCD	Jan-12	7.51	147	10	Still
1	Feb-12	7.3	388.0	44.0	Slow
8	Feb-12	7.5	480	20	Slow
9	Feb-12	NS	NS	NS	NS
10	Feb-12	7.47	618	30	Slow
11	Feb-12	7.4	393	25	Slow
FMCU	Feb-12	7.1	384.0	16.0	Slow
FMCD	Feb-12	7.49	253	55	Steady
1	Mar-12	7.0	687.0	16.0	Trickle
8	Mar-12	7.64	668	16	Slow
9	Mar-12	NS	NS	NS	NS
10	Mar-12	7.51	850	18	Slow
11	Mar-12	7.31	767	8	Slow
FMCU	Mar-12	6.9	199.0	21.0	Fast
FMCD	Mar-12	6.96	186	42	Fast
1	Apr-12	7.0	579.0	36.0	Slow
8	Apr-12	7.44	448	12	Steady
9	Apr-12	NS	NS	NS	NS
10	Apr-12	7.5	753	24	Steady
11	Apr-12	7.25	510	16	Slow
FMCU	Apr-12	7.3	432.0	26.0	Steady
FMCD	Apr-12	7.52	196	228	Fast
1	May-12	7.0	1190.0	37.0	Still
8	May-12	7.36	634	5	Slow
9	May-12	NS	NS	NS	NS
10	May-12	7.54	1440	22	Slow
11	May-12	7.35	1010	78	Still
FMCU	May-12	7.4	491.0	15.0	Slow
FMCD	May-12	7.59	192	33	Fast

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2012/2013

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jun-12	6.97	699	22	-
8	Jun-12	7.35	841	<5	-
9	Jun-12	NS	NS	NS	NS
10	Jun-12	7.41	825	22	-
11	Jun-12	7.1	822	19	-
FMCU	Jun-12	7.03	228	29	-
FMCD	Jun-12	7.13	215	26	-
1	Jul-12	6.97	906	<5	-
8	Jul-12	7.3	431	32	-
9	Jul-12	NS	NS	NS	NS
10	Jul-12	7.66	1020	12	-
11	Jul-12	0	0	0	NS
FMCU	Jul-12	7.35	624	22	-
FMCD	Jul-12	7.52	230	40	-
1	Aug-12	7.13	1330	17	-
8	Aug-12	7.36	717	174	-
9	Aug-12	NS	NS	NS	NS
10	Aug-12	7.67	1520	9	-
11	Aug-12	7.43	1070	25	-
FMCU	Aug-12	7.32	477	6	-
FMCD	Aug-12	7.52	235	6	-
1	Sep-12	7.18	1590	17	-
8	Sep-12	0	0	0	NS
9	Sep-12	NS	NS	NS	NS
10	Sep-12	7.62	1720	106	-
11	Sep-12	7.4	1290	95	-
FMCU	Sep-12	7.21	500	7	-
FMCD	Sep-12	7.57	206	<5	-
1	Oct-12	7.24	1760	18	-
8	Oct-12	0	0	0	NS
9	Oct-12	NS	NS	NS	NS
10	Oct-12	7.67	1750	12	-
11	Oct-12	7.62	1650	57	-
FMCU	Oct-12	7.37	453	16	-
FMCD	Oct-12	7.65	171	8	-
1	Nov-12	0	0	0	Dry
8	Nov-12	0	0	0	NS
9	Nov-12	NS	NS	NS	NS
10	Nov-12	0	0	0	NS
11	Nov-12	7.67	2550	108	-
FMCU	Nov-12	7.11	549	36	-
FMCD	Nov-12	7.44	149	43	-

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Dec-12	0.0	0.0	0.0	Dry
8	Dec-12	0	0	0	NS
9	Dec-12	NS	NS	NS	NS
10	Dec-12	0	0	0	NS
11	Dec-12	0	0	0	NS
FMCU	Dec-12	7.4	427.0	16.0	-
FMCD	Dec-12	7.69	142	5	-
1	Jan-13	0.0	0.0	0.0	Dry
8	Jan-13	0	0	0	NS
9	Jan-13	NS	NS	NS	NS
10	Jan-13	0	0	0	NS
11	Jan-13	0	0	0	NS
FMCU	Jan-13	7.7	461.0	20.0	-
FMCD	Jan-13	7.77	157	<5	-
1	Feb-13	6.9	483.0	28.0	-
8	Feb-13	0	0	0	NS
9	Feb-13	NS	NS	NS	NS
10	Feb-13	7.08	724	18	-
11	Feb-13	6.72	391	23	-
FMCU	Feb-13	6.7	325.0	5.0	-
FMCD	Feb-13	7.21	257	6	-
1	Mar-13	7.0	922.0	24.0	-
8	Mar-13	0	0	0	NS
9	Mar-13	NS	NS	NS	NS
10	Mar-13	7.47	1210	6	-
11	Mar-13	6.98	595	13	-
FMCU	Mar-13	7.1	284.0	26.0	-
FMCD	Mar-13	7.19	300	<5	-
1	Apr-13	7.1	1030.0	8.0	-
8	Apr-13	0	0	0	NS
9	Apr-13	NS	NS	NS	NS
10	Apr-13	7.42	1490	6	-
11	Apr-13	7.1	675	10	-
FMCU	Apr-13	7.1	269.0	25.0	-
FMCD	Apr-13	7.37	172	82	-
1	May-13	7.0	648.0	22.0	-
8	May-13	0	0	0	NS
9	May-13	NS	NS	NS	NS
10	May-13	7.55	1070	38	-
11	May-13	7.16	603	15	-
FMCU	May-13	0.0	0.0	0.0	NS
FMCD	May-13	0	0	0	NS

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2013/2014

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jun-13	6.97	702	<5	-
8	Jun-13	NF	NF	NF	NF
9	Jun-13	NS	NS	NS	NS
10	Jun-13	7.54	1240	<5	-
11	Jun-13	7.09	799	5	-
FMCU	Jun-13	7.17	306	83	Low
FMCD	Jun-13	7.55	140	<5	Low
1	Jul-13	6.59	593	7	-
8	Jul-13	NF	NF	NF	NF
9	Jul-13	NS	NS	NS	NS
10	Jul-13	6.98	787	12	-
11	Jul-13	6.84	392	5	-
FMCU	Jul-13	7.16	334	24	Low
FMCD	Jul-13	7.6	142	<5	Low
1	Aug-13	6.81	955	9	-
8	Aug-13	NF	NF	NF	NF
9	Aug-13	NS	NS	NS	NS
10	Aug-13	7.44	1350	<5	-
11	Aug-13	7.16	569	31	-
FMCU	Aug-13	7	354	<5	Pond
FMCD	Aug-13	7.5	132	<5	Mod
1	Sep-13	7.32	1120	18	-
8	Sep-13	NF	NF	NF	NF
9	Sep-13	NS	NS	NS	NS
10	Sep-13	7.81	1500	9	-
11	Sep-13	7.74	1040	14	-
FMCU	Sep-13	7.21	377	<5	Pond
FMCD	Sep-13	7.52	128	<5	Low
1	Oct-13	7.28	1090	9	-
8	Oct-13	NF	NF	NF	NF
9	Oct-13	NS	NS	NS	NS
10	Oct-13	7.64	1920	<5	-
11	Oct-13	8.03	1260	126	-
FMCU	Oct-13	7.31	428	12	Pond
FMCD	Oct-13	7.33	132	<5	Low
1	Nov-13	7.21	1060	5	-
8	Nov-13	NF	NF	NF	NF
9	Nov-13	NS	NS	NS	NS
10	Nov-13	7.6	2060	34	-
11	Nov-13	7.05	585	16	-
FMCU	Nov-13	6.85	202	6	Pond
FMCD	Nov-13	6.88	274	5	Mod

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Dec-13	6.7	706.0	9.0	-
8	Dec-13	NF	NF	NF	NF
9	Dec-13	NS	NS	NS	NS
10	Dec-13	7.02	1130	13	-
11	Dec-13	6.85	542	30	-
FMCU	Dec-13	6.6	337.0	6.0	Pond
FMCD	Dec-13	7.27	187	<5	Mod
1	Jan-14	6.9	740.0	84.0	-
8	Jan-14	NF	NF	NF	NF
9	Jan-14	NS	NS	NS	NS
10	Jan-14	7.42	1270	6	-
11	Jan-14	7.32	896	66	-
FMCU	Jan-14	6.9	353.0	7.0	Pond
FMCD	Jan-14	7.19	140	<5	Mod
1	Feb-14	7.3	865.0	10.0	-
8	Feb-14	NF	NF	NF	NF
9	Feb-14	NS	NS	NS	NS
10	Feb-14	7.66	1690	<5	-
11	Feb-14	0	0	0	Dry
FMCU	Feb-14	7.5	460.0	25.0	Pond
FMCD	Feb-14	7.65	146	<5	Low
1	Mar-14	7.0	276.0	32.0	-
8	Mar-14	NF	NF	NF	NF
9	Mar-14	NS	NS	NS	NS
10	Mar-14	7.4	815	14	-
11	Mar-14	6.85	532	20	-
FMCU	Mar-14	6.9	169.0	18.0	Pond
FMCD	Mar-14	7.23	139	11	Low
1	Apr-14	6.9	166.0	24.0	-
8	Apr-14	NF	NF	NF	NF
9	Apr-14	NS	NS	NS	NS
10	Apr-14	7.32	533	28	-
11	Apr-14	7.03	531	27	-
FMCU	Apr-14	6.6	140.0	11.0	Pond
FMCD	Apr-14	7.18	134	21	Mod
1	May-14	6.7	502.0	6.0	-
8	May-14	NF	NF	NF	NF
9	May-14	NS	NS	NS	NS
10	May-14	7.16	730	<5	-
11	May-14	6.77	513	<5	-
FMCU	May-14	6.8	209.0	9.0	Pond
FMCD	May-14	7.44	131	<5	Mod

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2014

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jun-14	7.11	481	10	Low
8	Jun-14	0	0	0	Dry
9	Jun-14	0	0	0	Not
10	Jun-14	0	936	8	Low
11	Jun-14	6.99	352	290	Low
FMCU	Jun-14	7.05	185	7	Low
FMCD	Jun-14	7.19	119	25	Mod
1	Jul-14	7.01	530	<5	0
8	Jul-14	0	0	0	Dry
9	Jul-14	0	0	0	Not
10	Jul-14	0	1490	<5	Low
11	Jul-14	7.07	756	<5	0
FMCU	Jul-14	7.35	223	6	Poole
FMCD	Jul-14	7.74	129	<5	Low
1	Aug-14	6.73	200	26	No
8	Aug-14	0	0	0	Dry
9	Aug-14	0	0	0	No
10	Aug-14	0	931	40	Low
11	Aug-14	6.8	860	8	Low
FMCU	Aug-14	6.8	151	<5	Low
FMCD	Aug-14	7.09	140	<5	Low
1	Sep-14	7.03	497	<5	Low
8	Sep-14	0	0	0	Dry
9	Sep-14	0	0	0	0
10	Sep-14	0	1120	<5	Low
11	Sep-14	7.1	512	<5	Low
FMCU	Sep-14	0	0	0	No
FMCD	Sep-14	7.53	144	<5	Low
1	Oct-14	7.01	420	18	Low
8	Oct-14	0	0	0	No
9	Oct-14	0	0	0	0
10	Oct-14	0	1410	22	Low
11	Oct-14	7.29	585	24	Low
FMCU	Oct-14	0	0	0	No
FMCD	Oct-14	7.54	127	<5	Low
1	Nov-14	0	0	0	No
8	Nov-14	0	0	0	No
9	Nov-14	0	0	0	0
10	Nov-14	0	1120	7	Low
11	Nov-14	6.9	670	87	Low
FMCU	Nov-14	0	0	0	No
FMCD	Nov-14	7.42	203	<5	Low

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Dec-14	0.0	0.0	0.0	No
8	Dec-14	0	0	0	0
9	Dec-14	0	0	0	0
10	Dec-14	0	0	0	No
11	Dec-14	0	0	0	No
FMCU	Dec-14	0.0	0.0	0.0	No
FMCD	Dec-14	7.43	189	<5	Low

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2015

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jan-15	6.52	218	64	Low
8	Jan-15	5.55	116.3	17	Low
9	Jan-15	NS	NS	NS	NS
10	Jan-15	7.02	673	104	Mod
11	Jan-15	6.17	229	51	Mod
FMCU	Jan-15	6.49	204	13	
FMCD	Jan-15	6.97	201	10	
1	Feb-15	6.44	2910	14	Low
8	Feb-15	NS	NS	NS	No
9	Feb-15	NS	NS	NS	NS
10	Feb-15	6.95	766	<5	Low
11	Feb-15	6.75	545	19	Low
FMCU	Feb-15	NS	NS	NS	N
FMCD	Feb-15	7.12	164.5	<5	Low
1	Mar-15	NS	NS	NS	N
8	Mar-15	NS	NS	NS	N
9	Mar-15	NS	NS	NS	NS
10	Mar-15	6.89	1107	<5	Low
11	Mar-15	NS	NS	NS	N
FMCU	Mar-15	NS	NS	NS	N
FMCD	Mar-15	7.53	170	<5	Low
1	Apr-15	6.67	382	22	Low
8	Apr-15	6.45	506	<5	Low
9	Apr-15	NS	NS	NS	NS
10	Apr-15	6.69	803	<5	Low
11	Apr-15	6.62	1334	53	Low
FMCU	Apr-15	7.11	307	14	Low
FMCD	Apr-15	6.13	372	9	Low
1	May-15	6.28	838	6	Low
8	May-15	6.15	478	<5	Low
9	May-15	NS	NS	NS	NS
10	May-15	6.46	977	<5	Low
11	May-15	6.23	1140	23	Low
FMCU	May-15	7.04	214	13	Mod
FMCD	May-15	6.71	217	9	Mod
1	Jun-15	6.02	599	<5	Low
8	Jun-15	5.97	482	<5	Low
9	Jun-15	NS	NS	NS	NS
10	Jun-15	6.35	834	<5	Low
11	Jun-15	6.15	1426	<5	Low
FMCU	Jun-15	6.33	202	6	Low
FMCD	Jun-15	6.08	200	<5	Mod

