AshtonCoal
PART OF THE YANCOAL AUSTRALIA GROUP

YANCOAL
兖煤澳大利亚有限公司

Annual Review

Ashton Coal Project

1 January 2025 – 31 December 2025

ASHTON COAL

PTY LTD

ABN: 22 078 556 500

Annual Review

for the

Ashton Coal Project

1 January 2025 – 31 December 2025

Prepared for:

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Ref No. 737/31c March 2026

AshtonCoal
PART OF THE YANCOAL AUSTRALIA GROUP

TITLE BLOCK

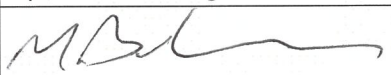
Name of Operation	Ashton Coal Project
Name of Operator	Ashton Coal Operations Pty Limited
Development consent / project approval #	309-11-2001-i
Name of holder of development consent / project approval	Ashton Coal Operations Pty Limited
Mining Lease #	Multiple - see Section 3
Name of holder of mining lease	White Mining (NSW) Pty Limited
Water licence #	Multiple - see Section 3
Name of holder of water licence	Ashton Coal Mines Limited
RMP start date	01/08/2022
RMP end date	Not applicable
Annual Review start date	01/01/2025
Annual Review end date	31/12/2025

I, Michael Bartlett, certify that, to the best of my knowledge, this report is a true and accurate record of the compliance status of the Ashton Coal Project for the period 1 January 2025 to 31 December 2025 and that I am authorised to make this statement of behalf of Ashton Coal Operations Pty Limited.

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	Michael Bartlett
Title of authorised reporting officer	Operations Manager
Signature of authorised reporting officer	
Date	31 March 2026

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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 were no non-compliances during the reporting period.

Table 1.1
Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	Yes / No
Development Consent 309-11-2001-i	Yes
Mining Leases 1529, 1533, 1623 (ACP Area)	Yes
Mining Leases 1834, 1835, 1836, 1837, 1861 (ACOL-operated RUM)	Yes
Water Access Licences 1358, 15583, 8404, 997, 1120, 1121, 6346, 23912, 984, 19510, 36702, 36703, 29566, 41501, 41552, 41553, 41529	Yes

2. INTRODUCTION

2.1 OVERVIEW OF OPERATIONS

The Ashton Coal Project (ACP) is located approximately 14km northwest of Singleton, New South Wales (see **Figure 2.1**). The ACP includes the decommissioned North-east Open Cut (NEOC), an underground coal mine, a Coal Handling and Preparation Plant (CHPP) and a rail siding. The ACP was granted Development Consent DA 309-11-2001-i in October 2002 by the (then) Minister for Planning. DA 309-11-2001-i has been modified a total of 11 times, with the most recent modification (MOD11) being granted on 6 July 2022. The most recent modification provided for part of the approved Ravensworth Underground Mine (RUM) coal resources to be extracted and processed as part of the ACP and other associated changes to facilitate this. This additional area is referred to as the ACOL-operated RUM.

A brief summary of the operations at the ACP are provided as follows.

North-east Open Cut

The NEOC was mined between January 2004 and September 2011 at which point open cut coal extraction ceased and, with approval, placement of coarse reject within the NEOC void commenced. The NEOC will continue to provide for coarse reject storage prior to the ultimate final landform rehabilitation, and may be used for coal fines emplacement, if needed.

Ashton Underground Coal Mine

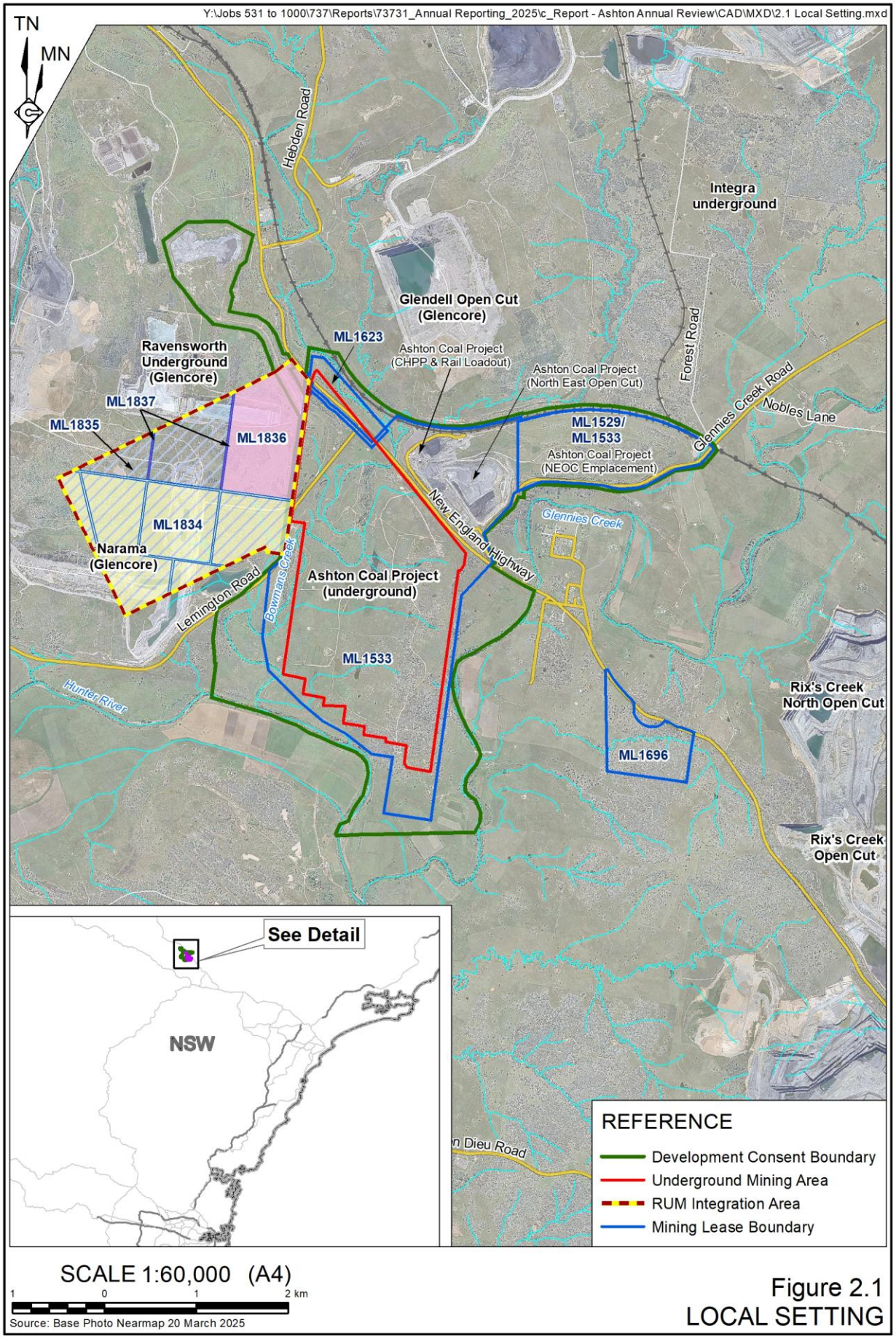
The Ashton underground operations commenced in December 2005 with the first longwall coal extracted within the Pikes Gully Seam in March 2007. Construction of the Bowmans Creek Diversion was completed in November 2012 allowing extraction of coal from beneath those excised sections of Bowmans Creek. Coal extraction operations within the underground operations remain ongoing with an approved maximum production of 5.45Mtpa.

Coal Handling and Preparation Plant

The CHPP was commissioned in April 2004 and expanded during 2006/2007, increasing its capacity from 400t/hr to 1,000t/hr. The CHPP continues to process coal from the Ashton underground operations for export through the Port of Newcastle, NSW.

ACOL-operated RUM

Operational activities commenced within the ACOL-operated RUM during 2024.


Y:\Jobs 531 to 1000\737\Reports\73731_Annual Reporting_2025\c_Report - Ashton Annual Review\CAD\MXD\2.1 Local Setting.mxd
TN
MN
Hebden Road
Integra underground
Glendell Open Cut (Glencore)
ML1623
Ravensworth Underground (Glencore)
Ashton Coal Project (CHPP & Rail Loadout)
Ashton Coal Project (North East Open Cut)
Forest Road
Glennies Creek Road
Nobles Lane
ML1837
ML1835
ML1836
ML1529/ ML1533
Ashton Coal Project (NEOC Emplacement)
New England Highway
Glennies Creek
ML1834
Narama (Glencore)
Ashton Coal Project (underground)
Bowmans Creek
Lemington Road
ML1533
Hunter River
Rix's Creek North Open Cut
ML1696
Rix's Creek Open Cut
See Detail
NSW
REFERENCE
Development Consent Boundary
Underground Mining Area
RUM Integration Area
Mining Lease Boundary
SCALE 1:60,000 (A4)
1 0 1 2 km
Source: Base Photo Nearmap 20 March 2025
Figure 2.1
LOCAL SETTING

2.2 SCOPE AND FORMAT

This Annual Review for the Ashton Coal Project has been compiled by R.W. Corkery & Co. Pty Limited on behalf of Ashton Coal Operations Pty Limited (ACOL). ACOL became part of Yancoal Australia Limited in July 2009.

This is the 11th Annual Review submitted for the ACP, following eleven Annual Environmental Management Reports, and is applicable for the period 1 January 2025 to 31 December 2025 ("the reporting period"). The information presented within this Annual Review has been compiled based on information and advice provided by ACOL.

This Annual Review has been prepared in accordance with the requirements of *Schedule 5 Condition 10* of DA No. 309-11-2001-i (MOD11). This Annual Review generally follows the format and content requirements identified in the (then) Department of Planning and Environment's (DPE) *Annual Review Guideline* dated October 2015.

2.3 KEY PERSONNEL CONTACT DETAILS

The Operations Manager, Mr Michael Bartlett is the primary mine contact (Tel: 02 6570 9104) and is responsible for the environmental management of the mine and ensuring compliance with all relevant legislative obligations. Mr Phillip Brown (Tel: 0439 909 952) 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:	Ashton Coal Operations Pty Limited PO Box 699 SINGLETON NSW 2330	Tel: 02 6576 1111
Email:	Ashton.Environment&Community@yancoal.com.au	
Physical Address:	Ashton Coal Operations Glennies Creek Road CAMBERWELL NSW 2330	

A 24-hour Environmental Hotline (Tel: 1800 657 639) is maintained by ACOL. Details of calls taken on this number are forwarded to the Environment & Community Relations Superintendent for further actioning, if required.

3. APPROVALS

ACOL has operated the ACP under the key approvals listed in **Table 3.1**.

Table 3.1
Ashton Coal Project – Consents, Leases and Licences

Consent/Lease/Licence	Issue Date	Expiry Date	Details / Comments
Development Approvals			
Development Consent DA 309-11-2001-i	11 October 2002	31 December 2035[1]	Granted by the (then) Minister for Planning and last modified on 6 July 2022 (MOD11).
Development Consent DA 104-96	20 November 1996	31 December 2032	Granted by the (then) Minister for Urban Affairs and Planning for the adjoining Ravensworth Underground Mine (RUM). Last modified on 6 July 2022 (MOD10) to address the integration of the ACOL-operated RUM. Activities associated with the non-ACOL operated RUM are reported separately.
Mining Authorities[2]			
Mining Lease ML 1529	10 September 2003	11 November 2030	Granted by the (then) Minister for Mineral Resources. Incorporates 128.7ha of surface area. Renewed on 12 July 2022.
Mining Lease ML 1533	26 February 2003	25 February 2045	Granted by the (then) Minister for Mineral Resources. Incorporates 883.4ha of surface area. A renewal application was lodged 21 February 2023 and approved 26 February 2024.
Mining Lease ML 1623	30 October 2008	30 October 2029	Granted by (then) Minister for Mineral Resources. Incorporates 26.17ha of surface area.
Mining Lease ML 1834	22 December 2022	3 June 2033	Partial transfer of 231.7ha including surface and depth restrictions.
Mining Lease ML 1835	22 December 2022	31 December 2044	Partial transfer of 404.6ha including surface and depth restrictions.
Mining Lease ML 1836	22 December 2022	31 December 2044	Partial transfer of 102.7ha including surface and depth restrictions.
Mining Lease ML 1837	22 December 2022	1 October 2043	Partial transfer of 3.304ha including surface and depth restrictions.
Mining Lease ML 1861	14 September 2023	14 September 2044	Granted by the Minister for Mineral Resources. Incorporates 52.59ha of surface area to a depth of 100m.
Exploration Licence 4918	18 December 1995	18 December 2027	Last renewed 12 March 2025.
Exploration Licence 5860	22 May 2001	22 May 2026	Last renewed 27 May 2021.
Other Licences			
Environment Protection Licence No. 11879	2 September 2003	Not applicable	Issued by the (then) Department of Environment and Climate Change (EPA). Current licence version dated 20 August 2025.
Water Access Licence (WAL) 1358	Continuing		Hunter Regulated River Water Source. Supplementary water. Share component: 4ML.
WAL 15583	Continuing		Hunter Regulated River Water Source. General security. Share component: 354ML.

Table 3.1 (Cont'd)
Ashton Coal Project – Consents, Leases and Licences

Consent/Lease/Licence	Issue Date	Expiry Date	Details / Comments
Other Licences (Cont'd)			
WAL 8404	Continuing		Hunter Regulated River Water Source. High security. Share component: 80ML.
WAL 997	Continuing		Hunter Regulated River Water Source. High security. Share component: 11ML.
WAL 1120	Continuing		Hunter Regulated River Water Source. High security. Share component: 3ML.
WAL 1121	Continuing		Hunter Regulated River Water Source. General security. Share component: 335ML.
WAL 6346	Continuing		Hunter Regulated River Water Source. Supplementary water. Share component: 15.5ML
WAL 23912	Continuing		Jerrys Water Source. Share component: 14ML.
WAL 984	Continuing		Hunter Regulated River Water Source. General security. Share component: 9ML.
WAL 19510	Continuing		Hunter Regulated River Water Source. High security. Share component: 130ML.
WAL 36702	Continuing		Jerrys Water Source. Share component: 116ML.
WAL 36703	Continuing		Jerrys Water Source. Share component: 150ML.
WAL 29566	Continuing		Jerrys Water Source Aquifer Share component: 358ML.
WAL 41501	Continuing		Sydney Basin-North Coast Groundwater Source. Share component: 100ML.
WAL 41552	Continuing		Sydney Basin-North Coast Groundwater Source. Share component: 511ML.
WAL 41553	Continuing		Sydney Basin-North Coast Groundwater Source. Share component: 81ML.
WAL 41529	Continuing		Sydney Basin-North Coast Groundwater Source. Share component: 400ML.
Note 1: Underground mining operations approved to 31 December 2035. Note 2: See **Figure 2.1**.			

This Annual Review has been prepared to fulfil the annual reporting requirements of DA 309-11-2001-i and the various Water Access Licences listed in **Table 3.1**. A separate Annual Return has continued to be submitted to the NSW EPA in accordance with the requirements of Environment Protection Licence 11879. Reporting requirements under the approved Extraction Plans for LW201-204 and LW205-208, and 2009 Conservation Agreement (for Southern Woodlands Conservation Area) are also included in the scope of this report.