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jul-15	7.0	872.0	<5	Low
8	Jul-15	6.56	642	<5	Low
9	Jul-15	NS	NS	NS	NS
10	Jul-15	7.03	1364	<5	Low
11	Jul-15	7.22	1492	<5	Low
FMCU	Jul-15	NS	NS	NS	N
FMCD	Jul-15	7.27	223	<5	Low
1	Aug-15	5.8	762.0	<5	Low
8	Aug-15	7.62	533	7	N
9	Aug-15	NS	NS	NS	NS
10	Aug-15	7.52	1315	<5	Low
11	Aug-15	7.67	1072	7	N
FMCU	Aug-15	7.9	267.0	<5	N
FMCD	Aug-15	7.92	145.7	17	Low
1	Sep-15	7.3	698.0	15.0	No
8	Sep-15	7.25	499	<5	No
9	Sep-15	NS	NS	NS	NS
10	Sep-15	7.7	1237	<5	Low
11	Sep-15	6.72	714	8	N
FMCU	Sep-15	7.2	252.0	8.0	N
FMCD	Sep-15	8	135.4	<5	Low
1	Oct-15	7.0	578.0	13.0	N
8	Oct-15	7.04	459	9	N
9	Oct-15	NS	NS	NS	NS
10	Oct-15	7.57	1332	8	Low
11	Oct-15	6.92	822	18	No
FMCU	Oct-15	7.0	226.9	<5	No
FMCD	Oct-15	7.6	134.9	<5	Low
1	Nov-15	7.3	442.0	<5	Low
8	Nov-15	6.99	452	<5	N
9	Nov-15	NS	NS	NS	NS
10	Nov-15	7.38	1022	<5	Low
11	Nov-15	7.13	1945	40	Low
FMCU	Nov-15	7.5	232.5	<5	N
FMCD	Nov-15	7.4	148.9	<5	Low
1	Dec-15	7.1	286.0	30.0	N
8	Dec-15	7.07	294	<5	Low
9	Dec-15	NS	NS	NS	NS
10	Dec-15	7.28	901	6	Low
11	Dec-15	7.08	626	10	N
FMCU	Dec-15	7.2	208.3	14.0	N
FMCD	Dec-15	7.58	175.1	<5	Low

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2016

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jan-16	6.85	765	6	N
8	Jan-16	7.22	545	5	N
9	Jan-16	NS	NS	NS	NS
10	Jan-16	7.2	1215	6	N
11	Jan-16	6.87	828	6	L
FMCU	Jan-16	6.65	200.9	5	
FMCD	Jan-16	7.08	208.2	5	
1	Feb-16	7.09	1004	5	N
8	Feb-16	7.04	541	5	L
9	Feb-16	NS	NS	NS	NS
10	Feb-16	7.24	1230	<5	N
11	Feb-16	7.07	1091	16	L
FMCU	Feb-16	7.19	259	5	N
FMCD	Feb-16	7.3	193.6	5	N
1	Mar-16	7.4	1060	5	N
8	Mar-16	7.34	556	5	N
9	Mar-16	NS	NS	NS	NS
10	Mar-16	7.5	1421	5	L
11	Mar-16	7.39	1388	16	N
FMCU	Mar-16	7.17	289	18	N
FMCD	Mar-16	7.8	183.2	5	N
1	Apr-16	7.81	498	151	N
8	Apr-16	7.34	270	10	N
9	Apr-16	NS	NS	NS	NS
10	Apr-16	7.42	1484	6	L
11	Apr-16	7.69	1105	15	N
FMCU	Apr-16	7.36	229.5	5	N
FMCD	Apr-16	8.07	133.8	5	N
1	May-16	7.35	487	22	N
8	May-16	7.3	479	5	N
9	May-16	NS	NS	NS	NS
10	May-16	7.35	1701	<5	M
11	May-16	7.53	1421	22	N
FMCU	May-16	6.97	226	5	
FMCD	May-16	7.65	133.6	5	
1	Jun-16	7.19	226	32	N
8	Jun-16	6.92	437	5	N
9	Jun-16	NS	NS	NS	NS
10	Jun-16	7.23	1044	<5	L
11	Jun-16	7	901	6	N
FMCU	Jun-16	6.8	176.3	5	
FMCD	Jun-16	7.6	142.9	18	

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jul-16	7.4	238.0	12.0	N
8	Jul-16	6.96	427	5	N
9	Jul-16	NS	NS	NS	NS
10	Jul-16	7.34	1267	<5	L
11	Jul-16	7.08	1245	14	N
FMCU	Jul-16	7.3	169.7	5.0	
FMCD	Jul-16	7.67	158.1	10	
1	Aug-16	7.1	432.0	5.0	N
8	Aug-16	6.95	408	5	N
9	Aug-16	NS	NS	NS	NS
10	Aug-16	7.22	1569	<5	L
11	Aug-16	7.34	972	7	N
FMCU	Aug-16	7.5	173.2	5.0	
FMCD	Aug-16	8.06	148.8	5	
1	Sep-16	7.3	374.0	10.0	N
8	Sep-16	6.91	374	5	N
9	Sep-16	NS	NS	NS	NS
10	Sep-16	7.27	1303	<5	N
11	Sep-16	7.07	321	8	N
FMCU	Sep-16	7.3	197.4	5.0	
FMCD	Sep-16	0	134.5	17	
1	Oct-16	7.3	400.0	10.0	N
8	Oct-16	7.21	394	7	N
9	Oct-16	NS	NS	NS	NS
10	Oct-16	7.39	1653	8	N
11	Oct-16	7.29	152.1	10	N
FMCU	Oct-16	7.4	194.9	5.0	N
FMCD	Oct-16	7.8	172.8	5	N
1	Nov-16	7.3	403.0	10.0	N
8	Nov-16	7.13	398	5	N
9	Nov-16	NS	NS	NS	NS
10	Nov-16	7.18	1893	11	N
11	Nov-16	7.16	154.2	5	N
FMCU	Nov-16	7.2	175.1	8.0	
FMCD	Nov-16	7.62	145.2	5	
1	Dec-16	7.0	378.0	63.0	N
8	Dec-16	6.86	328	11	N
9	Dec-16	NS	NS	NS	NS
10	Dec-16	7.28	1946	12	N
11	Dec-16	0	0	0	N
FMCU	Dec-16	7.1	213.9	30.0	N
FMCD	Dec-16	7.29	176.6	5	N

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2017

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jan-17	6.91	259	113	NF
8	Jan-17	NS	NS	NS	NF
9	Jan-17	NS	NS	NS	
10	Jan-17	NS	NS	NS	NF
11	Jan-17	6.51	142.1	9	NF
FMCU	Jan-17	7.05	181.7	22	
FMCD	Jan-17	7.19	164.4	9	
1	Feb-17	6.93	443	16	NF
8	Feb-17	NS	NS	NS	NF
9	Feb-17	NS	NS	NS	
10	Feb-17	NS	NS	NS	NF
11	Feb-17	6.6	171.9	22	NF
FMCU	Feb-17	6.98	198.3	23	
FMCD	Feb-17	7.49	173.2	5	
1	Mar-17	6.34	404	5	LF
8	Mar-17	5.89	580	<5	LF
9	Mar-17	NS	NS	NS	
10	Mar-17	6.76	1092	9	LF
11	Mar-17	6.5	904	10	NF
FMCU	Mar-17	6.09	252.9	8	
FMCD	Mar-17	7.45	241	9	
1	Apr-17	6.92	592	11	NF
8	Apr-17	6.33	521	<5	LF
9	Apr-17	NS	NS	NS	
10	Apr-17	6.85	1044	<5	LF
11	Apr-17	6.94	978	10	NF
FMCU	Apr-17	6.55	289	6	
FMCD	Apr-17	7.29	186.6	<5	
1	May-17	6.93	603	17	NF
8	May-17	6.7	685	16	NF
9	May-17	NS	NS	NS	
10	May-17	7.34	1493	30	NF
11	May-17	5.88	348	14	NF
FMCU	May-17	7.48	291	<5	
FMCD	May-17	6.94	168.6	<5	
1	Jun-17	6.67	450	6	LF
8	Jun-17	6.67	455	<5	NF
9	Jun-17	NS	NS	NS	
10	Jun-17	6.68	811	8	NF
11	Jun-17	6.75	1278	15	NF
FMCU	Jun-17	7.38	267	8	
FMCD	Jun-17	8.24	186	5	

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jul-17	7.8	565.0	5.0	NF
8	Jul-17	7.04	506	<5	NF
9	Jul-17	NS	NS	NS	
10	Jul-17	7	1438	<5	NF
11	Jul-17	7.37	387	14	NF
FMCU	Jul-17	7.5	298.0	14.0	Light brown
FMCD	Jul-17	8.15	110.1	<5	
1	Aug-17	8.1	494.0	5.0	NF
8	Aug-17	7.33	536	<5	NF
9	Aug-17	NS	NS	NS	
10	Aug-17	7.27	1361	<5	NF
11	Aug-17	7.31	476	176	NF
FMCU	Aug-17	6.7	303.0	122.0	
FMCD	Aug-17	6.83	110.8	86	
1	Sep-17	7.4	586.0	37.0	NF
8	Sep-17	7.21	581	28	NF
9	Sep-17	NS	NS	NS	
10	Sep-17	6.89	2071	30	NF
11	Sep-17	7.64	222	24	NF
FMCU	Sep-17	7.4	340.0	<5	
FMCD	Sep-17	7.22	202.3	<5	
1	Oct-17	NS	NS	NS	NF
8	Oct-17	NS	NS	NS	NF
9	Oct-17	NS	NS	NS	
10	Oct-17	7.07	2240	111	NF
11	Oct-17	NS	NS	NS	NF
FMCU	Oct-17	6.2	468.0	23.0	Pooled
FMCD	Oct-17	8.15	225	<5	
1	Nov-17	7.3	202.1	33.0	NF
8	Nov-17	6.28	348	<5	NF
9	Nov-17	NS	NS	NS	
10	Nov-17	7	456	21	NF
11	Nov-17	NS	NS	NS	NF
FMCU	Nov-17	6.5	163.5	10.0	
FMCD	Nov-17	7.53	149.2	5	
1	Dec-17	6.4	242.0	24.0	NF
8	Dec-17	NS	NS	NS	NF
9	Dec-17	NS	NS	NS	
10	Dec-17	6.43	1185	41	NF
11	Dec-17	NS	NS	NS	NF
FMCU	Dec-17	6.5	190.8	16.0	
FMCD	Dec-17	7.75	170.9	<5	

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2018

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jan-18	NS	NS	NS	N
8	Jan-18	NS	NS	NS	N
9	Jan-18	NS	NS	NS	N
10	Jan-18	NS	NS	NS	
11	Jan-18	6.69	178.2	16	
FMCU	Jan-18	NS	NS	NS	L
FMCD	Jan-18	7.2	190.9	5	
1	Feb-18	NS	NS	NS	N
8	Feb-18	NS	NS	NS	N
9	Feb-18	NS	NS	NS	N
10	Feb-18	NS	NS	NS	
11	Feb-18	6.59	158.9	13	
FMCU	Feb-18	5.42	313	16	
FMCD	Feb-18	7.98	208.2	10	
1	Mar-18	NS	NS	NS	N
8	Mar-18	6.87	389	7	
9	Mar-18	NS	NS	NS	
10	Mar-18	6.91	1071	235	
11	Mar-18	7.03	275	5	
FMCU	Mar-18	6.67	245	6	
FMCD	Mar-18	7.89	151.8	8	
1	Apr-18	7.14	580	10	
8	Apr-18	6.85	583	8	
9	Apr-18	NS	NS	NS	
10	Apr-18	6.82	1121	16	
11	Apr-18	7.4	311	5	
FMCU	Apr-18	6.06	291	7	
FMCD	Apr-18	7.12	157.1	5	
1	May-18	7.08	625	10	
8	May-18	6.8	650	9	
9	May-18	NS	NS	NS	
10	May-18	7.35	1436	5	
11	May-18	7.2	182.8	5	
FMCU	May-18	7.11	288	6	
FMCD	May-18	8.44	154.8	5	
1	Jun-18	6.96	302	9	
8	Jun-18	6.15	410	5	
9	Jun-18	NS	NS	NS	
10	Jun-18	6.96	1157	8	
11	Jun-18	6.85	359	5	
FMCU	Jun-18	6.63	193.9	5	
FMCD	Jun-18	7.8	147.7	26	

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jul-18	NS	NS	NS	N
8	Jul-18	7.13	630	24	
9	Jul-18	NS	NS	NS	
10	Jul-18	7.19	1776	11	
11	Jul-18	7	276	5	
FMCU	Jul-18	6.8	210.0	5.0	
FMCD	Jul-18	8.02	255	5	
1	Aug-18	7.3	253.0	31.0	
8	Aug-18	NS	NS	NS	N
9	Aug-18	NS	NS	NS	
10	Aug-18	7.25	1343	5	
11	Aug-18	6.95	134.4	5	
FMCU	Aug-18	6.3	239.0	13.0	
FMCD	Aug-18	7.35	149.5	7	
1	Sep-18	6.9	225.6	57.0	
8	Sep-18	NS	NS	NS	N
9	Sep-18	NS	NS	NS	
10	Sep-18	6.9	1469	5	
11	Sep-18	6.85	139.9	5	
FMCU	Sep-18	6.8	193.9	10.0	
FMCD	Sep-18	7.76	126.6	6	
1	Oct-18	6.7	486.0	5.0	
8	Oct-18	6.58	367	5	
9	Oct-18	NS	NS	NS	
10	Oct-18	6.98	1077	5	
11	Oct-18	6.74	272	5	
FMCU	Oct-18	6.5	434.0	10.0	
FMCD	Oct-18	8.03	148.4	11	
1	Nov-18	6.7	324.0	10.0	
8	Nov-18	6.89	441	12	
9	Nov-18	NS	NS	NS	
10	Nov-18	6.94	1437	12	
11	Nov-18	6.74	182.9	22	
FMCU	Nov-18	6.9	440.0	15.0	
FMCD	Nov-18	8.08	166.9	5	
1	Dec-18	6.4	294.0	15.0	
8	Dec-18	6.32	326	6	
9	Dec-18	NS	NS	NS	
10	Dec-18	6.95	523	23	
11	Dec-18	6.65	204	14	
FMCU	Dec-18	6.9	239.0	5.0	
FMCD	Dec-18	7.24	240	26	

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2019

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jan-19	6.92	350	15	N
8	Jan-19	NS	NS	NS	N
9	Jan-19	NS	NS	NS	N
10	Jan-19	6.78	1676	9	N
11	Jan-19	7.26	163.5	5	N
FMCU	Jan-19	6.95	314	28	N
FMCD	Jan-19	7.44	190.3	5	M
1	Feb-19	6.98	443	26	N
8	Feb-19	NS	NS	NS	N
9	Feb-19	NS	NS	NS	N
10	Feb-19	NS	NS	NS	N
11	Feb-19	7.26	196.6	10	N
FMCU	Feb-19	NS	NS	NS	N
FMCD	Feb-19	7.84	147.9	5	M
1	Mar-19	6.55	193.9	50	N
8	Mar-19	6.41	498	26	N
9	Mar-19	NS	NS	NS	N
10	Mar-19	6.54	410	28	N
11	Mar-19	6.94	214	5	N
FMCU	Mar-19	7.09	163	10	N
FMCD	Mar-19	7.64	224	26	L
1	Apr-19	5.73	329	27	N
8	Apr-19	6.3	275.2	10	N
9	Apr-19	NS	NS	NS	N
10	Apr-19	6.64	673.7	22	N
11	Apr-19	7.25	241	5	N
FMCU	Apr-19	6.87	189	5	N
FMCD	Apr-19	7.45	283	5	L
1	May-19	6.83	330	48	N
8	May-19	NS	NS	NS	N
9	May-19	NS	NS	NS	N
10	May-19	6.85	961	10	N
11	May-19	6.94	249	5	N
FMCU	May-19	7	178.9	12	N
FMCD	May-19	8.07	241	5	L
1	Jun-19	7.1	294	NS	N
8	Jun-19	NS	NS	NS	N
9	Jun-19	NS	NS	NS	N
10	Jun-19	6.82	1027	NS	N
11	Jun-19	7.09	238	NS	N
FMCU	Jun-19	7.22	151.8	10	N
FMCD	Jun-19	8.1	219	6	L

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jul-19	7.0	296.6	15.0	N
8	Jul-19	7.2	451.3	11	N
9	Jul-19	NS	NS	NS	N
10	Jul-19	7.36	751.6	5	N
11	Jul-19	7.37	183.9	5	N
FMCU	Jul-19	6.7	219.3	5.0	N
FMCD	Jul-19	7.69	237	5	L
1	Aug-19	NS	NS	NS	N
8	Aug-19	NS	NS	NS	N
9	Aug-19	NS	NS	NS	N
10	Aug-19	7.19	1004	9	N
11	Aug-19	7.47	257	5	L
FMCU	Aug-19	NS	NS	NS	N
FMCD	Aug-19	7.88	256	5	L
1	Sep-19	6.8	315.0	20.0	N
8	Sep-19	NS	NS	NS	N
9	Sep-19	NS	NS	NS	N
10	Sep-19	7	666	10	N
11	Sep-19	7.27	588	10	N
FMCU	Sep-19	6.9	162.9	18.0	N
FMCD	Sep-19	7.57	225	5	L
1	Oct-19	7.1	341.0	5.0	N
8	Oct-19	NS	NS	NS	N
9	Oct-19	NS	NS	NS	N
10	Oct-19	7.7	931	8	N
11	Oct-19	7.68	160.3	5	N
FMCU	Oct-19	6.9	210.6	21.0	N
FMCD	Oct-19	7.68	232.7	5	L
1	Nov-19	6.7	369.0	44.0	N
8	Nov-19	NS	NS	NS	N
9	Nov-19	NS	NS	NS	N
10	Nov-19	7.28	1100	6	N
11	Nov-19	6.65	314	24	N
FMCU	Nov-19	NS	NS	NS	D
FMCD	Nov-19	7.86	274	10	L
1	Dec-19	NS	NS	NS	N
8	Dec-19	NS	NS	NS	N
9	Dec-19	NS	NS	NS	N
10	Dec-19	7.23	1285	12	N
11	Dec-19	6.65	366	38	N
FMCU	Dec-19	NS	NS	NS	D
FMCD	Dec-19	7.79	332	68	N

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Surface Water Quality Monitoring Results – 2020

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jan-20	NS	NS	NS	N
8	Jan-20	NS	NS	NS	N
9	Jan-20	NS	NS	NS	NS
10	Jan-20	NS	NS	NS	NS
11	Jan-20	6.94	527	16	N
EM1	Jan-20	7.26	172.3	46	N
EM3	Jan-20	7.86	259	5	N
1	Feb-20	6.62	272.7	16	L
8	Feb-20	6.33	469	15	N
9	Feb-20	NS	NS	NS	NS
10	Feb-20	6.82	600	29	L
11	Feb-20	6.55	662	32	N
EM1	Feb-20	6.66	276.4	<5	L
EM3	Feb-20	6.79	274.5	5	N
1	Mar-20	7.26	295	36	N
8	Mar-20	6.8	474	522	N
9	Mar-20	NS	NS	NS	NS
10	Mar-20	6.96	359	8	N
11	Mar-20	9.28	549	14	N
EM1	Mar-20	6.71	350	12	N
EM3	Mar-20	8.97	9.5	5	L
1	Apr-20	6.74	291.1	15	N
8	Apr-20	6.7	585.8	<5	N
9	Apr-20	NS	NS	NS	NS
10	Apr-20	7.15	749.6	12	N
11	Apr-20	6.71	714.6	20	N
EM1	Apr-20	7.19	335.4	14	N
EM3	Apr-20	7.63	177.9	5	N
1	May-20	7.3	253.2	<5	N
8	May-20	6.94	327.7	6	N
9	May-20	NS	NS	NS	NS
10	May-20	7.23	851	20	N
11	May-20	6.75	597.3	8	N
EM1	May-20	7.31	233.4	17	N
EM3	May-20	7.33	240.5	5	L
1	Jun-20	7.26	172.3	46	N
8	Jun-20	6.68	380.1	<5	L
9	Jun-20	NS	NS	NS	NS
10	Jun-20	7.42	468.3	9	L
11	Jun-20	7.37	1216	10	N
EM1	Jun-20	6.79	161.2	22	N
EM3	Jun-20	7.15	153.7	5	M

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)	Flow
1	Jul-20	7.1	250.8	13.0	N
8	Jul-20	6.29	235.8	<5	N
9	Jul-20	NS	NS	NS	NS
10	Jul-20	7.35	366	15	L
11	Jul-20	8.73	947	76	N
EM1	Jul-20	6.92	210.6	19	N
EM3	Jul-20	7.19	169.6	155	L
1	Aug-20	6.8	583.0	6.0	N
8	Aug-20	6.64	507	<5	L
9	Aug-20	NS	NS	NS	NS
10	Aug-20	7.3	864	6	L
11	Aug-20	6.87	915	7	N
EM1	Aug-20	6.77	338.2	<5	N
EM3	Aug-20	7.16	225	5	L
1	Sep-20	7.1	564.0	5.0	N
8	Sep-20	6.31	559	7	N
9	Sep-20	NS	NS	NS	NS
10	Sep-20	7.43	1051	5	N
11	Sep-20	7.02	888	7	N
EM1	Sep-20	6.96	307	7	N
EM3	Sep-20	6.68	157.8	5	L
1	Oct-20	7.1	524.0	42.0	N
8	Oct-20	6.39	480	11	L
9	Oct-20	NS	NS	NS	NS
10	Oct-20	7.28	1300	13	L
11	Oct-20	7	976	22	N
EM1	Oct-20	7.02	335.1	8	N
EM3	Oct-20	6.47	156.3	15	L
1	Nov-20	6.9	450.0	14.0	N
8	Nov-20	6.31	431	8	N
9	Nov-20	NS	NS	NS	NS
10	Nov-20	6.99	940	6	N
11	Nov-20	6.99	1416	<5	N
EM1	Nov-20	6.67	301.2	7	L
EM3	Nov-20	7.04	177	7	L
1	Dec-20	7.0	394.0	25.0	L
8	Dec-20	6.43	546	8	L
9	Dec-20	NS	NS	NS	NS
10	Dec-20	7.28	707	5	L
11	Dec-20	6.91	1169	25	N
EM1	Dec-20	6.62	268.3	15	L
EM3	Dec-20	7.07	188.8	6	L

D - Dry, N - Nil Flow, L - Low Flow, M - Medium Flow, H - High Flow NS - Sample Unobtainable

Groundwater 2008 to 2020

Groundwater Quality Monitoring Results – 2008/2009

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jun-08	6.1	3740	362
7	Jun-08	6.8	2200	1130
12	Jun-08	6.1	4640	148
13	Jun-08	6.8	12830	32
JRD1	Jun-08	7	2660	132
JRD2	Jun-08	6.7	600	130
6	Jul-08	6.1	3970	174
7	Jul-08	7.1	2590	616
12	Jul-08	6.7	6720	121
13	Jul-08	6.7	14710	6
JRD1	Jul-08	6.8	3210	28
JRD2	Jul-08	7	3040	15
6	Aug-08	6.1	3930	804
7	Aug-08	6.7	2350	98
12	Aug-08	6.8	10130	216
13	Aug-08	7	13610	15
JRD1	Aug-08	7.0	3220	35
JRD2	Aug-08	7.2	2980	57
6	Sep-08	6.2	2860	261
7	Sep-08	6.9	2300	130
12	Sep-08	6.6	1630	152
13	Sep-08	6.8	13580	30
JRD1	Sep-08	7.3	3230	71
JRD2	Sep-08	6.5	220	78
6	Oct-08	6.4	3950	14
7	Oct-08	6.6	2260	878
12	Oct-08	6.8	11530	407
13	Oct-08	6.8	13910	9
JRD1	Oct-08	6.8	3650	28
JRD2	Oct-08	6	220	125
6	Nov-08	6	3750	550
7	Nov-08	6.9	2250	670
12	Nov-08	6.7	8880	182
13	Nov-08	7	13180	3
JRD1	Nov-08	6.7	3830	12
JRD2	Nov-08	6.9	240	178

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Dec-08	6.1	3750	356
7	Dec-08	6.8	2490	416
12	Dec-08	6.9	11300	173
13	Dec-08	7	13280	11
JRD1	Dec-08	6.9	3800	28
JRD2	Dec-08	6.4	410	180
6	Jan-09	6.6	4260	1160
7	Jan-09	6.5	2250	160
12	Jan-09	6.8	12440	1550
13	Jan-09	6.8	14450	7
JRD1	Jan-09	6.8	3830	13
JRD2	Jan-09	7.1	3080	16
6	Feb-09	6.3	3090	165
7	Feb-09	6.6	2070	177
12	Feb-09			
13	Feb-09	6.9	13090	18
JRD1	Feb-09	6.9	3790	59
JRD2	Feb-09	6.7	500	63
6	Mar-09	6.3	3820	204
7	Mar-09	6.5	2090	534
12	Mar-09	6.3	2390	106
13	Mar-09	7	13250	9
JRD1	Mar-09	6.8	3870	14
JRD2	Mar-09	6.7	490	27
6	Apr-09	6.7	3340	192
7	Apr-09	6.3	2060	196
12	Apr-09	6.8	7970	727
13	Apr-09	6.8	14680	2
JRD1	Apr-09	6.6	3770	11
JRD2	Apr-09	7	2620	15
6	May-09	6.8	4250	136
7	May-09	7	2530	264
12	May-09	6.7	11550	454
13	May-09	6.9	13410	18
JRD1	May-09	6.7	3260	23
JRD2	May-09	6.9	560	25