In November 2021 a modification application was lodged with (then) DPIE to modify DA 309-11-2001-i and DA 104-96 to provide for access to and mining of existing approved, but unmined, coal from the adjoining Ravensworth Underground Mine (DA 104-96) via connection with the existing Ashton underground workings. As part of the modification, an extension to the period for mining operations was sought to 31 December 2035. The application was approved on 6 July 2022. Following receipt of approval, applications were lodged for the partial transfer of the relevant Mining Leases for the ACOL-operated RUM. These were approved and registered on 22 December 2022.

4. OPERATIONS SUMMARY

4.1 MINING OPERATIONS

Open cut coal mining activities ceased in September 2011 and open cut rehabilitation works were completed between 2011 and 2012 with the exception of the Open Cut Void which is used as a reject and tailings emplacement.

Approval for underground mining operations includes the extraction of coal from the Pikes Gully (PG), Middle Liddell (ML), Upper Liddell (ULD), Upper Lower Liddell (ULLD) and Lower Barrett (LB) coal seams. Underground mining relies upon the longwall extraction method following continuous miner development of main headings and twin heading gate-roads.

During the reporting period coal was mined Longwall (LW) 208 within the ULLD, and continued development of the PG seam in LW 403 and LW 404 was undertaken in preparation for the integration with the ACOL-operated RUM (see **Figure 4.1**). **Table 4.1** presents a summary of the production statistics for the previous, current and next reporting periods.

In summary, a total of 1,068,935t of Run of Mine (ROM) coal was mined from underground operations during the reporting period and a total of approximately 439,052t of product coal was transported to the Port of Newcastle by rail.

Table 4.1
Production Summary

Material	Approved limit (specify source)	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Topsoil Stripped	None specified	0	0	0
Waste Rock / Overburden (m^3)	None specified	0	0	0
ROM Coal / Ore (t)[2]	5,450,000[1]	2,555,430	1,068,935	2,638,001
Coarse Reject (t)	None specified	1,036,800	416,140	1,041,634
Fine Reject (Tailings) (t)	None specified	267,681	128,733	322,259
Saleable Product (t)	None specified	1,277,141	515,531	1,207,322

Note 1: For underground operations as specified by DA 309-11-2001-i, Schedule 2, Condition 6(a).

Note 2: ROM coal does not equate to the sum of rejects and saleable product due to slight variance in the timing between extraction, stockpiling, processing and transport of coal off site.

4.2 GAS MANAGEMENT

No gas drainage boreholes were constructed during the reporting period.

Greenhouse gas emissions were reported as required by the National Greenhouse Gas and Energy Reporting (NGER) requirements (see Section 6.5). Details on measures implemented during the reporting period to further reduce gas emissions is also presented in Section 6.5.

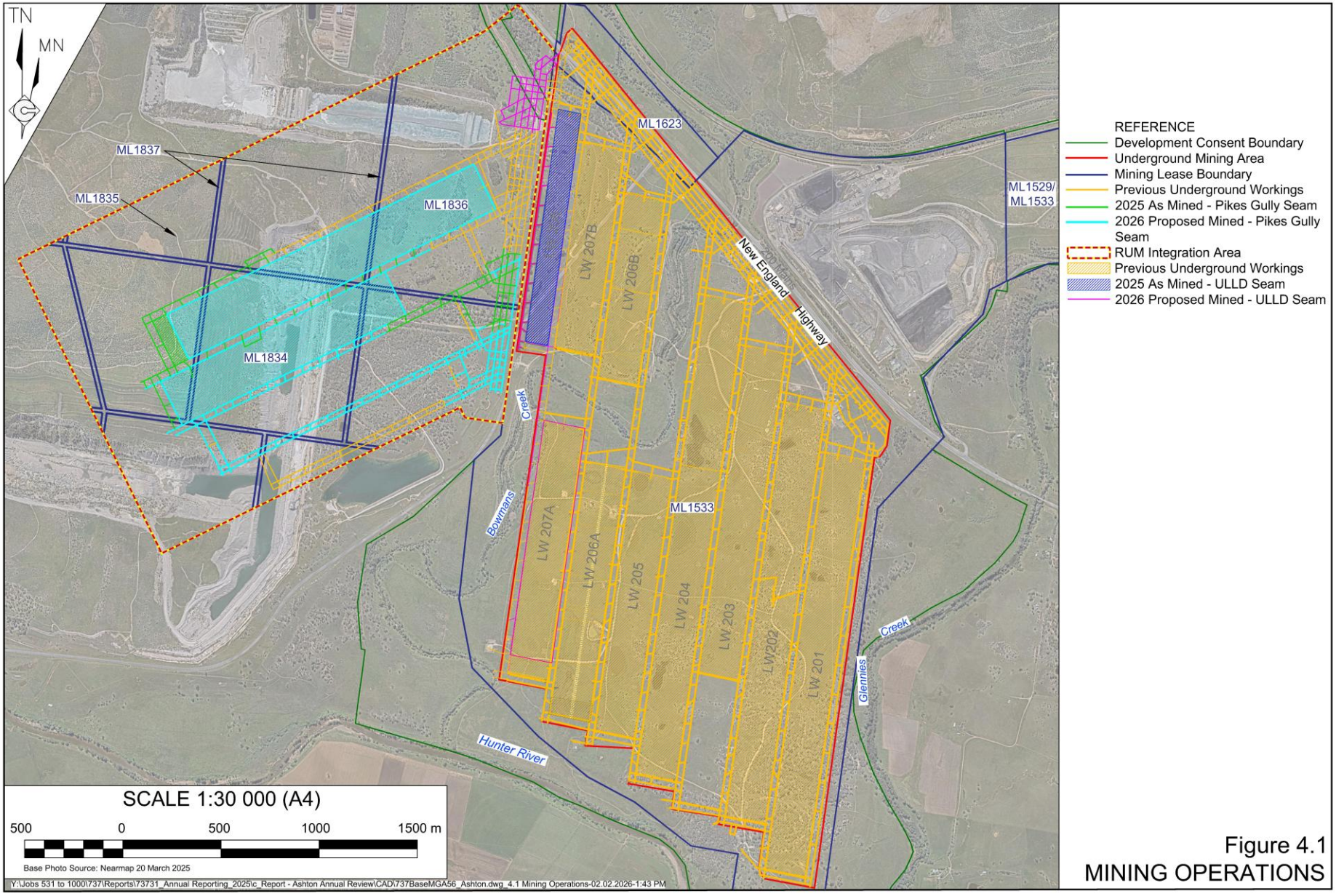


Figure 4.1
MINING OPERATIONS

4.3 OTHER OPERATIONS DURING THE REPORTING PERIOD

Ground Disturbing Works

A total of three internal Ground Disturbance Permits (GDPs) were applicable during the reporting period (see **Table 4.2**).

Table 4.2
Ground Disturbance Permits – 2025

Ground Disturbance Permit No.	Purpose	Rehabilitation Status
248	Permanent fence at Admin overflow carpark.	Works completed 03/11/2025, disturbance area of 10m^2. No rehabilitation required.
249	Gas Drainage Plant extension.	Works commenced.
252	Repairs to access track.	Works completed, disturbance area of 5,000m^2.

Environmental Monitoring and Community Liaison

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

The Community Consultative Committee continued to meet during the reporting period. Details of these meetings and other community liaison activities are summarised in Section 9.

Update of Management Plans

Following approval of the Ravensworth Underground Mine Longwalls 403 to 406, as part of the Extraction Plan, a review process was commenced for the various management plans required by the development consent. Updated versions of the Water Management Plan, Land Management Plan, Biodiversity Management Plan, Heritage Management Plan, Built Features Management Plan, Public Safety Management Plan, Coal Resource Recovery Plan, and Subsidence Monitoring Plan were approved by the Department of Planning, Housing and Infrastructure (DPHI) in July 2025.

4.4 NEXT REPORTING PERIOD

The activities proposed for 2026 will principally involve a continuation of activities undertaken during the previous twelve months, including a continuation of operations within the ACOL-operated RUM and Longwalls 403 to 406. The following provides a summary of the planned activities.

Exploration

It is not anticipated that further exploration will be undertaken during the next reporting period.

Mining

During the next reporting period, mining will focus upon continued longwall mining within ACOL_RUM Panel LW403 and LW404 within the Pikes Gully Seam. Development works are also planned to be undertaken within ACOL_RUM Panels LW405 and 406 (see **Figure 4.1**). It is estimated that in the order of 2,638,001t of ROM coal will be extracted during the next reporting period.

Rehabilitation

Rehabilitation activities planned for the 2026 reporting period include the remediation of subsidence impacts and completion of rehabilitation for remaining ground disturbances outlined in **Table 4.2** where able. Ongoing remedial treatment of previously repaired subsidence surface cracking and maintenance of existing disturbance, principally erosion and sediment control, will also be undertaken as necessary.

Monitoring

Environmental, meteorological, and subsidence monitoring will continue to be undertaken during the next reporting period in accordance with the approved management plans.

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 once every four months unless otherwise agreed with the committee. The 24hr environmental hotline will be maintained and a register retained of any complaints received.

Environmental Management Plans

Environmental management plans will continue to be reviewed at least annually and updates sought if required.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The 2024 Annual Review was submitted to the Resources Regulator and the DPHI on 31 March 2025. DPHI responded 17 July 2025 confirming that the Annual Review was considered to generally satisfy the conditions of the approval with no specific actions required for subsequent Annual Reviews.

Table 5.1 summarises actions required from previous Annual Reviews / actions proposed by ACOL, their status and where these are further discussed in this report.

Table 5.1
Status of Key Actions

Action Required From Previous Annual Review	Requested / Proposed by	Status	Section of this Report
Strategic grazing management will be reintroduced to effectively manage weed biomass and fuel loads once effective subsidence has been complete.	ACOL – Ongoing	Given the weed control works undertaken along Bowmans Creek, strategic grazing was not required during the reporting period. Under ongoing review.	Section 6.6
Within the Bowmans Creek Riparian corridor, consideration of investigations to identify crucial erosion areas and where rehabilitation and restoration works are required.	ACOL – Ongoing	During the reporting period, investigations were undertaken as part of the Bowmans Creek vegetation monitoring by DnA Environmental. Under ongoing review.	Section 6.6
Habitat enhancement plantings, particularly within the narrow casuarina woodland areas, will also be considered. Plantings will include a high proportion of shrubs, native grasses, and reeds to aid with erosion control.	ACOL – Ongoing	No work undertaken during the reporting period. Under ongoing review.	Section 6.6
During future reporting periods it is planned to seal off LW202-204 X Block roadway to further reduce the fugitive emission from the mine/	ACOL – Early 2026	Construction of the seals for LW202-204 X Block Roadway commenced during the reporting period. It is anticipated this will be complete early 2026.	Section 6.5

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.

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.	One community noise complaint was received for the mine during the reporting period. No exceedances of noise criteria were recorded.	The community complaint was investigated and the outcome of this in conjunction with the attended noise monitoring results implies management measures are currently adequate.	No additional management actions required. Continue proactive management approach.
Blasting	No exceedance of applicable blast criteria.	No surface blasting during reporting period.	Not applicable – no surface blasting	As no surface blasting planned for the next reporting period, no specific actions are required.
Air Quality	No exceedances of the applicable air quality criteria.	Six exceedances of the 24 hour PM_{10} criteria recorded. No community air quality complaints.	Incidences of exceedances were investigated. The outcomes of these investigations along with the continuous monitoring data imply management measures are currently adequate.	Bird deterrent rings with prongs will be installed to reduce occurrence of contaminated monitoring results.
Biodiversity	No significant impacts upon flora, fauna species, populations, communities or habitat.	No adverse impacts upon flora, fauna species, populations, communities or habitat attributable to the ACP were recorded. Notwithstanding, actions to improve biodiversity management are planned.	Current mining design and safeguards are currently adequate. However, further proactive land management actions can be taken to improve biodiversity outcomes.	Within Bowmans Creek Riparian Area, proposed habitat enhancement and controlled grazing to be investigated. Ongoing pest and weed control. Revised monitoring locations have been implemented in response to progression of mining.
Heritage	Management in accordance with approved Aboriginal Heritage Management Plan, including salvage.	Archaeological investigations and salvages undertaken in accordance with management plan, Aboriginal Heritage Impact Permits, and in consultation with Aboriginal Community. No complaints.	The Heritage Management Plan was updated during the reporting period. Continued implantation of the approved management plan and procedures for ground disturbance permits.	No additional management action currently required.

Table 6.1 (Cont'd)
Environmental Performance

Aspect	Approval criteria / EIS prediction	Performance during the reporting period	Trend/key management implications	Implemented/proposed management actions
Subsidence	Subsidence management in accordance with approved Subsidence Management Plan / Extraction Plan.	Subsidence impacts generally within predicted levels in accordance with the Extraction Plan. Minor rehabilitation and maintenance works completed to address impacts.	Implies management measures and action responses are currently adequate and predictions sufficiently accurate.	Continued monitoring and review of results. Continue remediation as required in accordance with approved Extraction Plans.

6.2 METEOROLOGICAL MONITORING

Meteorological data is used by ACOL to interpret environmental impacts and to understand air quality and noise management outcomes. The ACP has two meteorological monitoring stations, namely Monitoring Site 1 (M1 - predominantly used to monitor for noise and air quality impacts in adverse weather conditions and determine temperature inversion stability class) and the M2 Repeater Station (the main monitoring site) (see **Figure 6.1**).

A summary of rainfall data since the commencement of operations is presented in **Table 6.2** whilst monthly wind roses for the reporting period are presented in **Figures 6.2** and **6.3**.

Table 6.2
Monthly Rainfall Records

	Average Monthly Rainfall (mm)												
Period	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
2004	81.2	145.6	47.8	23.0	22.6	2.1	1.5	7.0	36.2	61.8	42.8	81.6	546.2
2005	56.6	116.8	79.2	8.5	43.4	87.0	12.0	7.0	41.4	107.6	86.0	15.2	660.7
2006	57.2	47.3	37.6	25.4	1.8	30.8	37.4	13.4	116.8	2.8	62.0	39.0	471.5
2007	30.0	32.6	83.0	27.8	30.4	270.5	14.8	73.7	9.0	15.4	124.2	58.2	769.6
2008	52.6	134.6	44.4	103.2	1.6	72.6	19.4	63.2	73.8	60.0	51.6	50.0	727.0
2009	3.6	161.6	84.8	47.6	42.8	27.4	20.9	0.4	27.6	47.0	28.4	67.6	559.7
2010	51.0	66.6	69.8	24.8	70.2	40.2	64.8	24.5	24.6	58.6	92.2	33.6	620.9
2011	25.0	35.6	90.2	54.0	78.6	132.4	17.4	43.8	79.4	101.6	155.2	43.4	856.6
2012	45.8	142.6	76.6	28.8	12.2	55.8	35.2	7.2	4.8	3.2	27.4	53.4	493.0
2013	131.6	100.0	100.4	21.2	33.6	57.8	10.8	5.0	27.4	4.8	175.2	22.6	690.4
2014	6.8	136.6	119.2	76.4	10.6	21.0	42.6	58.2	33.8	21.2	16.2	157.4	700.0
2015	142.8	17.4	15.6	269.6	73.2	27.0	18.4	59.6	15.0	31.0	119.4	113.0	902.0
2016	218.2	9.6	13.6	11.0	20.2	113.6	47.2	35.2	75.8	46.4	50.2	112.6	753.6
2017	27.8	31.2	176.8	52.4	28.0	40.4	1.6	9.4	9.0	76.0	20.8	45.0	518.4
2018	13.8	76.6	83.2	16.0	10.0	45.6	2.8	30.4	25.6	57.8	91.8	81.0	534.6
2019	66.4	31.6	153.2	9.4	19.4	20.6	9.0	29.8	40.2	1.6	22.0	0.0	403.2
2020	62.0	169	108.2	71.2	30.0	43.8	121.4	39.2	53.6	126.2	29.6	142.2	996.4
2021	78.4	149.8	272.4	27.6	25.4	66.0	24.6	34.0	38.0	79.0	296.0	114.6	1205.8
2022	66.6	112.8	393.6	38.7	38.8	11.2	250.8	76.6	90.2	144.4	85.2	32.2	1341.1
2023	68.2	110.2	97.2	53.4	7.0	10.8	10.4	29.4	0.2	28.6	23.8	56.6	495.8
2024	73.0	109.2	38.0	141.1	132.6	117.0	52.0	47.0	61.4	51.2	51.4	26.0	899.9
2025	**79.4**	**39.2**	**126.0**	**80.8**	**239.4**	**20.2**	**39.8**	**146**	**46**	**37.8**	**32.8**	**24.8**	**912.2**
Average	*65.4*	*89.8*	*105.0*	*55.1*	*44.2*	*59.7*	*38.9*	*38.2*	*42.3*	*52.9*	*76.6*	*62.3*	*729.9*

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

Total rainfall during the 2025 calendar year was 912.2mm, 182.3mm above the average annual rainfall of 729.9mm.