Groundwater Quality Monitoring Results – 2009/2010

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jun-09	6.5	4460	459
7	Jun-09	6.5	2140	551
12	Jun-09	NS	NS	NS
13	Jun-09	7.1	11920	15
JRD1	Jun-09	6.8	2250	29
JRD2	Jun-09	7.4	730	91
6	Jul-09	6.6	4290	945
7	Jul-09	6.8	2260	103
12	Jul-09	6.7	5330	1380
13	Jul-09	6.8	14850	25
JRD1	Jul-09	6.6	3720	21
JRD2	Jul-09	7	2660	15
6	Aug-09	6.7	4580	807
7	Aug-09	6.8	2380	16
12	Aug-09	6.9	8730	15
13	Aug-09	7.1	12600	20
JRD1	Aug-09	6.8	3090.0	52.0
JRD2	Aug-09	7	1160	97
6	Sep-09	6.6	4380	119
7	Sep-09	6.6	2460	12
12	Sep-09	NS	NS	NS
13	Sep-09	6.6	13490	14
JRD1	Sep-09	6.8	3130	66
JRD2	Sep-09	7.9	1230	61
6	Oct-09	6.9	3940	51
7	Oct-09	6.8	2000	147
12	Oct-09	NS	NS	NS
13	Oct-09	7.2	11610	12
JRD1	Oct-09	7.1	3250	106
JRD2	Oct-09	7.6	1770	61
6	Nov-09	7.2	8400	266
7	Nov-09	6.8	3590	246
12	Nov-09	NS	NS	NS
13	Nov-09	7.3	260	14
JRD1	Nov-09	6.9	10230	47
JRD2	Nov-09	7.1	350.0	47.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Dec-09	6.9	4270.0	193.0
7	Dec-09	6.9	2390	14
12	Dec-09	NS	NS	NS
13	Dec-09	7	12390	26
JRD1	Dec-09	6.7	3650	63
JRD2	Dec-09	7.3	1920.0	87.0
6	Jan-10	6.7	5310	173
7	Jan-10	NS	NS	NS
12	Jan-10	6.7	13200.0	37.0
13	Jan-10	6.5	12990	31
JRD1	Jan-10	6.8	3580	22
JRD2	Jan-10	7.3	2050.0	44.0
6	Feb-10	6.9	4570	193
7	Feb-10	NS	NS	NS
12	Feb-10	6.9	12280	46
13	Feb-10	7.1	11560	28
JRD1	Feb-10	6.9	3750	40
JRD2	Feb-10	7.3	960	139
6	Mar-10	6.7	4180	394
7	Mar-10	NS	NS	NS
12	Mar-10	6.5	6880	30
13	Mar-10	7	11430	32
JRD1	Mar-10	6.8	4040	38
JRD2	Mar-10	7.4	1220	100
6	Apr-10	6.4	3900.0	397.0
7	Apr-10	NS	NS	NS
12	Apr-10	8.2	8440	67
13	Apr-10	7	11430	32
JRD1	Apr-10	6.7	3930	52
JRD2	Apr-10	6.3	1990	101
6	May-10	6.89	1590	268
7	May-10	NS	NS	NS
12	May-10	6.75	8310	34
13	May-10	NS	NS	NS
JRD1	May-10	6.73	3780	23
JRD2	May-10	7.41	1590	136

Groundwater Quality Monitoring Results – 2010/2011

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jun-10	6.9	3320	206
7	Jun-10	NS	NS	NS
12	Jun-10	7.3	3200	63
13	Jun-10	7.6	10300	12
JRD1	Jun-10	7.5	3780	43
JRD2	Jun-10	7.2	315	14
6	Jul-10	7.23	3920	194
7	Jul-10	6.81	2630	22
12	Jul-10	6.41	7790	50
13	Jul-10	6.64	13100	6
JRD1	Jul-10	6.65	3520	22
JRD2	Jul-10	7.1	338	52
6	Aug-10	6.37	4020	234
7	Aug-10	6.8	2680	62
12	Aug-10	6.85	7840	12
13	Aug-10	6.65	13400	16
JRD1	Aug-10	7.2	3960.0	22.0
JRD2	Aug-10	7.2	2380	48
6	Sep-10	7.05	3700	412
7	Sep-10	4.76	2580	36
12	Sep-10	6.78	7800	22
13	Sep-10	6.78	11800	5
JRD1	Sep-10	8.03	3840	16
JRD2	Sep-10	7.05	2460	34
6	Oct-10	6.58	2320	152
7	Oct-10	7.03	2660	86
12	Oct-10	6.6	10800	17
13	Oct-10	6.99	12000	9
JRD1	Oct-10	8.05	4380	76
JRD2	Oct-10	7.27	2500	17
6	Nov-10	6.64	1090	141
7	Nov-10	7.21	2870	65
12	Nov-10	6.44	3260	30
13	Nov-10	6.97	13100	10
JRD1	Nov-10	8.34	4720	57
JRD2	Nov-10	7.2	2520.0	58.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Dec-10	6.5	1410.0	244.0
7	Dec-10	7.01	2670	232
12	Dec-10	6.31	2390	71
13	Dec-10	6.84	11000	5
JRD1	Dec-10	8.31	4460	229
JRD2	Dec-10	7.0	1120.0	99.0
6	Jan-11	6.51	3020	708
7	Jan-11	6.92	2800	68
12	Jan-11	6.4	7560.0	40.0
13	Jan-11	6.86	12400	30
JRD1	Jan-11	7.87	4990	51
JRD2	Jan-11	7.2	2110.0	222.0
6	Feb-11	6.47	2850	173
7	Feb-11	6.8	2760.0	147.0
12	Feb-11	6.35	7480	94
13	Feb-11	6.6	12400	25
JRD1	Feb-11	7.93	4660	69
JRD2	Feb-11	7.03	2500	62
6	Mar-11	6.68	2590	380
7	Mar-11	7.04	2560	39
12	Mar-11	6.58	13800	12
13	Mar-11	6.86	12200	24
JRD1	Mar-11	8.23	4710	32
JRD2	Mar-11	7.68	2080	69
6	Apr-11	7.4	3950.0	287.0
7	Apr-11	7.69	2780	150
12	Apr-11	7.46	14200	82
13	Apr-11	6.86	12200	24
JRD1	Apr-11	8.38	4840	24
JRD2	Apr-11	7.77	2520	50
6	May-11	6.7	4140	84
7	May-11	7.01	2860	18
12	May-11	6.5	9230	24
13	May-11	6.88	12600	42
JRD1	May-11	8.2	4970	76
JRD2	May-11	7.15	2080	70

Groundwater Quality Monitoring Results – 2011/2012

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jun-11	6.72	4020	143
7	Jun-11	6.84	2720	18
12	Jun-11	6.46	6820	18
13	Jun-11	6.99	8970	16
JRD1	Jun-11	8.18	4750	26
JRD2	Jun-11	7.08	2280	94
6	Jul-11	7.17	4120	123
7	Jul-11	7.2	2380	40
12	Jul-11	6.7	1840	210
13	Jul-11	7.37	11000	14
JRD1	Jul-11	8.18	4720	18
JRD2	Jul-11	6.32	441	32
6	Aug-11	6.78	3530	-
7	Aug-11	6.47	2160	258
12	Aug-11	7.33	1540	-
13	Aug-11	6.98	3770	-
JRD1	Aug-11	8.3	4640.0	-
JRD2	Aug-11	7.04	337	-
6	Sep-11	6.77	3890	144
7	Sep-11	6.56	2190	154
12	Sep-11	6.29	4560	40
13	Sep-11	6.89	11000	17
JRD1	Sep-11	NS	NS	NS
JRD2	Sep-11	6.25	351	48
6	Oct-11	6.69	2370	94
7	Oct-11	6.31	1540	113
12	Oct-11	6.01	1080	108
13	Oct-11	6.88	10200	36
JRD1	Oct-11	NS	NS	NS
JRD2	Oct-11	6.21	408	45
6	Nov-11	7.28	3730	194
7	Nov-11	7.06	2010	15
12	Nov-11	6.83	4290	101
13	Nov-11	7.34	11400	15
JRD1	Nov-11	8.25	4620	52
JRD2	Nov-11	7.1	386.0	54.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Dec-11	7.0	2680.0	262.0
7	Dec-11	6.78	2050	142
12	Dec-11	6.18	2720	80
13	Dec-11	7.28	9180	66
JRD1	Dec-11	NS	NS	NS
JRD2	Dec-11	6.8	313.0	76.0
6	Jan-12	7.08	2740	542
7	Jan-12	7.18	2190	240
12	Jan-12	6.4	9120.0	22.0
13	Jan-12	7.24	11000	21
JRD1	Jan-12	8.17	4120	36
JRD2	Jan-12	7.1	389.0	28.0
6	Feb-12	7.1	3260	66
7	Feb-12	7.2	2180.0	40.0
12	Feb-12	6.12	1460	27
13	Feb-12	7.21	8210	22
JRD1	Feb-12	8.26	4260	14
JRD2	Feb-12	8.06	471	18
6	Mar-12	7.11	3140	35
7	Mar-12	7.04	2190	124
12	Mar-12	6.17	517	46
13	Mar-12	7.03	3710	14
JRD1	Mar-12	8.05	4170	40
JRD2	Mar-12	7.26	390	48
6	Apr-12	7.3	3120.0	222.0
7	Apr-12	7.55	2740	105
12	Apr-12	6.5	2170	161
13	Apr-12	7.03	3710	14
JRD1	Apr-12	8.18	4500	57
JRD2	Apr-12	8	506	50
6	May-12	7.16	3170	174
7	May-12	7.49	2720	106
12	May-12	6.37	1250	130
13	May-12	7.34	11200	80
JRD1	May-12	8.17	4380	26
JRD2	May-12	6.57	315	69

Groundwater Quality Monitoring Results – 2012/2013

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jun-12	7.04	662	6400
7	Jun-12	7.14	2340	78
12	Jun-12	6.28	452	40
13	Jun-12	7.3	7560	87
JRD1	Jun-12	8.36	4280	40
JRD2	Jun-12	6.78	256	88
6	Jul-12	7.15	3320	384
7	Jul-12	7.47	2750	94
12	Jul-12	6.44	1980	84
13	Jul-12	7.25	11200	57
JRD1	Jul-12	8.63	4590	54
JRD2	Jul-12	6.9	317	72
6	Aug-12	0	NS	NS
7	Aug-12	7.41	2760	78
12	Aug-12	6.39	1030	63
13	Aug-12	7.48	9580	63
JRD1	Aug-12	8.4	4530.0	17.0
JRD2	Aug-12	6.93	336	118
6	Sep-12	NS	NS	NS
7	Sep-12	7.53	2820	166
12	Sep-12	6.57	1400	99
13	Sep-12	7.37	11500	19
JRD1	Sep-12	8.42	4550	22
JRD2	Sep-12	7.22	421	53
6	Oct-12	NS	NS	NS
7	Oct-12	7.08	2410	61
12	Oct-12	6.59	1910	118
13	Oct-12	7.29	12400	11
JRD1	Oct-12	8.44	4660	12
JRD2	Oct-12	7.24	404	37
6	Nov-12	NS	NS	NS
7	Nov-12	7.07	2490	232
12	Nov-12	6.78	3060	96
13	Nov-12	7.09	12400	44
JRD1	Nov-12	8.31	4730	8
JRD2	Nov-12	7.0	434.0	25.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Dec-12	NS	NS	NS
7	Dec-12	7.1	1190	90
12	Dec-12	7.42	4340	93
13	Dec-12	7.56	11600	66
JRD1	Dec-12	8.41	4480	22
JRD2	Dec-12	8.0	474.0	50.0
6	Jan-13	NS	NS	NS
7	Jan-13	6.78	2170	34
12	Jan-13	7.0	5770.0	130.0
13	Jan-13	7.45	12100	158
JRD1	Jan-13	8.3	4590	22
JRD2	Jan-13	7.6	483.0	25.0
6	Feb-13	NS	NS	NS
7	Feb-13	7.4	2760.0	16.0
12	Feb-13	6.45	1010	27
13	Feb-13	7.4	8840	69
JRD1	Feb-13	8.26	4810	31
JRD2	Feb-13	6.66	351	28
6	Mar-13	NS	NS	NS
7	Mar-13	7.19	2550	18
12	Mar-13	6.31	636	73
13	Mar-13	7.26	6050	328
JRD1	Mar-13	8.33	4460	38
JRD2	Mar-13	6.66	242	120
6	Apr-13	NS	NS	NS
7	Apr-13	6.79	1280	72
12	Apr-13	6.73	1800	61
13	Apr-13	7.26	6050	328
JRD1	Apr-13	8.31	4540	32
JRD2	Apr-13	6.77	255	67
6	May-13	NS	NS	NS
7	May-13	7.12	2160	136
12	May-13	6.78	2520	81
13	May-13	7.46	6660	130
JRD1	May-13	8.37	4610	37
JRD2	May-13	7.31	407	656

Groundwater Quality Monitoring Results – 2013/2014

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jun-13	NS	NS	NS
7	Jun-13	6.98	2910	<5
12	Jun-13	6.92	3750	664
13	Jun-13	7.62	6280	136
JRD1	Jun-13	8.28	4560	94
JRD2	Jun-13	7.16	372	201
6	Jul-13	6.45	807	11600
7	Jul-13	7.26	2530	1620
12	Jul-13	6.85	4200	3530
13	Jul-13	7.2	6910	1520
JRD1	Jul-13	8.46	4350	68
JRD2	Jul-13	7.22	1870	795
6	Aug-13	6.86	2590	6840
7	Aug-13	NS	NS	NS
12	Aug-13	7.02	5310	3070
13	Aug-13	7.82	10200	820
JRD1	Aug-13	8.3	4320	150.0
JRD2	Aug-13	7.43	2500	402
6	Sep-13	7.04	2410	4800
7	Sep-13	NS	NS	NS
12	Sep-13	6.9	6590	892
13	Sep-13	7.42	5950	180
JRD1	Sep-13	8.04	4390	30
JRD2	Sep-13	7.55	2350	178
6	Oct-13	6.69	2350	2560
7	Oct-13	NS	NS	NS
12	Oct-13	7.12	9590	157
13	Oct-13	7.49	5320	43
JRD1	Oct-13	8.31	4350	9
JRD2	Oct-13	7.54	2400	271
6	Nov-13	7.06	2300	207
7	Nov-13	NS	NS	NS
12	Nov-13	6.94	11100	332
13	Nov-13	7.64	5950	22
JRD1	Nov-13	8.39	4560	18
JRD2	Nov-13	7.5	2530	100.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Dec-13	6.8	967	44.0
7	Dec-13	NS	NS	NS
12	Dec-13	6.07	1940	14
13	Dec-13	7.42	5670	118
JRD1	Dec-13	NS	NS	NS
JRD2	Dec-13	6.2	282	<5
6	Jan-14	6.86	2260	655
7	Jan-14	NS	NS	NS
12	Jan-14	6.7	8240	120.0
13	Jan-14	7.28	6170	135
JRD1	Jan-14	8.39	4440	45
JRD2	Jan-14	7.4	2140	371.0
6	Feb-14	7.12	2350	1950
7	Feb-14	NS	NS	NS
12	Feb-14	NS	NS	NS
13	Feb-14	7.51	6430	78
JRD1	Feb-14	8.35	4520	28
JRD2	Feb-14	7.48	2390	497
6	Mar-14	6.98	2240	512
7	Mar-14	NS	NS	NS
12	Mar-14	NS	NS	NS
13	Mar-14	7.47	5480	133
JRD1	Mar-14	8.35	4220	70
JRD2	Mar-14	7.4	1800	932
6	Apr-14	7.2	2400	790.0
7	Apr-14	NS	NS	NS
12	Apr-14	NS	NS	NS
13	Apr-14	7.47	5480	133
JRD1	Apr-14	8.36	4330	121
JRD2	Apr-14	7.4	2150	364
6	May-14	7.04	2350	3590
7	May-14	NS	NS	NS
12	May-14	NS	NS	NS
13	May-14	7.3	5260	36
JRD1	May-14	8.35	4200	57
JRD2	May-14	7.55	1440	230

Groundwater Quality Monitoring Results – 2014

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jun-14	0	0	0
7	Jun-14	0	0	0
12	Jun-14	0	0	0
13	Jun-14	0	0	0
JRD1	Jun-14	0	0	0
JRD2	Jun-14	0	0	0
6	Jul-14	7.04	2110	872
7	Jul-14	0	0	0
12	Jul-14	0	0	0
13	Jul-14	7.43	5380	415
JRD1	Jul-14	8.35	4100	18
JRD2	Jul-14	7.36	2380	242
6	Aug-14	6.64	174	2220
7	Aug-14	0	0	0
12	Aug-14	0	0	0
13	Aug-14	6.48	4350	0
JRD1	Aug-14	8.5	3990	6.3
JRD2	Aug-14	7.8	2280	693
6	Sep-14	7.29	2370	1300
7	Sep-14	0	0	0
12	Sep-14	0	0	0
13	Sep-14	0	0	0
JRD1	Sep-14	0	0	0
JRD2	Sep-14	7.67	2290	71
6	Oct-14	7.58	2400	342
7	Oct-14	0	0	0
12	Oct-14	0	0	0
13	Oct-14	7.33	5280	22
JRD1	Oct-14	0	0	0
JRD2	Oct-14	7.36	690	92
6	Nov-14	7.29	2500	63
7	Nov-14	0	0	0
12	Nov-14	0	0	0
13	Nov-14	7.35	6130	88
JRD1	Nov-14	0	0	0
JRD2	Nov-14	7.4	2160	93.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Dec-14	6.8	2280	234.0
7	Dec-14	0	0	0
12	Dec-14	0	0	0
13	Dec-14	7.15	4910	75
JRD1	Dec-14	0	0	0
JRD2	Dec-14	6.6	439	102.0

Groundwater Quality Monitoring Results – 2015

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jan-15	6.64	2190	550
7	Jan-15	0	0	0
12	Jan-15	0	0	0
13	Jan-15	7.06	5490	75
JRD1	Jan-15	NS	NS	NS
JRD2	Jan-15	6.6	1784	171
6	Feb-15	6.74	2310	38
7	Feb-15	0	0	0
12	Feb-15	0	0	0
13	Feb-15	6.97	5480	40
JRD1	Feb-15	NS	NS	NS
JRD2	Feb-15	6.58	446	24
6	Mar-15	6.78	2350	424
7	Mar-15	0	0	0
12	Mar-15	0	0	0
13	Mar-15	6.91	5890	76
JRD1	Mar-15	NS	NS	NS
JRD2	Mar-15	6.68	788	110
6	Apr-15	6.45	2440	626
7	Apr-15	0	0	0
12	Apr-15	0	0	0
13	Apr-15	6.68	3220	86
JRD1	Apr-15	NS	NS	NS
JRD2	Apr-15	6.74	2080	130
6	May-15	6.53	2270	44
7	May-15	0	0	0
12	May-15	0	0	0
13	May-15	6.95	4030	27
JRD1	May-15	NS	NS	NS
JRD2	May-15	6.83	1910	41
6	Jun-15	6.47	2290	38
7	Jun-15	0	0	0
12	Jun-15	0	0	0
13	Jun-15	6.92	4250	71
JRD1	Jun-15	NS	NS	NS
JRD2	Jun-15	6.7	2030	37.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jul-15	6.9	2099	90.0
7	Jul-15	0	0	0
12	Jul-15	0	0	0
13	Jul-15	7.28	2540	94
JRD1	Jul-15	NS	NS	NS
JRD2	Jul-15	7.3	914	9.0
6	Aug-15	7.4	2260	62
7	Aug-15	0	0	0
12	Aug-15	0.0	0	0.0
13	Aug-15	7.45	4780	122
JRD1	Aug-15	NS	NS	NS
JRD2	Aug-15	7.7	2168	24.0
6	Sep-15	6.65	2399	31
7	Sep-15	0.0	0	0.0
12	Sep-15	0	0	0
13	Sep-15	7.1	4810	62
JRD1	Sep-15	NS	NS	NS
JRD2	Sep-15	6.94	2580	38
6	Oct-15	6.74	2267	68
7	Oct-15	0	0	0
12	Oct-15	0	0	0
13	Oct-15	7.01	4040	23
JRD1	Oct-15	NS	NS	NS
JRD2	Oct-15	7.13	1961	100
6	Nov-15	6.8	2450	103.0
7	Nov-15	0	0	0
12	Nov-15	0	0	0
13	Nov-15	7.01	4040	23
JRD1	Nov-15	NS	NS	NS
JRD2	Nov-15	7.12	2335	196
6	Dec-15	6.81	2417	342
7	Dec-15	0	0	0
12	Dec-15	0	0	0
13	Dec-15	7.15	5290	30
JRD1	Dec-15	NS	NS	NS
JRD2	Dec-15	7.13	2160	108

Groundwater Quality Monitoring Results – 2016

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jan-16	6.72	2425	128
12	Jan-16	0	0	0
13	Jan-16	7.03	3060	584
JRD1	Jan-16	NS	NS	NS
JRD2	Jan-16	6.29	527	142
6	Feb-16	6.64	2580	63
12	Feb-16	0	0	0
13	Feb-16	6.89	3670	20
JRD1	Feb-16	NS	NS	NS
JRD2	Feb-16	6.96	2113	15
6	Mar-16	6.67	2650	25
12	Mar-16	0	0	0
13	Mar-16	6.99	4410	33
JRD1	Mar-16	NS	NS	NS
JRD2	Mar-16	7.05	2436	38
6	Apr-16	6.72	2194	50
12	Apr-16	0	0	0
13	Apr-16	7.13	4240	31
JRD1	Apr-16	NS	NS	NS
JRD2	Apr-16	7.14	2360	36
6	May-16	6.8	2550	154
12	May-16	0	0	0
13	May-16	6.99	4840	45
JRD1	May-16	NS	NS	NS
JRD2	May-16	7.12	2650	21
6	Jun-16	6.7	2230	148
12	Jun-16	0	0	0
13	Jun-16	6.99	4540	19
JRD1	Jun-16	NS	NS	NS
JRD2	Jun-16	7.1	2470	24.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jul-16	6.7	2390	47.0
12	Jul-16	0	0	0
13	Jul-16	7.09	5310	146
JRD1	Jul-16	NS	NS	NS
JRD2	Jul-16	7.1	2660	75.0
6	Aug-16	6.68	2560	10
12	Aug-16	0.0	0	0.0
13	Aug-16	6.98	4200	9
JRD1	Aug-16	NS	NS	NS
JRD2	Aug-16	7.0	2120	106.0
6	Sep-16	6.73	2480	65
12	Sep-16	0	0	0
13	Sep-16	7.06	4040	10
JRD1	Sep-16	NS	NS	NS
JRD2	Sep-16	7.04	2330	12
6	Oct-16	6.9	2560	148
12	Oct-16	0	0	0
13	Oct-16	7.06	4240	18
JRD1	Oct-16	NS	NS	NS
JRD2	Oct-16	6.98	2550	28
6	Nov-16	6.8	2550	160.0
12	Nov-16	0	0	0
13	Nov-16	7.06	4240	18
JRD1	Nov-16	NS	NS	NS
JRD2	Nov-16	6.91	1015	42
6	Dec-16	6.57	2502	47
12	Dec-16	0	0	0
13	Dec-16	6.98	4520	30
JRD1	Dec-16	NS	NS	NS
JRD2	Dec-16	6.96	2515	30

Groundwater Quality Monitoring Results – 2017

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jan-17	6.93	2469	152
13	Jan-17	NS	NS	NS
JRD2	Jan-17	7.05	2522	32
6	Feb-17	6.68	2163	89
13	Feb-17	NS	NS	NS
JRD2	Feb-17	6.81	2202	44
6	Mar-17	6.62	2470	100
13	Mar-17	NS	NS	NS
JRD2	Mar-17	5.99	304	252
6	Apr-17	6.6	2219	104
13	Apr-17	NS	NS	NS
JRD2	Apr-17	6.26	506	33
6	May-17	6.69	2350	98
13	May-17	NS	NS	NS
JRD2	May-17	7.26	583	32
6	Jun-17	6.54	1720	30
13	Jun-17	NS	NS	NS
JRD2	Jun-17	5.8	330	152.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jul-17	6.5	2230	92.0
13	Jul-17	NS	NS	NS
JRD2	Jul-17	6.9	1661	62.0
6	Aug-17	6.75	2130	611
13	Aug-17	NS	NS	NS
JRD2	Aug-17	7.1	1533	28.0
6	Sep-17	6.63	2250	183
13	Sep-17	NS	NS	NS
JRD2	Sep-17	6.85	2410	11
6	Oct-17	6.51	2340	55
13	Oct-17	NS	NS	NS
JRD2	Oct-17	6.98	2480	27
6	Nov-17	5.4	363	658.0
13	Nov-17	NS	NS	NS
JRD2	Nov-17	6.6	425	146
6	Dec-17	5.93	1875	378
13	Dec-17	NS	NS	NS
JRD2	Dec-17	6.41	1330	28

Groundwater Quality Monitoring Results – 2018

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jan-18	NS	NS	NS
13	Jan-18	NS	NS	NS
JRD2	Jan-18	7.11	1432	51
6	Feb-18	5.87	203	190
13	Feb-18	NS	NS	NS
JRD2	Feb-18	6.81	1373	98
6	Mar-18	5.98	171	27
13	Mar-18	NS	NS	NS
JRD2	Mar-18	6.91	1100	12
6	Apr-18	6.59	2220	114
13	Apr-18	NS	NS	NS
JRD2	Apr-18	6.79	2230	5
6	May-18	6.8	2180	108
13	May-18	NS	NS	NS
JRD2	May-18	7.02	2060	60
6	Jun-18	6.67	2400	38
13	Jun-18	NS	NS	NS
JRD2	Jun-18	7.0	2350	18.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jul-18	6.7	2310	34.0
13	Jul-18	NS	NS	NS
JRD2	Jul-18	6.7	1252	29.0
6	Aug-18	6.26	2036	161
13	Aug-18	NS	NS	NS
JRD2	Aug-18	6.4	1770	44.0
6	Sep-18	6.64	2280	37
13	Sep-18	NS	NS	NS
JRD2	Sep-18	7.24	1182	78
6	Oct-18	6.63	2240	72
13	Oct-18	NS	NS	NS
JRD2	Oct-18	6.86	1198	81
6	Nov-18	6.8	2360	27.0
13	Nov-18	NS	NS	NS
JRD2	Nov-18	6.97	961	52
6	Dec-18	6.26	1177	616
13	Dec-18	NS	NS	NS
JRD2	Dec-18	5.88	178	158