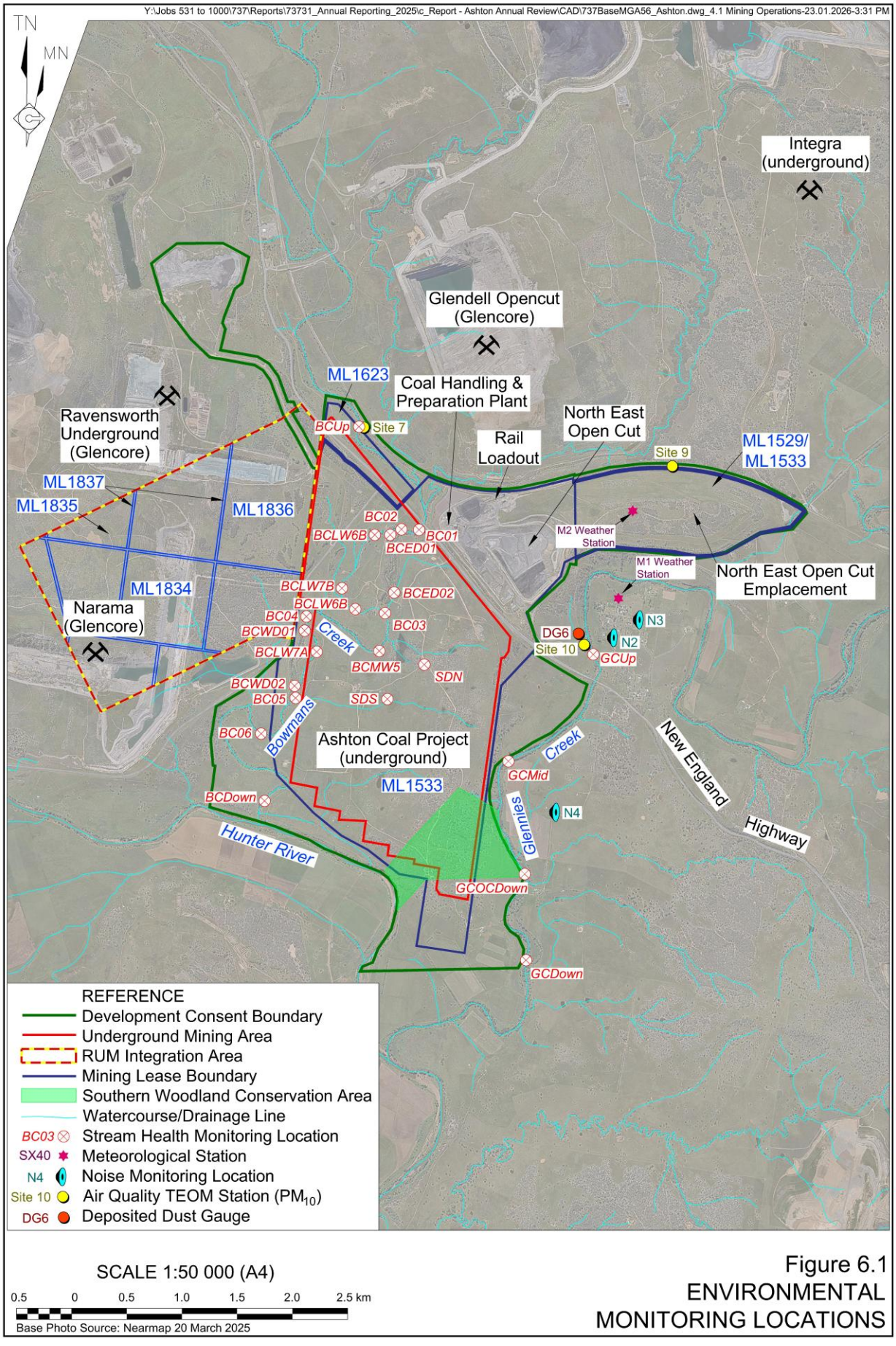


Figure 6.1
ENVIRONMENTAL MONITORING LOCATIONS

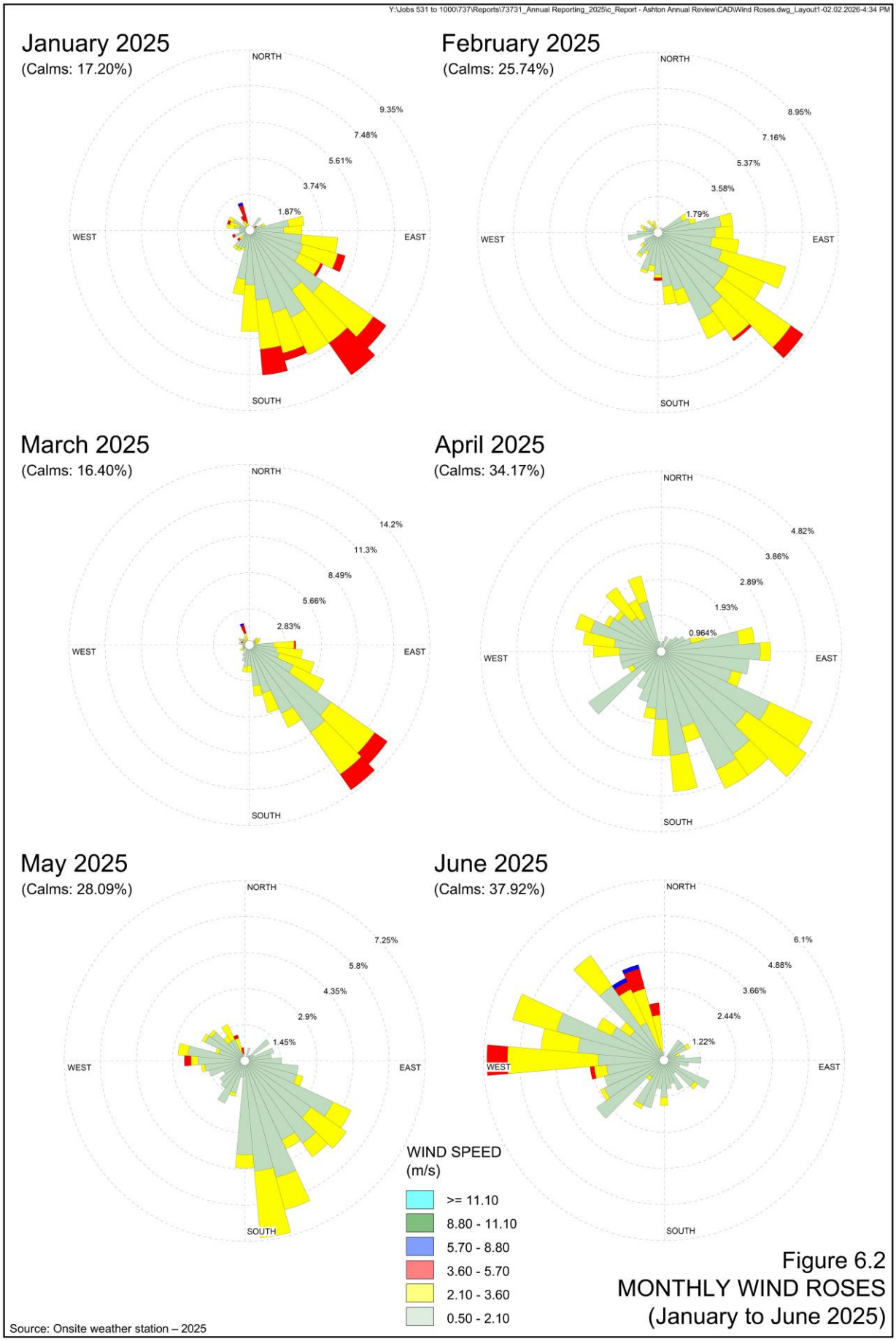


Figure 6.2
MONTHLY WIND ROSES
(January to June 2025)

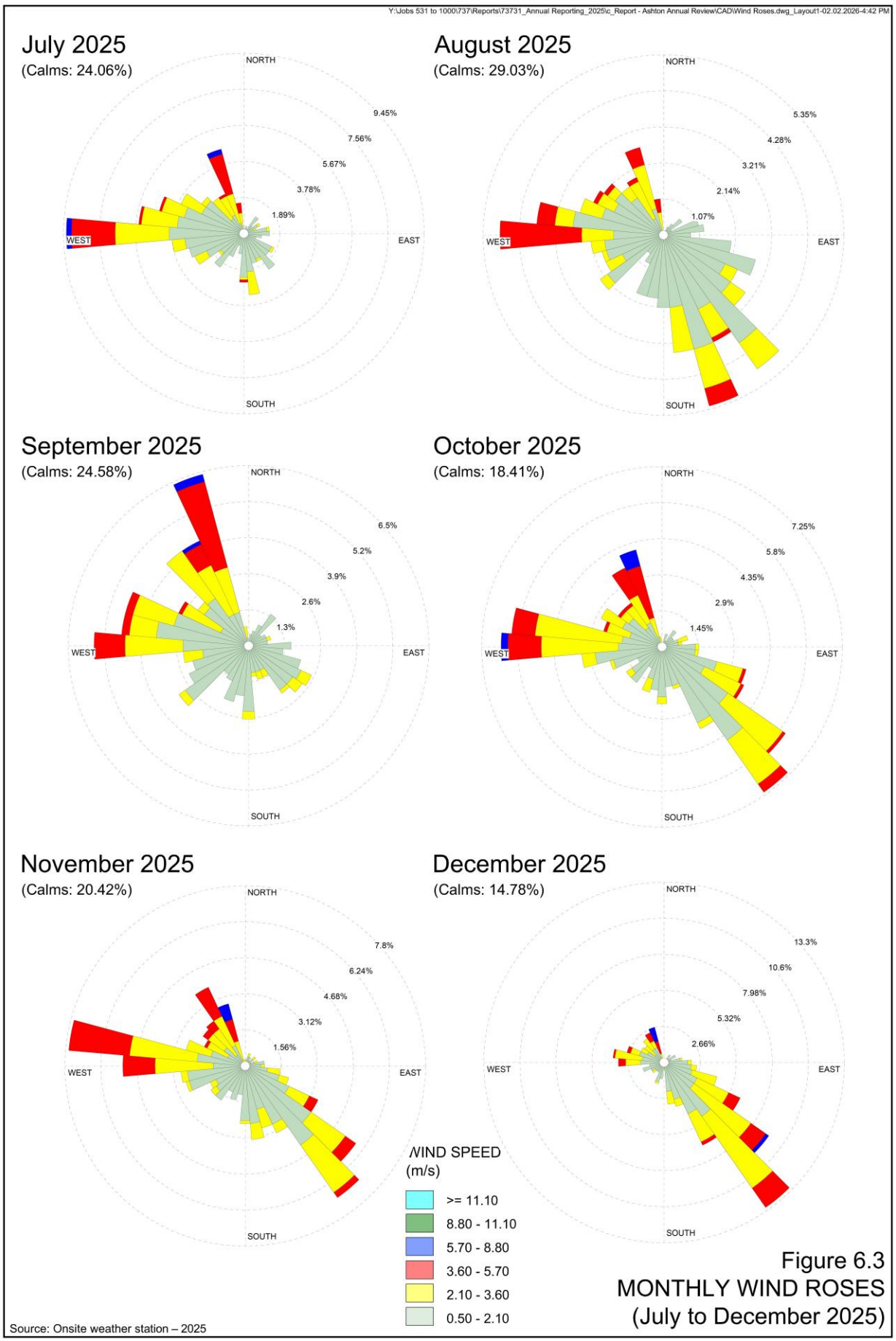


Figure 6.3
MONTHLY WIND ROSES
(July to December 2025)

6.3 NOISE

Environmental Management

Relevant noise impact assessment criteria, noise emission controls and compliance procedures are detailed in the Noise Management Plan for the ACP. The principal noise controls implemented at the ACP site during the reporting period included the maintenance of mobile plant, CHPP and ventilation fans, limiting hours of mobile noise generation (e.g. drilling), permanent noise mitigation controls at the CHPP, and pit top facilities located below the natural surface level.

Environmental Performance

Noise monitoring for the ACP consists of the following.

- Continuous noise monitoring – one continuous real time monitoring station located within Camberwell Village (see **Figure 6.1**) which informs proactive management of noise generating activities at the site. Monitoring results are not used for regulatory purposes.
- Unannounced[1] attended noise monitoring – monthly night-time monitoring conducted at three attended noise monitoring locations (N2, N3 and N4) (see **Figure 6.1**).
- Secondary attended noise monitoring – undertaken within 75 minutes of an attended noise monitoring measurement if results indicate that ACP-related noise exceeds the relevant noise criteria under standard weather conditions (i.e. wind speeds up to 3m/s at 10m above ground level and/or a temperature inversion of up to 3°C).

Monthly noise monitoring results for each of the three attended noise monitoring locations are presented in **Table 6.3** and a copy of the attended noise monitoring compliance report prepared by EMM is presented as **Appendix 1**.

The results of attended noise monitoring during the reporting period indicate that ACP operations were inaudible at all three monitoring locations during the January, March, May, July, August, September, October, November and December monitoring. Operations were also inaudible at locations N3 and N4 during the February monitoring, N2 and N3 during April monitoring, and N4 during June monitoring. Noise during these monitoring events were attributable to non-ACP related road and rail traffic, wildlife, livestock and by other mines in the vicinity.

During monitoring events in which operations at ACP were audible, noise remained below the applicable criteria, including night-time sleep disturbance criteria ($L_{A(1\ min)}$), at all locations. When audible, the ACP operations were also determined to be compliant with cumulative noise criteria. These results are consistent with noise monitoring results for previous years, with ACP operations remaining largely inaudible at the designated noise monitoring locations.

One noise complaint was received during the reporting period on 22 October 2025. An investigation into this complaint concluded that the noise from operations remained below approved limits.

[1] ACOL are not informed of the monitoring until it is completed.

Table 6.3
Summary of Attended Noise Monitoring Results – 2025

Month	Criteria (dB)				Location			Exceedance
	Period	Day	Evening	Night	N2 (dB)[1]	N3 (dB)[1]	N4 (dB)[1]	
January	LAeq (15 min)	38	38	36	IA	IA	IA	Nil
	LA1 (1 min)	-	-	46	IA	IA	IA	Nil
February	LAeq (15 min)	38	38	36	<20	IA	IA	Nil
	LA1 (1 min)	-	-	46	<20	IA	IA	Nil
March	LAeq (15 min)	38	38	36	IA	IA	IA	Nil
	LA1 (1 min)	-	-	46	IA	IA	IA	Nil
April	LAeq (15 min)	38	38	36	IA	IA	<20	Nil
	LA1 (1 min)	-	-	46	IA	IA	<20	Nil
May	LAeq (15 min)	38	38	36	IA	IA	IA	Nil
	LA1 (1 min)	-	-	46	IA	IA	IA	Nil
June[2]	LAeq (15 min)	38	38	36	<25	28	IA	Nil
	LA1 (1 min)	-	-	46	30	36	IA	Nil
July	LAeq (15 min)	38	38	36	IA	IA	IA	Nil
	LA1 (1 min)	-	-	46	IA	IA	IA	Nil
August	LAeq (15 min)	38	38	36	IA	IA	IA	Nil
	LA1 (1 min)	-	-	46	IA	IA	IA	Nil
September	LAeq (15 min)	38	38	36	IA	IA	IA	Nil
	LA1 (1 min)	-	-	46	IA	IA	IA	Nil
October	LAeq (15 min)	38	38	36	IA	IA	IA	Nil
	LA1 (1 min)	-	-	46	IA	IA	IA	Nil
November	LAeq (15 min)	38	38	36	IA	IA	IA	Nil
	LA1 (1 min)	-	-	46	IA	IA	IA	Nil
December	LAeq (15 min)	38	38	36	IA	IA	IA	Nil
	LA1 (1 min)	-	-	46	IA	IA	IA	Nil

IA = Inaudible. NM=Not measurable

Note 1: Estimated or measured noise attributed to ACP.

Note 2: Criteria not applicable due to non-standard weather conditions (i.e. wind speeds over 3m/s at 10m above ground level and/or a temperature inversion greater than 3℃.

Source: EMM Consulting – 2025

Reportable Incidents

No reportable incidents were recorded during the reporting period.

Further Improvements

Other than ongoing plant maintenance, monthly attended noise monitoring, and proactive management using continuous noise monitoring data, no additional management measures are planned during the next reporting period.

6.4 BLASTING

No surface blasts were undertaken during the reporting period.

6.5 AIR QUALITY

Environmental Management

Relevant air quality impact assessment criteria, air quality management measures and compliance procedures are detailed in the Air Quality and Greenhouse Gas Management Plan (AQGGMP) for the ACP. The principal air quality management measures applicable to the reporting period included:

- large earth berms and tree screens between the operations and the village (previously constructed and trees established);
- clear delineation and maintenance of roads and use of water carts to keep trafficked areas in a damp condition;
- keeping stockpiles damp by the use of fixed or mobile water sprays under dry and windy conditions; and
- proper maintenance of all diesel equipment used on site and fitting equipment with appropriate pollution control devices.

Greenhouse gas management during the reporting period included the flaring of gas from gas drainage bores, where feasible, to reduce greenhouse gas emissions. Additionally, energy efficient equipment is specified for all new or upgraded fixed and mobile plant as required.

Environmental Performance

Air quality monitoring at the ACP site consists of the following.

- Depositional dust monitoring – one sample collected every 30 days (± 2 days) from one depositional dust gauge (see **Figure 6.1**).
- Particulate matter 10 micrometres or less (PM_{10}) – a real-time tapered element oscillating microbalance (TEOM), Site 10 located at Camberwell. Two additional TEOM samplers (Sites 7 and 9) are used for operational management purposes and are not reflective of impacts on sensitive receivers (see **Figure 6.1**).

The results of air quality monitoring are provided as follows.

Deposited Dust

Deposited dust monitoring results for Sampling Point D6 during the reporting period are presented in **Table 6.4** with long-term data presented in **Figure 6.4**.

The highest insoluble solids measurements recorded during the reporting period was 7.7g/m^2/month in January 2025. It should be noted that this measurement, along with the measurements recorded in March, April, May, September, October and November, coincided with an incident of contamination (principally insects and bird droppings) on the depositional dust gauge and these results have been excluded from the analysis.

Table 6.4
Deposited Dust Monitoring Results – Sampling Point D6 – 2025

Month	Sampling Period		Dust Deposition Rate (g/m²/month)			Comments
	Start Date	End Date	Insoluble	Rolling Annual Average	Ash	
January	2/01/2025	3/02/2025	7.7	1.2	3.4*	Contaminated with insects, bird droppings
February	3/02/2025	3/03/2025	0.9	1.2	0.6	-
March	3/03/2025	1/04/2025	3.0	1.2	1.0*	Contaminated with insects, bird droppings, vegetation
April	1/04/2025	1/05/2025	2.8	1.2	1.8*	Contaminated with insects
May	1/05/2025	2/06/2025	7.3	1.2	6.7*	Contaminated with insects, vegetation
June	2/06/2025	1/07/2025	1.3	1.1	1.0	-
July	1/07/2025	1/08/2025	2.8	1.4	2.1	-
August	1/08/2025	1/09/2025	1.3	1.4	0.9	-
September	1/09/2025	2/10/2025	6.1	1.5	4.0*	Contaminated with insects, bird droppings
October	2/10/2025	3/11/2025	3.0	1.6	1.7*	Contaminated with insects, vegetation
November	3/11/2025	1/12/2025	4.9	1.5	1.8*	Contaminated with insects, bird droppings
December	1/12/2025	2/01/2026	1.7	1.6	1.2	-
Minimum			***0.9***	***1.1***	***0.6***	**-**
Maximum			***2.8***	***1.6***	***2.1***	**-**

*Contaminated samples not utilised in calculation of rolling annual average or in the minimum / maximum values

Source: Ashton Coal Operations Pty Limited.

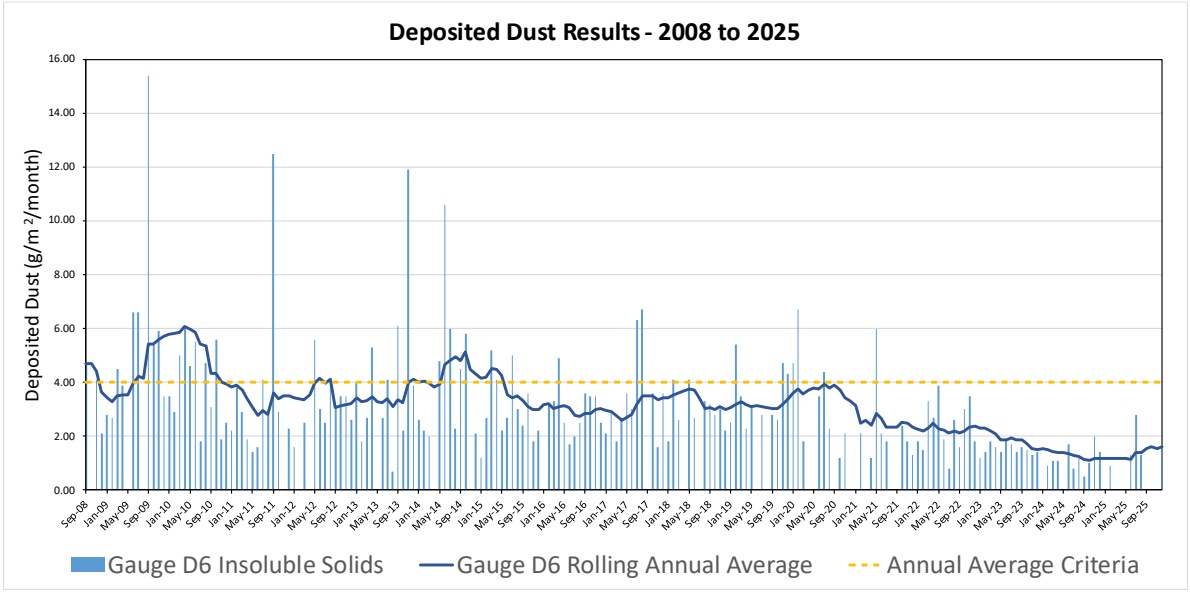


Figure 6.4
DEPOSITED MONITORING RESULTS

The rolling annual average deposited dust levels recorded throughout the reporting period ranged from 1.1g/m^2/month to 1.6/m^2/month, i.e. remaining below the criteria of 4g/m^2/month, and indicating good air quality with respect to dust deposition.

Long term deposited dust monitoring results indicate that the rolling annual average has remained below criteria since 2015 following two significant exceedances due to regional dust storms.

Suspended Particulates – PM_{10} and TSP

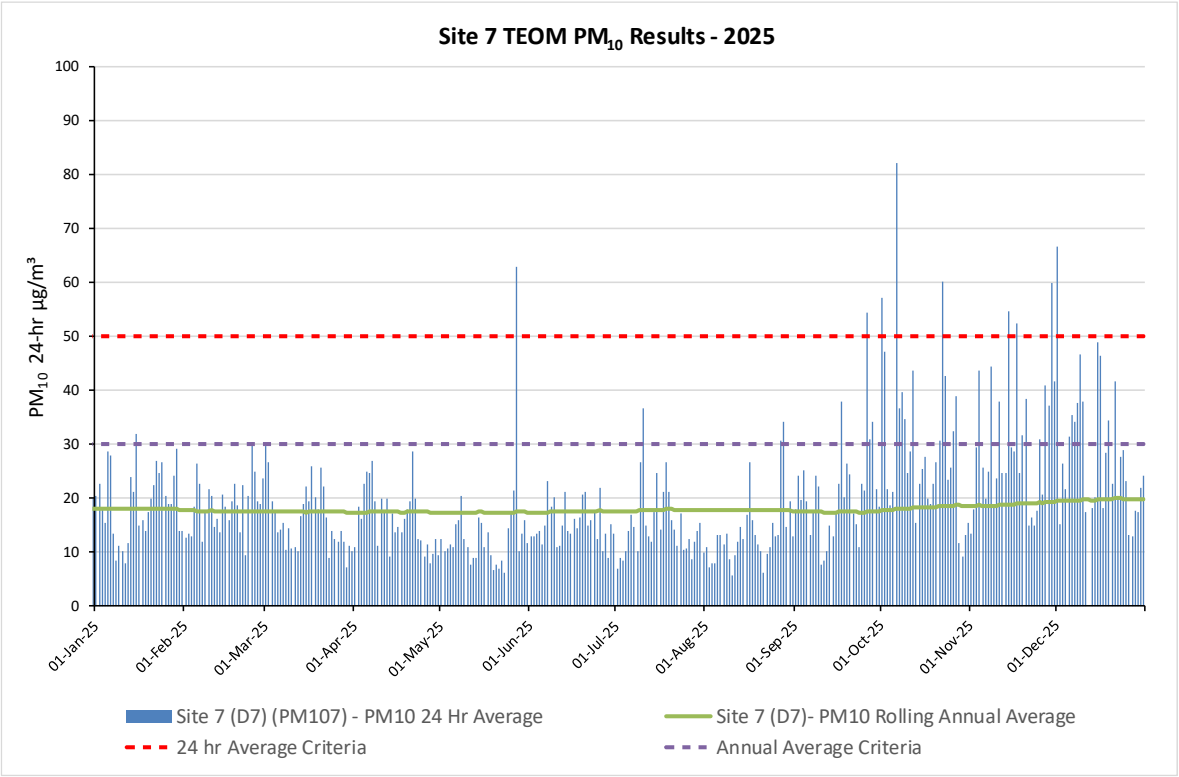
Table 6.5 provides a summary of the PM_{10} monitoring results for the reporting period and **Figures 6.5** to **6.7** present the PM_{10} data for the reporting period and the long-term monitoring data for each ACP TEOM. The highest recorded 24-hour average PM_{10} concentration during the reporting period ranged between 66.6µg/m^3 and 82.1µg/m^3, with the highest value measured on 6 October 2025 at monitoring Site 7. Notably, the Upper Hunter Air Quality Monitoring Network (UHAQMN) station at Camberwell also recorded an elevated result of 65.3µg/m^3 on 6 October 2025.

Table 6.5
Summary of PM_{10} Monitoring Results – 2025

Monitoring Site	Minimum 24-hr µg/m^3	Maximum 24-hr µg/m^3	Short-Term Criteria µg/m^3	Annual Average 2025 µg/m^3	Annual Average Criteria µg/m^3
Site 7^	5.7	66.6	50	19.3	30
Site 9^	4.7	82.1		19.4	
Site 10^	4.6	74.6		18.6	
UHAQMN*	5.1	80.8		20.9	
* Provided as reference (includes all days) ^ Ashton results exclude extraordinary events as defined in DA 309-11-2001-i					
Source: Ashton Coal Operations Pty Limited.					

As Site 10 is representative of PM_{10} at sensitive receivers, all PM_{10} results above 50µg/m^3 at Site 10 are investigated to determine if the criteria (which is based upon the ACP contribution) has been exceeded and further incident reporting to DPHI is required. The investigation includes a review of prevailing wind conditions, the activities occurring on site and the potential contribution from upwind sources to determine the likelihood of the ACP contributing to elevated levels above the criteria. The investigation also includes a detailed review of site operations to ensure that adequate dust controls were being implemented on site including use of water trucks, water sprays on the product stockpile gantries, rotary breaker and ROM coal stockpile discharge points.

During the reporting period, there were six days when the 24-hour PM_{10} results were above 50µg/m^3 at Site 10 (refer to **Table 6.6**). Investigations confirmed that, in each instance, ACP was not a substantial contributor to PM_{10} levels in Camberwell Village, calculated contributions remained below the incremental contribution criteria, and all reasonable and feasible avoidance measures were being employed. No further actions were required.