Groundwater Quality Monitoring Results – 2019

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jan-19	6.59	2420	77
13	Jan-19	NS	NS	NS
JRD2	Jan-19	6.27	146	68
6	Feb-19	6.82	2310	60
13	Feb-19	NS	NS	NS
JRD2	Feb-19	6.66	1103	119
6	Mar-19	6.65	2170	134
13	Mar-19	NS	NS	NS
JRD2	Mar-19	6.87	2290	98
6	Apr-19	6.7	2340	74
13	Apr-19	NS	NS	NS
JRD2	Apr-19	7.19	2550	34
6	May-19	6.84	2360	55
13	May-19	NS	NS	NS
JRD2	May-19	7.03	2460	5
6	Jun-19	6.7	1960	28
13	Jun-19	NS	NS	NS
JRD2	Jun-19	7.1	2410	27.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jul-19	6.8	1997	90.0
13	Jul-19	NS	NS	NS
JRD2	Jul-19	7.1	2540	6.0
6	Aug-19	6.88	2350	26
13	Aug-19	NS	NS	NS
JRD2	Aug-19	7.1	2500	28.0
6	Sep-19	6.66	2080	26
13	Sep-19	NS	NS	NS
JRD2	Sep-19	6.68	2100	136
6	Oct-19	6.89	2404	23
13	Oct-19	NS	NS	NS
JRD2	Oct-19	7.16	2548	24
6	Nov-19	7.0	2370	28.0
13	Nov-19	NS	NS	NS
JRD2	Nov-19	7.28	2490	13
6	Dec-19	6.93	2410	18
13	Dec-19	NS	NS	NS
JRD2	Dec-19	7.22	2470	5

Groundwater Quality Monitoring Results – 2020

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jan-20	6.76	2210	42
13	Jan-20	NS	NS	NS
JRD2	Jan-20	7.01	2310	23
6	Feb-20	NS	NS	NS
13	Feb-20	NS	NS	NS
JRD2	Feb-20	6.28	620	70
6	Mar-20	6.76	2615	443
13	Mar-20	NS	NS	NS
JRD2	Mar-20	6.3	720	83
6	Apr-20	6.92	2710	46
13	Apr-20	NS	NS	NS
JRD2	Apr-20	7.35	2188	49
6	May-20	6.88	2689	70
13	May-20	NS	NS	NS
JRD2	May-20	7.13	2557	64
6	Jun-20	5.89	188	75
13	Jun-20	NS	NS	NS
JRD2	Jun-20	7.2	1853	58.0

Sample Site	Date	pH	EC (uS/cm)	TSS (mg/L)
6	Jul-20	6.0	275	168.0
13	Jul-20	NS	NS	NS
JRD2	Jul-20	7.1	2590	11.0
6	Aug-20	5.77	272	124
13	Aug-20	NS	NS	NS
JRD2	Aug-20	6.0	714	13.0
6	Sep-20	6.84	2065	627
13	Sep-20	NS	NS	NS
JRD2	Sep-20	7.17	1875	51
6	Oct-20	6.64	2391	181
13	Oct-20	NS	NS	NS
JRD2	Oct-20	7.13	2551	58
6	Nov-20	5.9	120	127.0
13	Nov-20	NS	NS	NS
JRD2	Nov-20	6.26	924	280
6	Dec-20	6.58	2116	526
13	Dec-20	NS	NS	NS
JRD2	Dec-20	6.26	869	194

Appendix 3

Subsidence Management Plan

End of Year Report 2020

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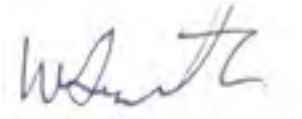
Abel Mine
Subsidence Management Plan
End of Year Report 2020

31 March 2021

Approved by



William Farnworth
Operations Manager
Donaldson Coal

TABLE OF CONTENTS

TABLES

ATTACHMENTS

1 INTRODUCTION

This Subsidence Management Plan End of Year Report fulfils the requirements of Condition 19 of the Abel Subsidence Management Plan (SMP) Approval Conditions for Area 1 and Condition 18 of the Approval Conditions for Area 2, 3 and 4.

A summary of monitoring results for the period January to December 2020 is presented in this report. Mining activities were suspended on 28th April 2016 due to the Mine being placed on Care and Maintenance. Therefore, no pillar extraction was undertaken during this reporting period.

Subsidence surveys, photographic monitoring and visual inspections were conducted over all pillar extraction areas in accordance with the approved Subsidence Monitoring Programs, with environmental monitoring conducted in accordance with the approved Environmental Management Plan.

2 PURPOSE AND SCOPE

The purpose of this document is to comply with the relevant approval condition which states:

"The Leaseholder shall prepare an end of year report. This report shall be submitted to the Director Environmental Sustainability, within the first three months of the subsequent year. The end of year report must:

(a) include a summary of the subsidence and environmental results for the year;

(b) include an analysis of these monitoring results against the relevant;

- *impact assessment criteria;*
- *monitoring results from previous years; and*
- *predictions in the SMP.*

(c) identify any trends in the monitoring results over the life of the activity; and

(d) describe what actions were taken to ensure adequate management of any potential subsidence impacts due to mining."

3 SMP PILLAR EXTRACTION DURING REPORTING PERIOD

Area 1

SMP Approval was granted for Abel Area 1 (Panels 1 to 14 inclusive plus East Mains) on 27 May 2010. Pillar extraction has continued in East Mains during 2014. A Variation application for SMP Area 1 was submitted on the 8 August 2011 and was approved on the 29 September 2011. This variation was related to Panels 9 – 13 being removed from the SMP approved area. No extraction took place in this area during this period.

Area 2

SMP Approval was granted for Abel Area 2 (Panels 14 – 26) on 7 December 2011. A variation was submitted on 19 December 2011 relating to the removal of Panel 14 and the shortening of Panels 15 – 19. The second variation submitted, relating to partial pillar extraction Panel 20 – 22, was approved on the 3 September 2012. A third variation submitted, relating to Panels 19 & 19A, was approved on the 21 December 2012. A fourth variation submitted relating to Panel 22, was approved on the 16 April 2013. No extraction took place in this area during this period.

Area 3

SMP Approval was granted for Abel Area 3 (Panels 23 – 26 and part East Install Headings) on 16 July 2013. A variation was submitted to increase the width to part of Panel 24 and was approved on the 23 December 2013. No extraction took place in this area during this period.

Area 4

SMP/EP Approval was granted for Abel Area 4 (Panels 27 – 35) on the 19th September 2014. A variation was submitted to remove the Subsidence Control Zones around the protected farm dams and was approved on the 11th November 2014. The second variation submitted, relating to Panel 28 panel layout, was approved on 1 April 2015. The third variation submitted, relating to modifying the layout of Panels 29, 31, 33 and 35 which is now to be extracted in the Lower Donaldson Seam, was approved on 13 August 2015. The fourth variation submitted, relating to the removal of the Subsidence Control Zones beneath a principal residence. No extraction took place in this area during this period.

Table 1 below provides approval, plus mining commencement and completion dates for the Panels extracted since approval was granted.

Table 1 – Approval and Extraction Dates

Panel	Approval Date	Extraction Commenced	Extraction Completed
Panel 1	27 May 2010	12 July 2010	22 December 2010
Panel 2	27 May 2010	17 September 2010	12 November 2010
Panel 3	27 May 2010	7 January 2011	19 April 2011
Panel 4	27 May 2010	14 March 2011	20 July 2011
Panel 5	27 May 2010	30 May 2011	24 September 2011
Panel 6	27 May 2010	22 September 2011	2 February 2012
Panel 7	27 May 2010	19 November 2011	31 May 2012
Panel 8	7 December 2011	31 March 2012	17 July 2012
Panel 15	7 December 2011	20 February 2012	26 March 2012
Panel 20	3 September 2012	12 September 2012	3 December 2012
Panel 21	3 September 2012	8 November 2012	18 April 2013
East Mains	27 May 2010	18 July 2012	5 July 2014
East Install Headings	7 December 2011	4 December 2012	17 September 2014
Tailgate Headings	7 December 2011	5 June 2012	10 September 2012
Panel 19A	21 December 2012	20 January 2013	25 May 2013
Panel 19	21 December 2012	25 May 2013	7 August 2013
Panel 22	16 April 2013	19 April 2013	19 July 2013
Panel 23	16 July 2013	22 July 2013	10 March 2014
Panel 24	16 July 2013	16 September 2013	10 July 2014
Panel 25	16 July 2013	11 May 2014	8 May 2015
Panel 26	16 July 2013	11 August 2014	17 June 2015
Panel 27	19 September 2014	30 September 2014	12 August 2015
Panel 28	19 September 2014	11 May 2015	3 February 2016
Panel 30	19 September 2014	22 June 2015	28 April 2016
Panel 31	19 September 2014	25 February 2016	28 April 2016

4 SUBSIDENCE AND ENVIRONMENTAL PROGRAMS AND MANAGEMENT PLANS

Subsidence Monitoring Programs consisting of a combination of subsidence surveys, visual inspections and photographic monitoring, have been developed in consultation with and approved by the Principal Subsidence Engineer, DPE for all Panels extracted to date. All required subsidence monitoring lines have been installed and subsidence surveys completed in accordance with the agreed Subsidence Monitoring Programs.

Management Plans have been prepared for the following infrastructure outlined in **Table 2** and have been approved by the Director of Mine Safety Operations.

Table 2 – Approved Management Plans

Infrastructure Owners	Management Plans	Approved
Ausgrid	Ausgrid Powerline Management Plan SMP Area 2 – Tailgate Headings	21 June 2012
	Ausgrid Powerline Management Plan SMP Area 2 - Panels 20 - 22	2 November 2012
	Ausgrid Powerline Management Plan SMP Area 1 – East Mains	12 July 2013
	Ausgrid Powerline Management Plan SMP Area 3	17 July 2013
	Ausgrid Powerline Management Plan EP / SMP Area 4	1 October 2014
Telstra	Telstra Corporation Management Plan SMP Area 2 (Panels 21 & 22)	21 December 2012
	Telstra Corporation Management Plan SMP Area 3 (Panels 23 & 24)	17 July 2013
	Telstra Corporation Management Plan SMP Area 3 Optic Fibre (Panels 23 & 24)	6 December 2013
	Telstra Corporation Management Plan SMP Area 3 (Panels 25)	11 April 2014
	Telstra Corporation Management Plan SMP Area 3 (Panels 26)	3 September 2014
Telstra	Telstra Corporation Management Plan EP / SMP Area 4 (Panels 27, 28, 29)	1 October 2014

Infrastructure Owners	Management Plans	Approved
TransGrid	TransGrid Towers Management Plan SMP Area 1	22 March 2012
	TransGrid Towers Management Plan SMP Area 2	16 January 2013
Cessnock City Council	Blackhill Road and Taylors Road Management Plan SMP Area 2	7 December 2012
	Blackhill Road Management Plan SMP Area 3	11 September 2013
	Public Roads Management Plan	23 December 2014
Hunter Water	Hunter Water Corporation Water Pipeline Management Plan SMP Area 2	21 June 2012
	Hunter Water Corporation Water Pipeline Management Plan SMP Area 1 – East Mains	12 December 2012

5 SUMMARY OF SUBSIDENCE IMPACTS

Visual inspections and photographic monitoring of various surface features were conducted throughout the year.

No surveys for subsidence, tilt and strain were undertaken during the year.

5.1 Impacts on General Surface and Roads / Tracks

Surface cracking had occurred generally as predicted on the surface above Panels 28, 30 & 31 in the both the cleared and vegetated areas, private access tracks, and sealed private access road, and sealed local government roads whilst mining was being undertaken.

Remedial works were carried out in consultation and agreement with the landholders and infrastructure owners.

5.2 Impacts on Hunter Water Corporation Waterline

No further impacts observed. Impacts were within predictions and infrastructure remained in a safe and serviceable condition.

5.3 Impacts on Ausgrid Powerlines

No further impacts observed. Impacts were within predictions and infrastructure remained in a safe and serviceable condition.

5.4 Impacts on TransGrid Transmission Towers

No further impacts observed. Impacts were within predictions and infrastructure remained in a safe and serviceable condition.

5.5 Impacts on Blackhill Road

No further impacts observed. Impacts were within predictions and infrastructure remained in a safe and serviceable condition.

5.6 Notification under SMP Approval Conditions

There have been no observed and/or reported subsidence impacts, incidents, service difficulties, community complaints, or any other relevant information, that would require notification under the approval conditions.

6 SUBSIDENCE SURVEY SUMMARY AND ANALYSIS

All required subsidence surveys have been completed and were completed shortly after mining effects ceased. A record of all completed subsidence surveys is shown in **Table 3**.

A summary of subsidence, strain and tilt results are detailed in **Table 4** with comparison to the SMP predictions.

All required subsidence monitoring lines have been installed and all pre-mining subsidence surveys completed in accordance with the agreed Subsidence Monitoring Programs.

Table 3 – Subsidence Monitoring Survey Dates

Survey / Monitoring Line	Survey / Monitoring Description	Pre – Mining Survey	Survey / Inspection / Monitoring Dates	Post – Mining
Panel 1	*Subsidence survey*	Installation and pre-mining survey 7/07/2010	Weekly Surveys	11/02/2011 24/06/2011 1/08/2012
Panel 2	*Subsidence Survey*			22/12/2010 21/06/2011 20/06/2012 9/10/2013
Panel 3	*Subsidence survey*	*23/12/2010*	Weekly Surveys	*10/06/2011* *25/10/2011*

Survey / Monitoring Line	Survey / Monitoring Description	Pre – Mining Survey	Survey / Inspection / Monitoring Dates	Post – Mining
				9/05/2012
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*23/12/2010*		
Panel 4	*Subsidence survey*	*4/03/2011*	Weekly Surveys	*24/08/2011* *9/05/2011* *3/09/2013*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*4/03/2011*		
Panel 5	*Subsidence survey*	*27/05/2011*		*4/11/2011* *2/05/2012* *18/02/2013* *14/09/2013*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*27/05/2011*		
Panel 6	*Subsidence survey*	*14/09/2011*		*1/05/2012* *4/09/2013*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*14/09/2011*		
Panel 7	*Subsidence survey*	*8/02/2012*		*2/08/2012* *28/05/2013* *13/09/2013*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*8/02/2012*		
	Subsidence survey	*13/02/2012*		*31/10/2012*

Survey / Monitoring Line	Survey / Monitoring Description	Pre – Mining Survey	Survey / Inspection / Monitoring Dates	Post – Mining
Panel 8				*17/05/2013* *6/09/2013*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*13/02/2012*		
Panel 15	*Subsidence survey*	*9/02/2012*		*27/04/2012* *14/01/2013* *17/05/2013*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*9/02/2012*		
Panel 20	*Subsidence survey*	*29/08/2012*		*10/01/2013* *8/01/2014* *9/07/2014*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*29/08/2012*		
Panel 19	*Subsidence survey*	*1/05/2013*		*14/09/2013* *9/07/2014*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*1/05/2013*		
Panel 19A	*Subsidence survey*	*7/01/2013*		*4/06/2013* *14/09/2013* *5/11/2013* *7/01/2014* *7/07/2014*
	Visual inspection		Weekly Surveys	
	Photographic	*7/01/2013*		

Survey / Monitoring Line	Survey / Monitoring Description	Pre – Mining Survey	Survey / Inspection / Monitoring Dates	Post – Mining
	monitoring			
Panel 21	*Subsidence survey*	*7/11/2012*		*16/05/2013* *24/01/2014* *1/09/2014*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*7/11/2012*		
Panel 22	*Subsidence survey*	*11/04/2013*		*30/07/2013* *28/01/2014* *19/02/2015*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*11/04/2013*		
Panel 23	*Subsidence survey*	*12/07/2013*		*8/04/2014* *3/03/2015* *28/10/2015*
	Visual inspection		Daily	
	Photographic monitoring	*12/07/2013*		
Panel 24	*Subsidence survey*	*19/02/2013*		*1/10/2014* *3/03/2015* *22/10/2015*
	Visual inspection		Daily	
	Photographic monitoring	*19/02/2013*		
Panel 25	*Subsidence survey*	*13/03/2014*		*3/12/2015* *22/09/2015*
	Visual inspection		Daily	
	Photographic	*13/03/2014*		

Survey / Monitoring Line	Survey / Monitoring Description	Pre – Mining Survey	Survey / Inspection / Monitoring Dates	Post – Mining
	monitoring			
Panel 26	*Subsidence survey*	*9/05/2014*		*6/08/2015* *31/01/2017*
	Visual inspection		Daily	
	Photographic monitoring	*9/05/2014*		
Panel 27	*Subsidence survey*	*16/10/2014*		*3/09/2015* *31/01/2017*
	Visual inspection		Daily	
	Photographic monitoring	*22/09/2014*		
Panel 28	*Subsidence survey*	*6/05/2014*		*20/12/2016* *28/11/2017*
	Visual inspection		*3 times a week*	
	Photographic monitoring	*6/05/2014*		
Panel 30	*Subsidence survey*	*30/11/2015*		*20/12/2016*
	Visual inspection		*3 times a week*	
	Photographic monitoring	*30/11/2015*		
Panel 31	*Subsidence survey*	*25/02/2016*		*5/12/2016*
	Visual inspection		*3 times a week*	
	Photographic monitoring	*25/02/2016*		
East Install Headings	*Subsidence survey*	*14/11/2012*		*23/01/2013* *8/01/2014*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*14/11/2012*		

Survey / Monitoring Line	Survey / Monitoring Description	Pre – Mining Survey	Survey / Inspection / Monitoring Dates	Post – Mining
Tailgate Headings	*Subsidence survey*	*18/05/2012*		*19/12/2012* *13/06/2013* *14/01/2014*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*18/05/2012*		
East Mains Headings	*Subsidence survey*	*9/07/2012*		*14/01/2013* *30/05/2013*
	Visual inspection		Weekly Surveys	
	Photographic monitoring	*9/07/2012*		
Blackhill Road	*Subsidence survey*	*19/02/2013*	*As detailed in Management Plan*	Same date as Panel surveys
	Visual inspection		*Daily Surveys*	
	Photographic monitoring	*19/02/2013*		
Hunter Water Corporation Pipeline	*Subsidence survey*	7/07/2010 over P1 8/09/2010 over P2	Weekly Surveys	*11/02/2011 & 24/06/2011 Over P1* *22/12/2010 & 21/06/2011 Over P2*
	Visual inspection		*As detailed in Management Plan*	
	Photographic monitoring			
Ausgrid Power Poles	*Subsidence survey*	Same date as Panel surveys	Weekly Surveys	Same date as Panel surveys
	Visual inspection		Weekly Surveys	
	Photographic monitoring	Same date as Panel surveys		
	Subsidence survey	28/03/2012	*As detailed in Management*	Same date as Panel

Survey / Monitoring Line	Survey / Monitoring Description	Pre – Mining Survey	Survey / Inspection / Monitoring Dates	Post – Mining
TransGrid Transmission Towers			*Plan*	surveys
	Visual inspection		Daily Surveys	
	Photographic monitoring	28/03/2012		

Table 4 – Comparison of Subsidence Monitoring Results to SMP Predictions

PANEL 1 (W = 120 m; T = 2.35 - 3.0m)			
>75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	0.95 - 1.25m	0.72 - 1.228m	Measured subsidence < predictions
Tensile Strain	10 - 18 mm/m	4 - 12 mm/m (18 mm/m)	Measured tensile strains < predictions.
Compressive Strain	13 - 23 mm/m	5 - 14 mm/m	Measured compressive strains < predictions
Tilt	22 - 40 mm/m	22 - 46 mm/m	Measured tilts < predictions. One exceedance of 15%.
Other		Cracked Joint to Hunter Water Pipeline Repaired 11kv Power Line	All necessary repairs have been carried out.

PANEL 2 (W= 150m ; T = 2.5 m)			
< 75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.30 - 1.38m	0.977 - 1.041 m	Measured subsidence < predictions
Tensile Strain	18 - 31 mm/m	4 - 6 mm/m (5 mm/m)	Measured tensile strains < predictions
Compressive Strain	23 - 40 mm/m	4 - 7 mm/m	Measured compressive strains < predictions
Tilt	40 - 67 mm/m	22 - 32 mm/m	Measured tilts < predictions
Other			
>75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.20 - 1.32m	0.94 - 0.966m	Measured subsidence < predictions
Tensile Strain	13 - 20 mm/m	9 mm/m (15 mm/m)	Measured tensile strains < predictions
Compressive Strain	17 - 25 mm/m	6 mm/m	Measured compressive strains < predictions
Tilt	30 - 45 mm/m	27 mm/m	Measured tilts < predictions
Other			

PANEL 3 (W=160.5 m; T = 2.5 m)			
< 75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.33 - 1.34 m	1.003 m	Measured subsidence < predictions
Tensile Strain	19 - 31 mm/m	8 - 9 mm/m (26 mm/m)	Measured tensile strains < predictions
Compressive Strain	24 - 40 mm/m	5 - 7 mm/m	Measured compressive strains < predictions
Tilt	42 - 67 mm/m	28 - 39 mm/m	Measured tilts < predictions
Other			
>75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.26 - 1.27 m	0.884 - 0.982 m	Measured subsidence < predictions
Tensile Strain	14 - 21mm/m	8 mm/m (10 mm/m)	Measured tensile strains < predictions
Compressive Strain	18 - 27 mm/m	4 mm/m	Measured compressive strains < predictions
Tilt	33 - 49 mm/m	30 mm/m	Measured tilts < predictions
Other			

PANEL 4 (W= 160.5 m; T = 2.5 m)			
< 75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.27-1.29m	1.065m	Measured subsidence < predictions
Tensile Strain	19 - 31 mm/m	6 - 10 mm/m (37.5 mm/m)	Measured tensile strains < predictions with 1 exceedance of 20% at clay cap.
Compressive Strain	24 - 40 mm/m	6 - 18 mm/m	Measured compressive strains < predictions
Tilt	42 - 67 mm/m	36 - 60 mm/m	Measured tilts < predictions
Other			
>75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.29 - 1.32m	1.054 m	Measured subsidence < predictions
Tensile Strain	14 - 21mm/m	5 mm/m	Measured tensile strains < predictions
Compressive Strain	18 - 27 mm/m	5 mm/m	Measured compressive strains < predictions
Tilt	42 - 67 mm/m	25 - 36 mm/m	Measured tilts < predictions
Other			

PANEL 5 (W= 160.5 m; T = 2.5 m)			
< 75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.27-1.43	1.154m	Measured subsidence < predictions
Tensile Strain	14 - 15 mm/m	10 mm/m	Measured tensile strains < predictions
Compressive Strain	15 - 19 mm/m	4 mm/m	Measured compressive strains < predictions
Tilt	41 - 46 mm/m	68 mm/m	Measured tilts < predictions with 1 minor exceedance
Other			
>75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.42 - 1.43m	1.002 m	Measured subsidence < predictions
Tensile Strain	11 - 15 mm/m	2 mm/m	Measured tensile strains < predictions
Compressive Strain	15 - 18 mm/m	13 mm/m	Measured compressive strains < predictions
Tilt	38 - 46 mm/m	29.8 mm/m	Measured tilts < predictions
Other			

PANEL 6 (W= 160.5 m; T = 2.5 m)			
< 75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.21 - 1.32m	1.215m	Measured subsidence < predictions
Tensile Strain	14 mm/m	8 mm/m	Measured tensile strains < predictions
Compressive Strain	17 - 18 mm/m	21 mm/m	Measured compressive strains < predictions with 1 minor exceedance
Tilt	39 - 41 mm/m	89.6 mm/m	Measured tilts < predictions with 1 minor exceedance
Other			
>75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.32 - 1.42m	1.066 m	Measured subsidence < predictions
Tensile Strain	11 - 14mm/m	9 mm/m	Measured tensile strains < predictions
Compressive Strain	14 - 17 mm/m	7 mm/m	Measured compressive strains < predictions
Tilt	38 - 41 mm/m	30 mm/m	Measured tilts < predictions
Other			

PANEL 7 (W= 160.5 m; T = 2.5 m)			
< 75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.27 - 1.32m	0.771m	Measured subsidence < predictions
Tensile Strain	11 - 14 mm/m	5 mm/m	Measured tensile strains < predictions
Compressive Strain	14 - 18 mm/m	2 mm/m	Measured compressive strains < predictions
Tilt	41 mm/m	12 mm/m	Measured tilts < predictions
Other			
>75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.32 - 1.43m	1.336 m	Measured subsidence < predictions
Tensile Strain	11 - 15mm/m	23 mm/m	Measured tensile strains < predictions with 1 minor exceedance
Compressive Strain	14 - 18 mm/m	36 mm/m	Measured compressive strains < predictions with 1 minor exceedance
Tilt	41 mm/m	42.5 mm/m	Measured tilts < predictions with 1 minor exceedance
Other			

PANEL 8 (W= 160.5 m; T = 2.5 m)			
< 75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	< 1.32m	0.830m	Measured subsidence < predictions
Tensile Strain	14 - 15 mm/m	2 mm/m	Measured tensile strains < predictions
Compressive Strain	17 - 19 mm/m	3 mm/m	Measured compressive strains < predictions
Tilt	42 mm/m	11.4 mm/m	Measured tilts < predictions
Other			
>75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.25 - 1.32m	0.845 m	Measured subsidence < predictions
Tensile Strain	10 - 14mm/m	11 mm/m	Measured tensile strains < predictions with 1 minor exceedance
Compressive Strain	13 - 17 mm/m	6 mm/m	Measured compressive strains < predictions with 1 minor exceedance
Tilt	41 mm/m	33.8 mm/m	Measured tilts < predictions
Other			

PANEL 15 (W= 160.5 m; T = 2.5 m)			
>75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.17 - 1.23m	1.164m	Measured subsidence < predictions
Tensile Strain	7 - 12mm/m	15 mm/m	Measured tensile strains < predictions
Compressive Strain	9 - 15 mm/m	13 mm/m	Measured compressive strains < predictions
Tilt	19 - 32 mm/m	49 mm/m	Measured tilts < predictions with 2 minor exceedance
Other			

PANEL 20 (W= 128 m; T = 2.7 m)			
>75m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	150 mm	62 mm	Measured subsidence < predictions
Tensile Strain	2 mm/m	1 mm/m	Measured tensile strains < predictions
Compressive Strain	2 mm/m	2 mm/m	Measured compressive strains < predictions
Tilt	3 mm/m	2.5 mm/m	Measured tilts < predictions
Other			

PANEL 21 (W= 212 m; T = 2.7 m)			
125m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	150 mm	96 mm	Measured subsidence < predictions
Tensile Strain	2 mm/m	1 mm/m	Measured tensile strains < predictions
Compressive Strain	2 mm/m	1 mm/m	Measured compressive strains < predictions
Tilt	3 mm/m	2.1 mm/m	Measured tilts < predictions
Other			

TAILGATE HEADINGS (W= 80.5 m; T = 2.8 m)			
<110mCover	**Predicted**	**Final Measured**	**Comment**
Subsidence	0.88 – 0.99m	0.250m	Measured subsidence < predictions
Tensile Strain	8 - 9mm/m	2 mm/m	Measured tensile strains < predictions
Compressive Strain	8 - 9 mm/m	2 mm/m	Measured compressive strains < predictions
Tilt	18 - 33 mm/m	7 mm/m	Measured tilts < predictions
Other			

EAST INSTALL HEADINGS (W= 105m; T = 2.7 m)			
100m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	0.9m	1.286m	Measured subsidence > predictions
Tensile Strain	13 – 19 mm/m	12 mm/m	Measured tensile strains < predictions
Compressive Strain	16 - 24 mm/m	9 mm/m	Measured compressive strains < predictions
Tilt	24 - 35 mm/m	44 mm/m	Measured tilts > predictions
Other			