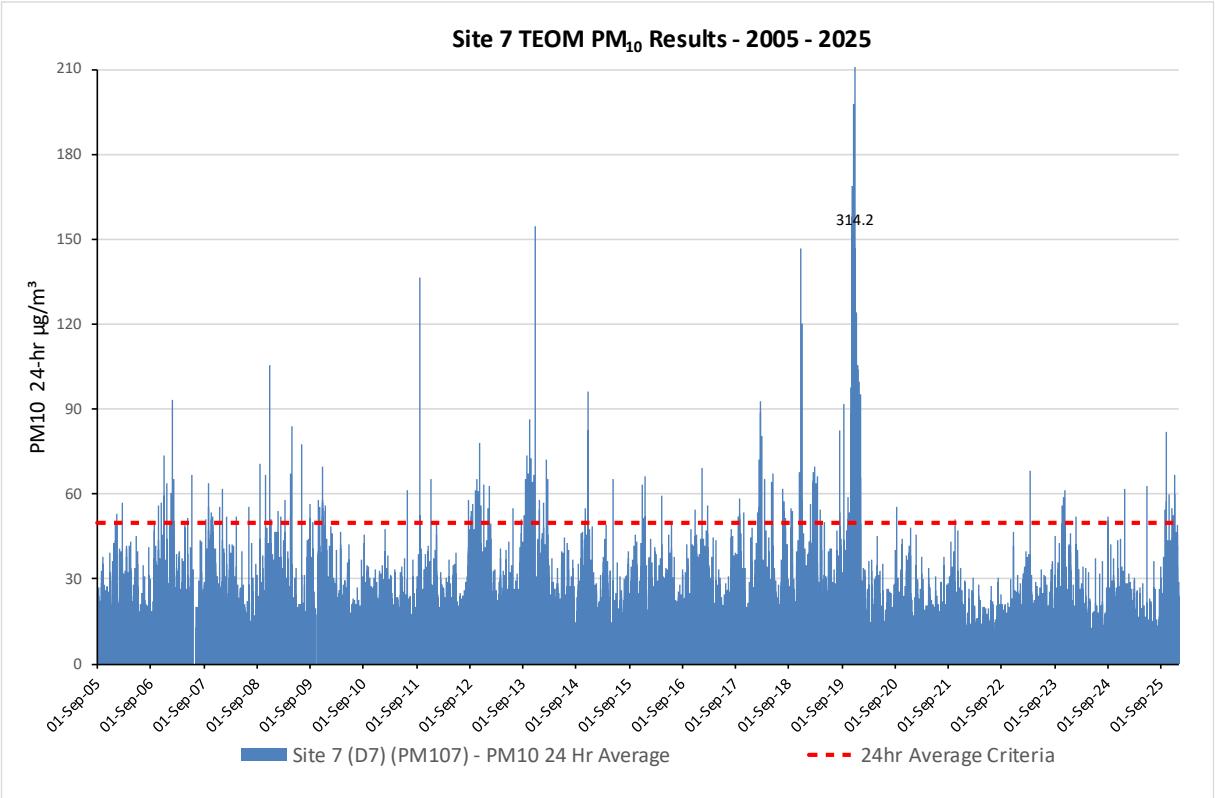
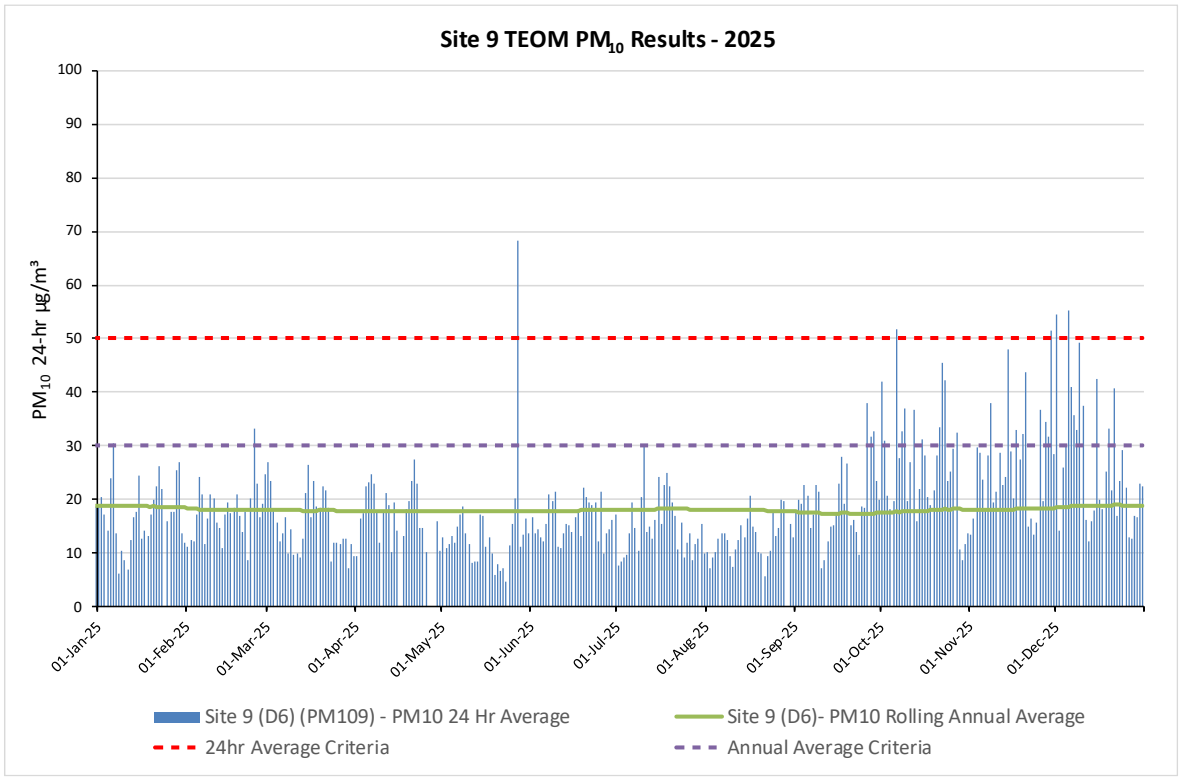


Figure 6.5
PM_{10} MONITORING RESULTS – SITE 7



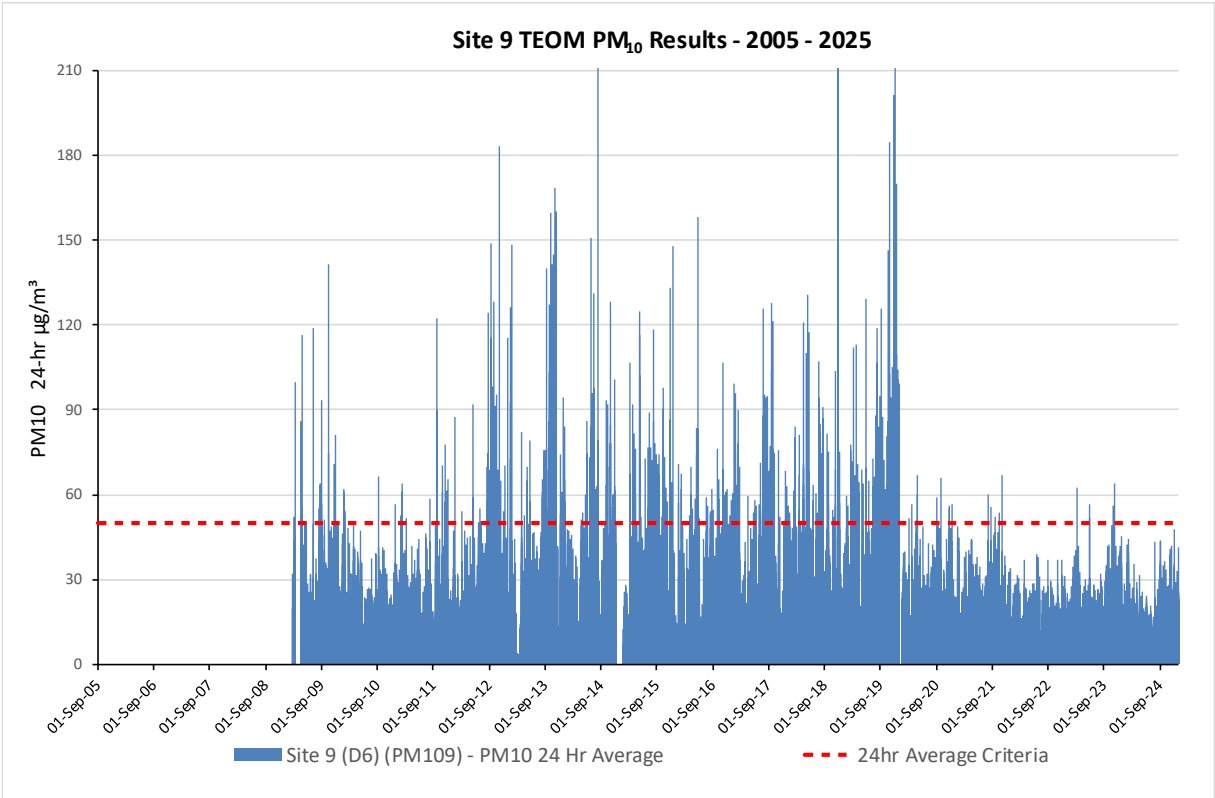
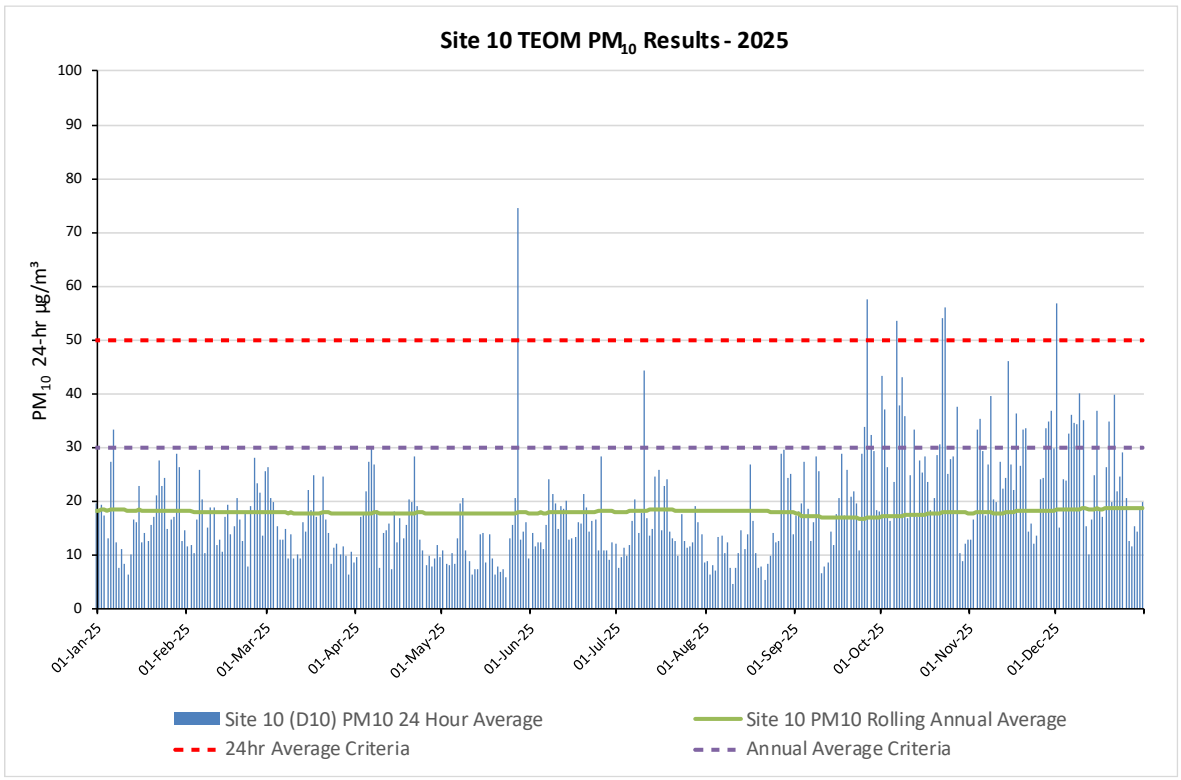


Figure 6.6
PM_{10} MONITORING RESULTS – SITE 9



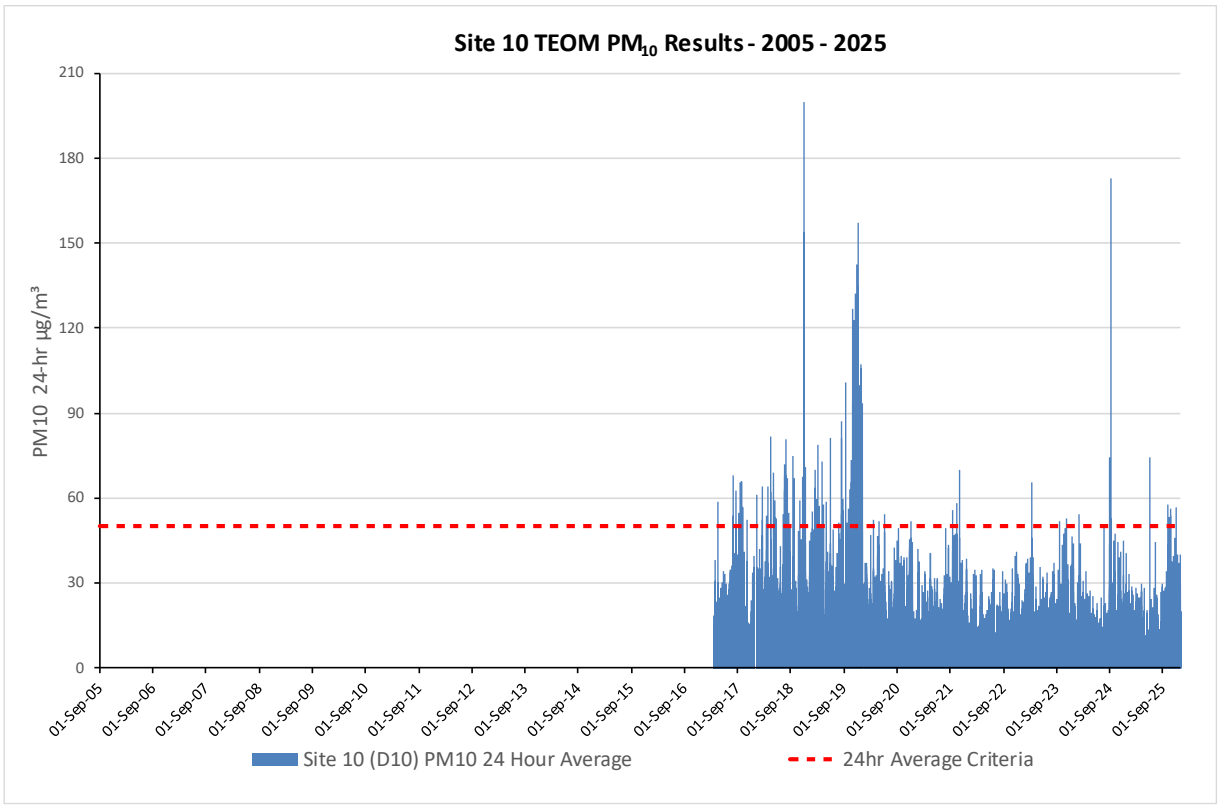


Figure 6.7
PM_{10} MONITORING RESULTS – SITE 10

Table 6.6
24-hour PM_{10} Exceedance Investigation Outcomes – 2025

Date	Site 10 (Camberwell Village)		UHAQMN (Camberwell Village)	Comments
	Total PM_{10} ($\mu g/m^3$) (24hr average)	Potential ACP PM_{10} ($\mu g/m^3$) (24hr average)	Total PM_{10} ($\mu g/m^3$) (24hr average)	
27/05/2025	74.6	9.1	80.8	ACOL not a substantial PM_{10} contributor
26/09/2025	57.5	6.2	50.5	ACOL not a substantial PM_{10} contributor
06/10/2025	53.5	0.6	43.6	ACOL not a substantial PM_{10} contributor
22/10/2025	54.0	0.2	60.0	ACOL not a substantial PM_{10} contributor
23/10/2025	56.1	1.4	49.2	ACOL not a substantial PM_{10} contributor
01/12/2025	56.7	0.4	50.5	ACOL not a substantial PM_{10} contributor

Source: Ashton Coal Operations Pty Limited and https://www.airquality.nsw.gov.au/air-quality-data-services/data-download-facility

The rolling annual average PM_{10} concentrations for each monitoring location ranged between 16.8µg/m^3 and 20.0µg/m^3 during the reporting period and was therefore below the annual average criteria value of 30µg/m^3. The annual average PM_{10} during the reporting period for all ACP monitoring sites was also generally consistent with or lower than that recorded at the DCCEEW operated Upper Hunter Air Quality Monitoring Station at Camberwell, which recorded an annual average PM_{10} of 20.9µg/m^3.