EAST MAINS HEADINGS (W= 125m; T = 2.7 m)			
100m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.59m	1.408m	Measured subsidence < predictions
Tensile Strain	10 - 16 mm/m	11 mm/m	Measured tensile strains < predictions
Compressive Strain	13 - 20 mm/m	15 mm/m	Measured compressive strains < predictions
Tilt	49 mm/m	48.6 mm/m	Measured tilts < predictions
Other			

Panel 19A (W= 227.9m; T = 2.6 m)			
100m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.42m	1.261m	Measured subsidence < predictions
Tensile Strain	8 - 14 mm/m	3 - 12 mm/m	Measured tensile strains < predictions
Compressive Strain	11 - 18 mm/m	4 - 13 mm/m	Measured compressive strains < predictions
Tilt	40 mm/m	29 - 48 mm/m	Measured tilts < predictions with only a minor exceedance
Other			

PANEL 22 (W= 180.3 m; T = 2.8 m)			
125m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	150 mm	44 mm	Measured subsidence < predictions
Tensile Strain	2 mm/m	1 mm/m	Measured tensile strains < predictions
Compressive Strain	2 mm/m	1 mm/m	Measured compressive strains < predictions
Other			

PANEL 23 (W= 215 m; T = 2.5 m)			
<130m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.30m	0.983m	Measured subsidence < predictions
Tensile Strain	30 mm/m	13 mm/m	Measured tensile strains < predictions
Compressive Strain	30 mm/m	13 mm/m	Measured compressive strains < predictions
Other			

PANEL 24 (W= 220 m; T = 2.5 m)			
<130m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.30m	1.061m	Measured subsidence < predictions
Tensile Strain	30 mm/m	7 mm/m	Measured tensile strains < predictions
Compressive Strain	30 mm/m	9 mm/m	Measured compressive strains < predictions
Other			

PANEL 25 (W= 220 m; T = 2.5 m)			
<130m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.30m	1.087m	Measured subsidence < predictions
Tensile Strain	30 mm/m	21 mm/m	Measured tensile strains < predictions
Compressive Strain	30 mm/m	9 mm/m	Measured compressive strains < predictions
Other			

PANEL 26 (W= 220 m; T = 2.5 m)			
<130m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.30m	1.130m	Measured subsidence < predictions
Tensile Strain	30 mm/m	9 mm/m	Measured tensile strains < predictions
Compressive Strain	30 mm/m	13 mm/m	Measured compressive strains < predictions
Other			

PANEL 27 (W= 190 m; T = 2.5 m)			
<170m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.40m	1.005m	Measured subsidence < predictions
Tensile Strain	30 mm/m	2 mm/m	Measured tensile strains < predictions
Compressive Strain	30 mm/m	8 mm/m	Measured compressive strains < predictions
Other			

PANEL 28 (W= 190 m; T = 2.5 m)			
<190m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.40m	1.319m	Measured subsidence < predictions
Tensile Strain	30 mm/m	1 mm/m	Measured tensile strains < predictions
Compressive Strain	30 mm/m	10 mm/m	Measured compressive strains < predictions
Other			

PANEL 30 (W= 190 m; T = 2.5 m)			
<200m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.40m	1.131m	Measured subsidence < predictions
Tensile Strain	30 mm/m	11 mm/m	Measured tensile strains < predictions
Compressive Strain	30 mm/m	11 mm/m	Measured compressive strains < predictions
Other			

PANEL 31 (W= 170 m; T = 2.5 m)			
<200m Cover	**Predicted**	**Final Measured**	**Comment**
Subsidence	1.40m	0.307 m	Measured subsidence < predictions
Tensile Strain	30 mm/m	6 mm/m	Measured tensile strains < predictions
Compressive Strain	30 mm/m	7 mm/m	Measured compressive strains < predictions
Other			

7 PHOTOGRAPHIC MONITORING AND VISUAL INSPECTION SUMMARY AND ANALYSIS

Dates of photographic monitoring and visual inspections are shown in **Table 3.** No impacts or changes have been noted in either photographic monitoring or visual inspections and these results have been detailed in the Subsidence Management Status Report submitted in September 2018.

No evidence of impacts has been observed or noted during these inspections and monitoring.

Comparison of pre and post mining photographic monitoring did not reveal any evidence of impact.

8 ENVIRONMENTAL MONITORING SUMMARY AND ANALYSIS

Water

Monthly monitoring of regional groundwater levels and quality was undertaken throughout the year in accordance with the Site Water Management Plan.

A summary of groundwater and surface water quality is provided in **Tables 5** and **6.**

Table 5 – Summary of Groundwater Quality Monitoring Results 1 January to 31 December 2020.

Sampling Site	pH	EC (µS/cm)	TSS (mg/L)
6	5.77 – 6.92 (6.44)	120 – 2710 (2,605)	42– 627 (221)
13	No Access to site	No Access to site	No Access to site
JRD2	6.02 – 7.35 (6.77)	620 – 2,590 (1,648)	11 – 280 (79.5)

Table 6 – Summary of Surface Water Quality Monitoring Results 1 January to 31 December 2019

Sampling Site	pH	EC (µS/cm)	Turbidity (NTU)	TSS (mg/L)
1	6.62 - 7.3 (7.00)	172 - 583 (368)	6.4 – 72.3 (36.1)	<5 – 46 (21.8)
8	6.5 – 6.94 (6.53)	236 – 586 (454)	10.9 – 200 (45.6)	<5 – 522 (54.3)
10	6.82 – 7.43 (7.20)	359 – 1,300 (750)	2.7 – 85.4 (19.9)	5 – 29 (11.6)
11	6.55 – 9.28 (7.26)	527 – 1416 (881)	6.2 – 44.3 (19.0)	<5 -76 (21.5)
FMCU	6.62 - 7.31 (6.87)	161 – 350 (283)	19.9 – 27.9 (24.7)	<5 – 22 (11.9)
FMCD	6.59 – 7.83 (7.17)	151.3 – 501 (253)	8.2 – 44.9 (23.2)	<5 – 74 (13.4)

9 TRENDS IN MONITORING RESULTS

Surface Water

The pH values at all sites were slightly acidic to slightly alkaline. All but one result was within the upper and lower water quality trigger values for Lowland Rivers in NSW (8.5) outlined in the Guidelines for Fresh and Marine Water Quality (ANZECC 2000). Previously there have been short term declines in pH following significant rainfall events such as in November 2013 (261.8mm rainfall), April 2015 (412mm rainfall) and January 2016 (430.8mm). Overall, during the reporting period there were no significant differences in pH between the upstream and downstream sites.

The electrical conductivity (EC) results range between 151µS/cm and 1,416µS/cm for all sites. There were no occasions were electrical conductivity was recorded outside of water quality trigger values for Lowland Rivers in NSW (125 to 2,200µS/cm) (ANZECC 2000).

Whilst it is expected that rainfall will influence EC results, EC does not appear to be strongly correlated with the monthly rainfall. The average EC values upstream are typically similar or slightly higher than the corresponding downstream values. No other long-term trends in EC are apparent.

Turbidity and total suspended solids (TSS) levels at Sites 1, 8 and 10 exceeded the water quality trigger values for Lowland Rivers in NSW (6 to 50 NTU) outlined in the Guidelines for Fresh and Marine Water Quality (ANZECC 2000) and industry standard TSS criteria (50mg/L). These exceedances did not correspond to a high rainfall event. Sites 1, 8 and 10 are upstream monitoring locations and it is not considered that the mine activities contributed to these levels but rather localised conditions.

No long-term trends are apparent within the monitoring data with widely varying results with spikes in turbidity and TSS not necessarily correlated with monthly rainfall. Baseline monitoring results for both upstream and downstream sites have previously recorded significantly elevated TSS which are considered to form part of the natural variation.

Groundwater Levels

Piezometers located within and to the south of the Abel mine area are behaving predictably, with drawdown in the Donaldson Seams and by a lesser amount in most overburden piezometers responding as expected to mining activities. Piezometers to the west of the Abel mine area appear to be influenced by mining activity at Bloomfield Colliery.

Monitoring confirms that there is no evidence of any drawdown response in the alluvium or regolith groundwater. In particular, Piezometers 81A and 81B are located adjacent the Pambalong Nature Reserve.

Monitoring results from 81A (single vibrating wire transducer placed within the Lower Donaldson Seam) showed a drawdown response to mining the Donaldson Seam within the Abel Mine. However, Piezometer 81B is screened within overlying shallow Permian strata with water levels remaining stable. The lack of response in the shallow piezometer indicates there has been no mining impact on the Pambalong Nature Reserve.

Piezometers 63A and B are located to the east of the Abel Mine adjacent to the F3 Freeway and near the Hexham Swamp. However, it appears that the shallow Piezometer 63B has failed or the bore has collapsed. Notwithstanding this, review of the responses from other shallow alluvium and regolith bores is still consistent with there being no impact on the Hexham Swamp.

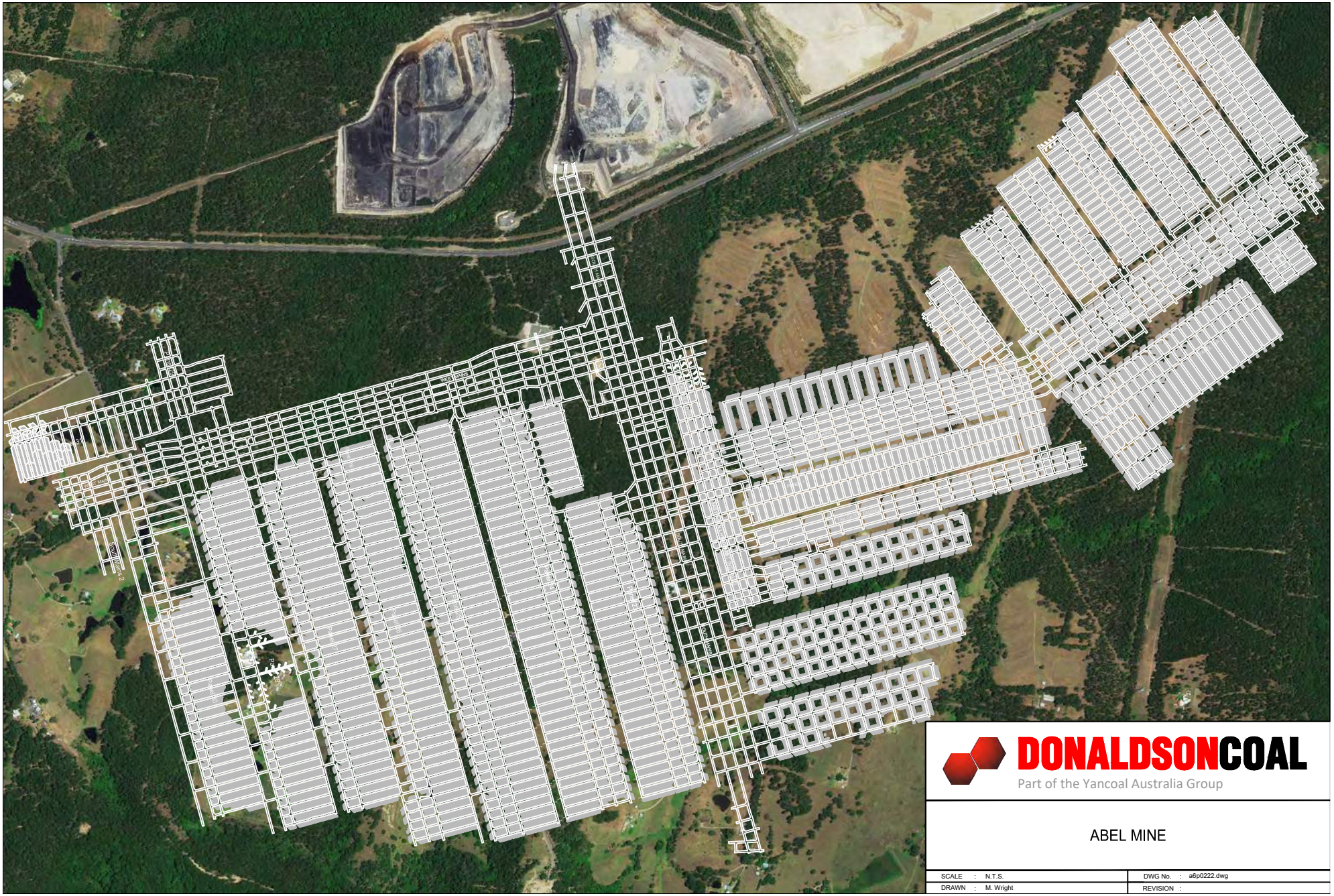
During the period access to Site 13 was restricted with no access granted by the property owner.

10 MANAGEMENT ACTIONS

Actions taken to ensure adequate management of any potential subsidence impacts due to mining include:

- Various monitoring programs, subsidence surveys, visual inspections, photographic monitoring to detect any impact;

- TARPs (Trigger, Action, Response Plans) forming part of approved Public Safety Management Plans and Environmental Monitoring Programs which include mitigation/remediation options and notification procedures relating to subsidence monitoring, surface cracking on both roads / fire trails and vegetated areas and impacts on rock mass / steep slopes and Aboriginal sites.



DONALDSONCOAL

Part of the Yancoal Australia Group

ABEL MINE

SCALE : N.T.S.	DWG No. : a6p0222.dwg
DRAWN : M. Wright	REVISION :

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