As TSP is proportionally calculated from the annual average PM_{10} result at Site 10, the annual TSP remained below the annual average criteria of 90µg/m^3.

Greenhouse Gas

Emissions During the Reporting Period

Greenhouse gas emissions associated with the ACP were reported on behalf of ACOL by Yancoal Australia Limited under the National Greenhouse and Energy Reporting Scheme (NGER) for the 2024-2025 reporting period. Scope 1 greenhouse gas emissions include both direct greenhouse gas production as a result of ACP operations as well as fugitive emissions associated with underground mine ventilation, gas drainage, gas flaring and post-mining gas. Scope 2 emissions include indirect greenhouse gas emissions primarily associated with emissions generated during the production of electricity used on site.

Table 6.7 presents an overview of ACP Scope 1 and Scope 2 greenhouse gas emissions for the reporting period and the previous five reporting periods. In summary, Scope 1 emissions associated with the ACP totalled 682,780tCO_{2-e} (tonnes CO_2 equivalent) compared to 350,750tCO_{2-e} for the previous 2023-2024 reporting period. Scope 2 emissions associated with the ACP during the 2024-2025 reporting period totalled 28,649tCO_{2-e} compared to 28,840tCO_{2-e} during the previous 2023-2024 reporting period.

Table 6.7
ACP Greenhouse Gas Emissions – 2019/2020 to 2024/2025

Greenhouse Gas Emission Type	2019/2020	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025
Scope 1 (tCO_{2-e})	196,641	411,570	596,235	381,866	350,750	682,780
Scope 2 (tCO_{2-e})	32,982	39,761	35,442	31,654	28,840	28,649
Total (tCO_{2-e})	229,623	451,331	631,677	413,520	379,590	711,429
Source: Yancoal Australia Limited – National Greenhouse and Energy Reporting Scheme Results 2024/2025.						

Performance, Energy Efficiency and Emission Reductions

Significant variability in year to year ACP greenhouse gas emissions are primarily a reflection of changes in gas management methods as well as differences in gas levels between longwalls and seams mined during each reporting period. During the 2024/2025 reporting period, a concentrated effort was made to prioritise sealing in areas of completed mining, to further reduce GHG emissions. Specific measures commenced during the reporting period were as follows.

- Remediation works on the Final Seals of TG1, MG1 and MG2.
- Construction of the Seals for LW202-204 Cross Block Roadway.

These emission reduction measures further build upon the reduction measures completed during previous reporting years and discussed in the respective Annual Reviews.

Comparison of Predicted Emissions

Due to the significant changes in assessment and reporting requirements for GHGs, and the numerous modifications to approved operations that have occurred over the life of the Mine, a direct comparison of predicted vs. reported emissions is not considered practicable or informative. **Table 6.8** presents a summary of the key modelling results from all air quality and greenhouse gas assessments undertaken over the life of the Mine.

Table 6.8
Predicted Average Annual Emissions

Source	Emission Source	Averaging Period (years)	Greenhouse Gas Emission by Type (CO_{2-e})			
			Scope 1	Scope 2	Total Scope 1 and 2	Scope 3
Holmes (2001)	Entire Project	20	27,600t (diesel) 4,455t (explosives) Fugitive emissions not calculated	37,000t	69,055t	4.28Mt
PAE Holmes (2009)	SEOC Only	7	50,160t (diesel) 1,730t (explosives) 132,428t (fugitive)	9,140t	193,5487t	4.83Mt
PAE Holmes (2011)	Gas Drainage Project – Stage 1	Not Specified	1,128 (diesel) 328,173 (gas venting)	-	329,301t	86t
PAE Holmes (2012)	Gas Drainage Project – Stage 2	Not Specified	270,480t to 708,259t (pending proportion flared)	-	270,480t to 708,259t	-

Reportable Incidents

One internal incident report was recorded on 7 June 2025 where visible dust was observed on the tailings dam. At the time of the incident, no operational activities were being carried out. An investigation into the incident determined that the dust was caused by significant wind conditions in the region and not related to mining operations. It was confirmed this was not a reportable incident and no further actions were required.

Further Improvements

During the next reporting periods it is planned to seal off LW202-204 X Block roadway to further reduce the fugitive emissions from the mine.

Bird deterrent rings with prongs will also be installed to reduce occurrence of contaminated monitoring results.

6.6 BIODIVERSITY

Environmental Management

Biodiversity at the ACP site is managed under the Ashton Coal 2020 Biodiversity Management Plan (BMP) together with the 2012 Plan of Management Voluntary Conservation Area for the Southern Woodland Conservation Area (SWCA). Key biodiversity management measures include: establishment of the SWCA; targeted rehabilitation to improve habitat linkages across the landscape; planting of River Red Gum saplings, placement of nesting boxes; stock exclusion from selected areas; weed and feral pest control; and ongoing monitoring.

Biodiversity Offsets

Schedule 3 Condition 27 of Development Consent DA 309-11-2001-i requires the establishment of the following biodiversity offsets.

- Southern Conservation Area (existing vegetation and vegetation to be established) – minimum size 190ha.
- Bowman Creek Riparian Area (riparian and woodland vegetation) – minimum size 60ha.
- North East Open Cut Rehabilitation Area (woodland vegetation to be established) – minimum size 100ha.

As part of the biodiversity offset strategy, a Voluntary Conservation Agreement covering the Southern Woodland Conservation area was established between ACOL and the Minister for the Environment under the *National Parks and Wildlife Act 1974* on 16 September 2010. This conservation agreement provides for in perpetuity conservation of 65.45ha.

As outlined within the approved Biodiversity Management Plan, the conservation area is augmented by approximately 125ha of revegetation corridors and 66ha of Bowmans Creek Riparian corridor. Whilst not subject to specific instrument of long-term protection, management of these areas is consistent with the conservation measures implemented for the Voluntary Conservation Agreement. In total these areas equate to ~256ha, i.e. exceeding the minimum 250ha requirement for the Southern Conservation Area and Bowman Creek Riparian Area.

The North East Open Cut has been completed with ~140ha of rehabilitated area currently consisting of ~68ha of rehabilitated exotic pasture and ~71ha of native trees and shrubs. Areas of exotic pasture are planned to be progressively converted to woodland habitat with approximately 15ha of exotic pasture areas planned to be converted into areas of eucalypt woodland habitat over the next 5 years. These rehabilitation areas are not subject to a specific instrument of long-term protection, however, rehabilitation monitoring is undertaken in accordance with the requirements of the approved Biodiversity Management Plan.

A summary of biodiversity monitoring completed for these areas is provided as follows whilst Section 8.1 provides further discussion on rehabilitation activities and associated monitoring of rehabilitation.

Environmental Performance

Multiple terrestrial and aquatic flora and fauna monitoring programs are completed each year to determine the condition of ecological communities and habitats and compare these findings against relevant management plan performance indicators and closure objectives.

The monitoring programs include terrestrial and aquatic monitoring, weed and vertebrate pest monitoring and associated management measures where required. The monitoring program covers important biodiversity areas including the Bowmans Creek riparian corridor, the River Red Gum communities and the SWCA. This monitoring complements the rehabilitation monitoring of Bowmans Creek Diversion and North East Open Cut (NEOC), and the mining impacted "Farmland" above the underground mine, which is discussed further in Section 8. The following provides a summary of the key outcomes of the monitoring undertaken during the reporting period.

Where relevant, monitoring has been compared to completion / performance criteria developed for the ACP site and outlined within the BMP.

Flora and Fauna Monitoring

Bi-annual fauna monitoring was undertaken during the reporting period by Umwelt Environmental and Social Consultants in June/July 2025 and November 2025. Fauna monitoring at the ACP site has been undertaken within the Southern Woodlands Conservation Area (SWCA) since 2005 and was expanded in 2010 to include the northern woodland area and the proposed (at that time) South East Open Cut (SEOC) area. The program was again expanded in 2018 to include monitoring of rehabilitated areas within the NEOC and Bowmans Creek Diversion. The survey for bi-annual fauna monitoring includes ten survey transect sites, of which four sites consist of remnant vegetation ('control' sites), four sites are located over previously undermined areas ('impact' sites), and two sites are within rehabilitated areas.

A total of 120 fauna species were recorded as a result of the bi-annual fauna monitoring program, including 40 mammals, 64 birds, three amphibians and nine reptiles. Fourteen threatened species were recorded during the 2025 fauna monitoring surveys, two greater than the previous reporting period (12). The threatened species recorded include the following.

- Grey-crowned babbler (*Pomatostomus temporalis temporalis*)
- Latham's snipe (*Gallinago hardwickii*)
- Brush-tailed phascogale (*Phascogale tapoatafa*)
- Eastern coastal free-tailed bat (*Micronomus norfolkensis*)

- Little bentwinged-bat (*Miniopterus australis*)
- Eastern bentwinged-bat (*Miniopterus orianae oceanensis*)
- Southern myotis (*Myotis Macropus*)
- Eastern cave bat (*Vespadelus troughtoni*)
- Yellow-bellied sheathtail-bat *(Saccolaimus flaviventris)*
- Greater broad-nosed bat *(Scoteanax rueppellii)*
- Spotted harrier (*Circus assimilis*)
- White-bellied sea-eagle (*Haliaeetus leucogaster*)
- Masked Owl (*Tyto novaehollandiae*)
- Speckled warbler (*Pyrrholaemus sagittatus*)

All of the above species are listed as vulnerable under the NSW *Biodiversity Conservation Act 2016*, with the exception of Latham's snipe which is listed as vulnerable under the Commonwealth *Environmental Protection Biodiversity Conservation Act 1999*. All species have previously been identified as occurring at the ACP site. A total of 32 threatened species have been recorded at the ACP site since monitoring commenced in 2006.

During the 2025 reporting period, the following 10 introduced species were recorded during the fauna monitoring surveys.

- European rabbit (*Oryctolagus cuniculus*)
- Brown hare (*Lepus capensis*)
- European fox (*Vulpes vulpes*)
- Black rat (*Rattus rattus*)
- House mouse (*Mus Musculus*)
- Pig (*Sus scrofa*)
- Feral cat (*Felis catus*)
- Common myna (*Sturnus tristis*)
- Red deer (*Cervus elaphus*)
- Goat (*Capra hircus*)

Analysis of the fauna monitoring results indicated that species diversity was similar between the control (76 species) and impact (102 species) monitoring sites. Long-term species diversity is shown on **Figure 6.8**. Species richness for mammals and birds was higher than the previous reporting period, while amphibian and reptile richness was lower. Comparisons among species groups indicated that fluctuations in species richness is generally comparable between impact and control types for all fauna types. These trends are generally consistent with previous monitoring and are most likely explained by local environmental and ecological factors outside of the influence of mining activity.

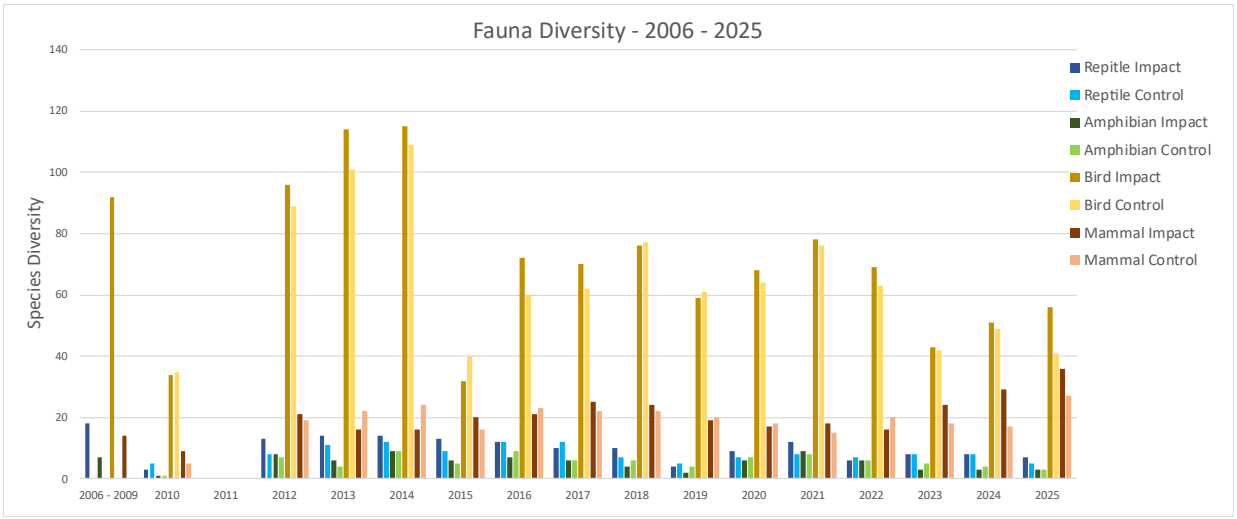


Figure 6.8
FAUNA DIVERSITY 2006 - 2025

Nest box inspections indicated that 29 of the 39 nest boxes installed in the SWCA remain in a moderate to good condition and are sufficient to support roosting and nesting of arboreal species. The brush-tailed phascogale and common brush tailed possum were observed to occupy eight boxes across the monitoring period.

The results of the bi-annual fauna monitoring program indicate that threatened fauna species and their habitats have not been adversely impacted by mining activities. Observed inter-year and inter-seasonal variation is consistent with expected results for dynamic ecological systems responding to regional-level climate patterns. Furthermore, the results of the fauna monitoring program indicate compliance with the relevant performance criteria outlined in the BMP and no further actions are required to address BMP compliance.

Aquatic Ecology – Bowmans Creek and Glennies Creek

Biannual monitoring of aquatic ecology was undertaken by Marine Pollution Research Pty Ltd in autumn (12 to 15 May 2025) and spring (8 to 11 December 2025).

Monitoring during this reporting period builds on both the results of initial surveys conducted in 2001 to support the original development application as well as the results of biannual monitoring undertaken since 2006. These results also include the 13th year of monitoring for the Bowmans Creek Diversion which was completed in 2012.

Established sites are included in monitoring programs based on the progression of mining, and additional sites may be added or removed, if required. No new or temporary sites were established during the reporting period.

Monitoring locations currently include a total of 26 sites where monitoring may occur, as follows.

- 18 sites within Bowmans Creek, of which 14 are currently utilised as part of the monitoring program.
- Two sites within the Bowmans Creek Diversion channels, with one site per each of the two diversion channels.

- Two sites within Glennies Creek.
- Four sites within waterbodies established within subsidence depressions, which for reporting purposes are included with Bowmans Creek.

Habitat Condition

Aquatic habitat conditions during the 2025 sampling period showed trends reflective of variable climatic conditions characterised by multiple rainfall events followed by dry periods.

Aquatic habitat conditions for each active monitoring site, measured using the Riparian Channel Environment habitat scoring system (RCE index), are presented in **Table 6.9**.

Table 6.9
Monitoring Site RCE Index Score – 2015 to 2025

Year	Period	Site RCE Index Score (% Condition)[1]																		
		BCUp	BC1	BCLW7B	BCLW6B[2]	BCED1[3]	BCED2[3]	BC3	BC4	BCLW7A[2]	BCWD1	BCWD2[3]	BC5	BC6	BCDown	SDLW3N	SDLW4S	SDLW5S	SDLW5N	GCUp	GCMid
2015	Autumn	78.8	76.9		71.2	78.8		77.9		76.0		79.8		74.0	73.1					74.0	73.1
	Spring	77.9	75.0		69.2	75.0		77.9		73.1		76.9		74.0	71.2					74.0	74.0
2016	Autumn	77.9	75.0		69.2	75.0		77.9		73.1		76.9		74.0	71.2					74.0	74.0
	Spring	77.9	75.0		69.2	75.0		77.9		73.1		76.9		74.0	70.2					74.0	74.0
2017	Autumn	76.9	74.0		68.3	74.0		77.9		73.1		75.0		74.0	70.2					72.1	71.2
	Spring	74.0	74.0		69.2	74.0		77.9		73.1		75.0		72.1	70.2					73.1	73.1
2018	Autumn	76.0	76.9		71.2	Dry		77.9		75.0		Dry		72.1	70.2					73.1	73.1
	Spring	76.0	76.9		Dry	Dry		Dry		75.0		Dry		Dry	70.2					71.2	71.2
2019	Autumn	Dry	73.1		Dry	Dry		Dry		Dry		Dry		Dry	49.0					71.2	71.2
	Spring	Dry	76.0		Dry	Dry		Dry		Dry		Dry		Dry	52.9					71.2	71.2
2020	Autumn	76.9	74.0		74	77.9	78.8	76.9		74.0		Dry		76.9	52.9					73.1	73.1
	Spring	76.9	75.0		73.1	80.8	79.8	77.9		74.0		80.8		76.0	52.9					73.1	73.1
2021	Autumn	76.9	76.0		73.1	81.7	78.8	76.0		72.1		80.8		76.0	53.8					73.1	73.1
	Spring	75.0	76.0		73.1	79.8	78.8	76.0		72.1		80.8		74.0	53.8					73.1	73.1
2022	Autumn	77.9	74.0		73.1	81.7	79.8	75.0		74.0		81.7		73.1	57.7					73.1	73.1
	Spring	77.9	74.0	74.0	72.1	79.8	78.9	72.1		74.0	78.8	81.7	72.1	73.1	57.7	42.3	32.7			73.1	73.1
2023	Autumn	77.9	73.1	Dry	Dry	81.7	81.7	Dry	76.0	72.1	80.8	Dry	74.0	73.1	67.3	41.3	32.7	34.6	29.8	73.1	73.1
	Spring	76.9	74.0	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	73.1	66.3	42,3	32.7	34.6	29.8	73.1	73.1
2024	Autumn	76.9	75.0	Dry	Dry	81.7	81.7	74.0	76.0	Dry	83.7	84.6	76.0	76.0	63.5	42.3	33.7	34.6	32.7	73.1	73.1
	Spring	76.0	75.0	Dry	74.0	80.8	80.8	76.0	76.0	Dry	81.7	Dry	75.0	75.0	66.3	42.3	32.7	34.6	32.7	73.1	73.1
2025	Autumn	74.0	74.0	Dry	72.1	80.8	80.8	75.0	72.1		81.7	78.8		73.1	67.3	42.3	32.7	34.6	32.7	73.1	73.1
	Spring	72.1	73.1	Dry	68.3	77.9	79.8	72.1	72.1		78.8	Dry		73.1	67.3	42.3	33.7	35.6	33.7	73.1	73.1
Minimum		***72.1***	***73.1***	***74.0***	***68.3***	***74.0***	***72.1***	***72.1***	***76.0***	***72.1***	***42.3***	***33.7***	***35.6***	***32.7***	***34.6***	***32.7***	***32.7***	***34.6***	***29.8***	***68.3***	***71.2***
Maximum		***78.8***	***76.9***	***74.0***	***74.0***	***81.7***	***81.7***	***77.9***	***78.8***	***76.0***	***83.7***	***84.6***	***76.0***	***76.9***	***73.1***	***73.1***	***73.1***	***73.1***	***74.0***	***74.0***	***77.9***
Mean		***77.1***	***75.2***		***71.6***	***78.0***	***79.9***	***76.8***	***76.0***	***73.4***	***81.3***	***78.9***	***74.3***	***74.3***	***64.1***	***42.1***	***32.9***	***34.6***	***31.3***	***72.9***	***72.9***

Note 1: Monitoring sites are presented in order from upstream (left) to downstream (right). See **Figure 6.1**.
Note 2: Excised Creek monitoring sites.
Note 3: Diversion channel creek sites.

Source: Modified after Table 3 of Marine Pollution Research Pty Ltd (2026).

For those sites which were sampled, all sites were found to be in 'good' condition (i.e. >70%) with the exception of BCDown (67.3% in both autumn and spring). Notwithstanding this, BCDown showed a minor increase in RCE scores compared to the 2024 reporting period. RCE scores at the remaining sites were generally comparable to or slightly lower than the 2024 results. Both the autumn and spring sampling results for the reporting period were also generally consistent with or lower than the long term means at all monitoring sites. This is attributed to the multiple wet weather events and periods of high flow followed by increasingly dry conditions during the reporting period. These conditions influenced several RCE categories, including aquatic vegetation (filamentous algae and macrophytes), stream bottom (sediment composition), stream detritus (variation in detritus composition) and retention devices in stream (rocks and logs).

Habitat condition scores recorded at Glennies Creek monitoring sites (GCUp and GCMid) are consistent with those recorded for the previous reporting period. Habitat conditions at these sites are generally dependent upon water levels, with upstream dam water releases providing relatively stable flow rates during the reporting period.

Stream Health – Aquatic Fauna

Table 6.10 and **Table 6.11** present the long term macroinvertebrate diversity and SIGNAL Index scores respectively for monitoring locations within Bowmans Creek (including the subsidence pond locations) and Glennies Creek. In accordance with sampling triggers outlined in the BMP, diversity values and SIGNAL scores are ranked as either 'Low', 'In' or 'High' if they fall below, within or above one standard deviation from the long term mean.

Macroinvertebrate diversities recorded for Bowmans Creek during the reporting period was ranked as 'In' or 'High'. During the autumn sampling, ten sites were ranked as 'High' with the remaining sites ranked as 'In', indicating recovery from the 2025 spring survey. The total number of macroinvertebrates recorded was consistent with or higher than the previous years for both autumn and spring. Three sites in autumn and four sites in spring recording their highest, or equal highest, diversity result to date.

For Glennies Creek, macroinvertebrate diversity was ranked as 'In' for both sites sampled during the autumn and spring monitoring event.

Table 6.10
Stream Health Monitoring – Macroinvertebrate Diversity

Year	Period	Macroinvertebrate Diversity (No.)																														
		Bowmans Creek Sites^																				Summary		Glennies Creek Sites^					Summary	
		BC Up	BC1	BCLW7 B	BCLW6 B	BCED0	BCED1	BCED2	BC3	BC4	BC4.5	BCLW7 A	BCWD1	BCWD2	BC5	BC6	BC Down	SDLW3 N	SDLW4 S	SDLW5 S	SDLW5 N	*Total*	*Mean Site*	GC Up	GCOC Up	GC Mid	GCOC Down	GC Down	*Total*	*Mean*
2007	Autumn	12	-		-		-	-	-		-	21	-	-	-	-	9	-	-	-	-	***25***	***14.0***	26	-	17	-	14	***34***	***19.0***
	Spring	21	-		-		-	-	-		-	17	-	-	-	-	17	-	-	-	-	***30***	***17.0***	22	26	22	23	20	***42***	***22.6***
2008	Autumn	20	-		-		-	-	-		-	21	-	-	-	-	16	-	-	-	-	***32***	***18.8***	26	24	24	24	23	***42***	***24.2***
	Spring	24	12	18	18		-	-	-		-	21	-	-	-	-	16	-	-	-	-	***37***	***18.8***	21	20	21	22	20	***34***	***20.8***
2009	Autumn	23	12	24	24		-	-	-		-	21	-	-	-	-	22	-	-	-	-	***44***	***19.8***	22	24	23	27	24	***41***	***24.0***
	Spring	-	15	12	12		-	-	23		-	29	-	-	-	-	25	-	-	-	-	***46***	***21.2***	21	-	20	-	23	***33***	***21.0***
2010	Autumn	-	12	14	14		-	-	12		-	26	-	-	-	-	22	-	-	-	-	***40***	***17.5***	18	-	25	-	22	***36***	***22.0***
	Spring	18	-	19	19		-	-	-	24	-	-	-	-	-	22	12	-	-	-	-	***39***	***19.2***	9	-	30	22	-	***34***	***20.3***
2011	Autumn	20	-	19	19		-	-	-	21	-	-	-	-	-	18	21	-	-	-	-	***33***	***20.0***	-	-	27	23	-	***34***	***25.0***
	Spring	22	-	21	21		-	-	-	20	-	-	-	-	-	17	19	-	-	-	-	***37***	***19.8***	20	-	27	22	-	***35***	***23.0***
2012	Autumn	26	-	19	19		-	-	-	25	-	-	-	-	-	24	17	-	-	-	-	***39***	***22.2***	14	-	17	18	-	***26***	***16.3***
	Spring	35	22	17	17		-	-	-	24	-	35	-	-	-	31	23	-	-	-	-	***52***	***26.7***	26	-	28	24	-	***41***	***26.0***
2013	Autumn	27	23	23	23		-	-	26		-	33	-	-	-	24	24	-	-	-	-	***52***	***25.7***	17	-	21	-	-	***22***	***19.0***
	Spring	35	18	-	27		24	-	26		-	29	-	21	-	25	30	-	-	-	-	***53***	***26.1***	24	-	29	-	-	***32***	***26.4***
2014	Autumn	31	24	-	15		26	-	29		-	27	-	25	-	25	23	-	-	-	-	***52***	***25.0***	26	-	23	-	-	***31***	***24.5***
	Spring	32	20	-	25		27	-	22		-	21	-	21	-	31	24	-	-	-	-	***52***	***24.8***	22	-	22	-	-	***30***	***22.0***
2015	Autumn	23	21	-	13		27	-	23		-	24	-	21	-	20	19	-	-	-	-	***47***	***21.2***	20	-	21	-	-	***28***	***20.5***
	Spring	21	18	-	10		21	-	20		-	20	-	18	-	20	16	-	-	-	-	***38***	***18.2***	18	-	18	-	-	***23***	***18.0***
2016	Autumn	21	20	-	13		23	-	22		-	20	-	24	-	27	24	-	-	-	-	***49***	***21.6***	20	-	22	-	-	***27***	***21.0***
	Spring	21	16	-	20		22	-	23		-	20	-	24	-	20	22	-	-	-	-	***41***	***20.9***	19	-	18	-	-	***26***	***18.5***
2017	Autumn	23	20	-	18		19	-	22		-	19	-	22	-	21	20	-	-	-	-	***36***	***20.4***	17	-	20	-	-	***25***	***18.5***
	Spring	20	20	-	18		16	-	26		-	17	-	21	-	23	24	-	-	-	-	***42***	***20.6***	19	-	15	-	-	***22***	***17.5***
2018	Autumn	22	17	-	14		Dry	-	15		19	16	-	Dry	-	19	15	-	-	-	-	***39***	***17.1***	21	-	20	-	-	***28***	***20.5***
	Spring	21	18	-	Dry		Dry	-	Dry		20	24	-	Dry	-	14	19	-	-	-	-	***40***	***19.3***	17	-	19	-	-	***22***	***18.0***
2019	Autumn	Dry	14	-	Dry		Dry	-	Dry		18	Dry	-	Dry	-	14	21	-	-	-	-	***30***	***16.8***	18	-	16	-	-	***26***	***17.0***
	Spring	Dry	13	-	Dry		Dry	-	Dry		-	Dry	-	Dry	-	Dry	9	-	-	-	-	***18***	***11.0***	20	-	19	-	-	***25***	***19.5***
2020	Autumn	15	20	-	16		21	22	20		-	7	-	Dry	-	15	9	-	-	-	-	***28***	***16.2***	22	-	25	-	-	***31***	***23.5***
	Spring	25	23	-	20		22	21	21		-	21	-	21	-	20	20	-	-	-	-	***39***	***21.5***	26	-	32	-	-	***36***	***29.0***
2021	Autumn	18	23	-	18		20	18	19		-	10	-	19	-	21	13	-	-	-	-	***40***	***18.1***	23		20			***35***	***21.5***
	Spring	24	19	-	18		26	29	20		-	15	-	23	-	20	19	-	-	-	-	***44***	***20.5***	20		29			***32***	***24.5***
2022	Autumn	19	22	-	17		23	21	25		-	21	-	22	-	17	12	-	-	-	-	***52***	***19.9***	23		20			***28***	***21.5***
	Spring	22	23	25	15		18	19	27			24	21	17	20	26	14	28	21	-	-	***47***	***20.8***	27		27			***34***	***27.0***
2023	Autumn	29	23	Dry	Dry		25	18	Dry	-		30	19	Dry	14	26	27	22	18	19	17	***53***	***22.2***	23		30			***34***	***21.5***
	Spring	32	26	Dry	Dry	28	Dry	Dry	Dry	Dry	25	Dry	Dry	Dry	Dry	19	31	20	18	19	13	***55***	***23.1***	24		25			***33***	***24.5***
2024	Autumn	17	18	Dry	Dry		20	16	14	16		Dry	19	8	10	8	22	16	17	14	13	***40***	***15.3***	21		22			***29***	***21.5***
	Spring	27	20	Dry	24		26	25	28	28		Dry	25	Dry	22	26	22	22	16	15	15	***46***	***24.8***	27		29			***34***	***28.0***
2025	Autumn	26	25		21		24	31	31	26			21	27		22	19	19	14	20	14	***49***	***24.8***	20		26			***29***	***23.0***
	Spring	35	23		19		35	27	19	33			26			22	27	17	21	14	17	***55***	***26.6***	22		24			***31***	***23.0***
LTM[1]		***23.6***	***19.1***	***19.2***	***17.9***		***22.7***	***22.7***	***20.4***	***22.5***		***21.8***	***21.7***	***21.7***	***17.7***	***21.7***	***19.3***	***21.6***	***18.0***	***16.8***	***14.5***	***41.3***	***20.5***	***21.1***	***23.5***	***22.9***	***22.9***	***20.9***	***21.1***	***23.5***
SD LTM[2]		***5.4***	***4.0***	***4.0***	***4.5***		***3.3***	***3.3***	***2.4***	***4.2***		***6.3***	***3.1***	***3.1***	***3.2***	***4.6***	***5.6***	***4.3***	***1.9***	***2.6***	***1.9***	***8.9***	***3.6***	***3.9***	***2.5***	***4.5***	***2.4***	***3.4***	***3.8***	***2.5***
Status[3]	***Autumn***	In	High		In		In	High	High	In			In	High		In	In	In	Low	High	In	***In***	***High***	In		In			In	In
	Spring	High	In		In		High	High	In	High			High			In	High	Low	High	Low	High	***High***	***High***	In		In			In	In

^ See **Figure 6.1**.
Note 1: Long Term Mean of results preceding the two seasonal results recorded for the current reporting period.
Note 2: Standard deviation of results preceding the two seasonal results recorded for the current reporting period from the Long Term Mean.
Note 3: Status of each site compared to the Long Term Mean (LTM), where 'Low' = results below one standard deviation from the LTM, 'In' = results within one standard deviation from the LTM, and 'High' = results higher than one standard deviation above the LTM.
Note 4: Value not calculated due to low sample number.

Source: Modified after Tables 4, 5, 7 and 8 of Marine Pollution Research Pty Ltd (2026).

Table 6.11
Stream Health Monitoring – SIGNAL Scores

Signal Score																															
		Bowmans Creek Sites^																			*Summary*		Glennies Creek Sites^					*Summary*	
Year	Period	BCUp	BC1	BCLW7B	BCLW6B	BCED0	BCED1	BCED2	BC3	BCE4	BC4.5	BCLW7A	BCWD1	BCWD2	BC5	BC6	BC Down	SDLW3N	SDLW4S	SDLW5S	SDLW5N	*Creek Score*	*Mean Site*	GC Up	GCOC Up	GC Mid	GCOC Down	GC Down	*Creek Score*	*Mean Site*
2007	Autumn	2.17	-	-	-	-	-	-	-	-	2.93	3.24	-	-	-	-	3.33	-	-	-	-	***2.95***	***2.92***	3.71	-	3.81	-	3.58	***3.71***	***3.70***
	Spring	3.57	-	-	-	-	-	-	-	-	4.31	3.35	-	-	-	-	3.59	-	-	-	-	***3.64***	***3.69***	4.19	3.92	3.71	3.48	3.65	***3.80***	***3.79***
2008	Autumn	3.84	-	-	-	-	-	-	-	-	4.17	3.81	-	-	-	-	4.25	-	-	-	-	***4.00***	***4.02***	4.16	3.82	3.71	4.13	3.62	***3.90***	***3.89***
	Spring	4.13	3.92	3.89	3.89	-	-	-	-	-	4.00	3.71	-	-	-	-	3.88	-	-	-	-	***3.93***	***3.92***	3.85	3.84	4.00	3.62	3.40	***3.74***	***3.74***
2009	Autumn	3.87	3.64	3.50	3.50	-	-	-	-	-	3.76	4.00	-	-	-	-	3.70	-	-	-	-	***3.75***	***3.74***	3.68	4.00	4.10	3.96	4.05	***3.95***	***3.96***
	Spring	-	3.29	3.82	3.82	-	-	-	3.15	-	-	3.70	-	-	-	-	3.74	-	-	-	-	***3.55***	***3.54***	3.63	-	3.56	-	3.90	***3.71***	***3.70***
2010	Autumn	-	3.36	2.83	2.83	-	-	-	4.09	-	-	3.63	-	-	3.65	-	3.90	-	-	-	-	***3.61***	***3.58***	4.00	-	4.25	-	3.68	***3.98***	***3.98***
	Spring	3.33	-	3.84	3.84	-	-	-	-	3.50	-	-	-	-	-	3.52	3.67	-	-	-	-	***3.58***	***3.59***	3.22	-	3.61	3.55	-	***3.53***	***3.46***
2011	Autumn	3.60	-	3.47	3.47	-	-	-	-	3.62	-	-	-	-	-	3.44	3.60	-	-	-	-	***3.58***	***3.57***	-	-	3.81	3.74	-	***3.78***	***3.78***
	Spring	3.86	-	3.35	3.35	-	-	-	-	4.05	-	-	-	-	-	4.06	3.68	-	-	-	-	***3.79***	***3.80***	4.10	-	3.80	4.05	-	***3.97***	***3.98***
2012	Autumn	3.85	-	3.33	3.33	-	-	-	-	3.45	-	-	-	-	-	3.57	3.44	-	-	-	-	***3.55***	***3.53***	3.71	-	3.53	3.50	-	***3.57***	***3.58***
	Spring	3.77	3.68	4.00	4.00	-	-	-	-	4.18	-	3.85	-	-	-	3.62	3.75	-	-	-	-	***3.82***	***3.83***	3.92	-	3.79	4.50	-	***4.05***	***4.07***
2013	Autumn	3.77	3.73	3.45	3.45	-	-	-	3.73	-	-	3.61	-	-	-	3.83	3.76	-	-	-	-	***3.70***	***3.70***	3.88	-	4.14	-	-	***4.03***	***4.01***
	Spring	3.76	4.00	-	3.62	-	3.45	-	4.04	-	-	3.74	-	3.42	-	3.95	4.11	-	-	-	-	***3.79***	***3.79***	4.17	-	4.00	-	-	***4.08***	***4.09***
2014	Autumn	3.53	3.21	-	3.54	-	3.96	-	3.37	-	-	3.88	-	3.35	-	3.67	3.59	-	-	-	-	***3.57***	***3.57***	3.91	-	4.38	-	-	***4.14***	***4.15***
	Spring	4.00	3.47	-	3.63	-	4.48	-	3.70	-	-	3.53	-	3.65	-	3.63	3.86	-	-	-	-	***3.67***	***3.66***	4.15	-	4.33	-	-	***4.24***	***4.24***
2015	Autumn	3.83	3.65	-	3.10	-	3.44	-	3.70	-	-	3.23	-	3.70	-	3.53	3.72	-	-	-	-	***3.57***	***3.54***	3.50	-	4.19	-	-	***3.85***	***3.85***
	Spring	3.57	3.39	-	3.00	-	3.67	-	3.95	-	-	3.30	-	3.88	-	3.90	4.00	-	-	-	-	***3.66***	***3.63***	3.81	-	4.29	-	-	***3.97***	***3.97***
2016	Autumn	3.75	4.05	-	3.77	-	3.45	-	3.50	-	-	3.17	-	3.63	-	3.40	3.82	-	-	-	-	***3.61***	***3.61***	3.22	-	3.71	-	-	***3.44***	***3.47***
	Spring	3.52	3.13	-	3.26	-	3.70	-	3.38	-	-	3.00	-	3.73	-	3.47	3.50	-	-	-	-	***3.36***	***3.41***	3.65	-	3.35	-	-	***3.65***	***3.50***
2017	Autumn	3.35	3.78	-	2.94	-	3.88	-	4.05	-	-	3.11	-	3.38	-	3.42	3.68	-	-	-	-	***3.42***	***3.51***	3.94	-	3.53	-	-	***3.56***	***3.73***
	Spring	3.61	3.84	-	3.59	-	3.44	-	3.38	-	-	3.38	-	3.52	-	3.55	3.45	-	-	-	-	***3.42***	***3.53***	3.55	-	3.63	-	-	***3.54***	***3.59***
2018	Autumn	3.71	3.27	-	2.62	-	Dry	-	2.92	-	-	2.69	-	Dry	-	3.28	3.20	-	-	-	-	***3.18***	***3.13***	3.42	-	3.88	-	-	***3.64***	***3.65***
	Spring	3.05	3.18	-	Dry	-	Dry	-	Dry	-	-	3.71	-	Dry	-	3.45	3.00	-	-	-	-	***3.30***	***3.30***	4.14	-	3.75	-	-	***3.93***	***3.95***
2019	Autumn	Dry	3.43	-	Dry	-	Dry	-	Dry	-	-	Dry	-	Dry	-	3.08	3.05	-	-	-	-	***3.18***	***3.19***	3.94	-	3.86	-	-	***3.90***	***3.90***
	Spring	Dry	4.09	-	Dry	-	Dry	-	Dry	-	-	Dry	-	Dry		Dry	2.75	-	-	-	-	***3.42***	***3.42***	4.12	-	3.61	-	-	***3.86***	***3.87***
2020	Autumn	3.15	3.38	-	3.23	-	3.22	3.11	3.06	-	-	2.00	-	Dry	-	3.17	2.50	-	-	-	-	***3.07***	***2.98***	3.65	-	4.00	-	-	***3.84***	***3.83***
	Spring	3.73	3.76	-	3.17	-	3.75	3.37	3.35	-	-	3.25	-	3.89	-	3.39	3.32	-	-	-	-	***3.50***	***3.49***	4.17	-	3.94	-	-	***4.04***	***4.05***
2021	Autumn	4.18	3.73	-	3.53	-	3.63	4.18	4.00	-	-	3.50	-	4.32	-	4.33	3.91	-	-	-	-	***4.08***	***3.90***	3.90	-	3.95	-	-	***3.93***	***3.90***
	Spring	3.59	3.58	-	3.38	-	3.42	3.59	3.75	-	-	3.62	-	3.91	-	3.90	3.63	-	-	-	-	***3.62***	***3.61***	4.05	-	3.92	-	-	***3.99***	***3.99***
2022	Autumn	3.63	3.68	-	3.56	-	4.09	4.05	3.88	-	-	3.61	-	3.65	-	3.47	3.67	2.83	2.85	-	-	***3.73***	***3.71***	3.70	-	4.05	-	-	***3.82***	***3.87***
	Spring	4.23	4.26	3.40	3.20	-	4.78	3.95	4.30	-	-	3.68	4.05	4.71	4.30	4.00	4.07	-	-	-	-	***4.07***	***4.07***	3.54	-	3.70	-	-	***3.62***	***3.62***
2023	Autumn	3.78	3.68	Dry	Dry	-	4	3.94	Dry	3.83		3.45	3.74	Dry	3.46	3.65	3.92	3.44	3.07	3.2	3.07	***3.75***	***3.74***	4.00	-	4.11	-	-	**4.08**	**4.07**
	Spring	3.90	3.50	Dry	Dry	3.19	Dry	Dry	Dry	Dry	3.19	Dry	Dry	Dry	Dry	3.88	3.66	3.00	3.33	3.27	3.44	***3.57***	***5.57***	3.50	-	4.04	-	-	**3.79**	**3.77**
2024	Autumn	3.60	Dry	Dry	Dry	-	3.00	2.92	2.55	3.23	-	Dry	3.00	3.00	2.50	3.33	3.26	2.77	2.77	2.40	3.33	***3.08***	***3.05***	3.38	-	3.73	-	-	**3.56**	***3.55***
	Spring	3.65	Dry	Dry	3.50	-	3.58	3.52	3.33	3.46	-	Dry	3.38	Dry	3.48	3.39	3.62	3.21	3.27	3.46	3.07	***3.48***	***3.48***	4.08	-	4.07	-	-	**4.08**	**4.08**
2025	Autumn	4.23	3.72		3.22		3.74	3.63	3.83	3.56			3.76	3.69		3.45	3.82	3.07	3.00	3.25	3.09	***3.71***	***3.70***	4.15	-	4.20	-	-	**4.18**	**4.18**
	Spring	3.85	3.82		3.33		3.71	3.46	3.42	3.59			3.56			3.47	3.62	3.25	3.21	3.43	2.93	***3.62***	***3.60***	3.64	-	4.05	-	-	**3.84**	**3.84**
LTM[1]		***3.66***	***3.61***	***3.54***	***3.33***		***3.71***	***3.71***	***3.63***	***3.73***			***3.73***	***3.77***	***3.80***	***3.61***	***3.61***	***3.68***	***3.02***	***3.08***	***3.23***	***3.6***	***3.6***	***3.82***	***3.90***	***3.89***	***3.83***	***3.70***	***3.85***	***3.84***
SD LTM[2]		***0.38***	***0.29***	***0.33***	***0.30***		***0.37***	***0.37***	***0.38***	***0.30***			***0.30***	***0.37***	***0.44***	***0.29***	***0.29***	***0.38***	***0.26***	***0.47***	***0.19***	***0.3***	***0.3***	***0.28***	***0.08***	***0.25***	***0.36***	***0.21***	***0.20***	***0.21***
Status[3]	**Autumn**	High	In		In		In	In	In	In			In	In		In	In	In	In	In	In	***In***	***In***	High		High			High	High
	Spring	In	In		In		In	In	In	In			In			In	In	In	In	In	Low	***In***	***In***	In		In			In	In

^See **Figure 6.1**
Note 1: Long Term Mean of results preceding the two seasonal results recorded for the current reporting period.
Note 2: Standard deviation of results preceding the two seasonal results recorded for the current reporting period from the Long Term Mean.
Note 3: Status of each site compared to the Long Term Mean (LTM), where 'Low' = results below one standard deviation from the LTM, 'In' = results within one standard deviation from the LTM, and 'High' = results higher than one standard deviation above the LTM.
Note 4: Value not calculated due to low sample number.

Source: Modified after Tables 6, 7 and 9 of Marine Pollution Research Pty Ltd (2026).

Site SIGNAL scores recorded for Bowmans Creek were 'In' for all sites sampled during both autumn and spring (excluding Dry sites), with the exception of BCUp in autumn which recorded 'High' and SDLW5N in spring which recorded 'Low'. For Glennies Creek, all macroinvertebrate diversities and SIGNAL scores were 'High' during autumn and 'In' during spring. The general consistency or improvement in SIGNAL scores compared to the previous reporting periods likely reflect a gradual recolonisation by more sensitive taxa due to sustained water levels, with complete recolonisation likely to take time due to the need for adult stages of these taxa to recolonise upstream areas by aerial means.

In addition to aquatic macroinvertebrates, five native fish species and two pest species were recorded within Bowmans Creek during the reporting period, as follows.

Native Species

- Flathead gudgeons (*Phylipnodon grandiceps*)
- Firetail gudgeons (*Hypseleotris galii*)
- Australian smelt (*Retropinna semmoni*)
- Eel-tailed catfish (*Tandanus tandanus*)
- Long-finned eels (*Anguilla reinhardtii*)

Pest Species

- Plague minnow (*Gambusia holbrooki*
- Carp (*Cyprinus carpio*)

A Long-necked turtle *(Chelodina longicollis)* was also observed at site BCED2 in spring. Tadpoles were also observed within Bowmans Creek during autumn.

Vegetation - Bowmans Creek Riparian Zone

Monitoring of the Bowman Creek riparian vegetation was undertaken during the reporting period between 5 May to 14 May 2025 by DnA Environmental. Monitoring of riparian vegetation is undertaken at the ACP site to assess the condition of vegetation associated with Bowmans Creek, the status of vegetation and rehabilitated areas within the Bowmans Creek Diversion channels, and the condition of local protected River Red Gum (*Eucalyptus camaldulensis*) populations.

A total of 17 riparian vegetation sites were monitored during the reporting period, including five Casuarina monitoring sites, four Casuarina rehabilitation sites, four Eucalypt woodland rehabilitation sites, three Casuarina reference sites and one remnant Red River Gum woodland site. Monitoring of reference sites which are representative of natural vegetation communities is undertaken in order to inform appropriate completion criteria and ecological targets for rehabilitated areas within the ACP site.

Table 6.12 presents an overview of the performance of each monitoring site against the relevant completion criteria. In summary, rehabilitated casuarina and eucalypt woodland sites have generally formed functional and stable ecosystems comparable to conditions recorded in reference sites not subject to mining-related impacts.

The stability of the Casuarina reference sites is showing signs of recovery following a declining trend since 2019, as a direct result of the extreme flood events over the past few years. Drier conditions throughout 2023 and 2024 have resulted in the re-establishment of groundcover.

Despite flooding events during 2025, Casuarina monitoring sites stability remained high with indices ranging from 69.8 to 74.3 and all sites comparable or higher than the stability of the reference sites.

Stability within the woodland sites compared to Casuarina sites is generally more stable in the long term, and less impacted from extreme weather events such as flooding. However, during 2025 the combination of ongoing dry conditions and light grazing by cattle caused a decline in the stability of the woodland reference sites with stability indices ranging from 68.0 to 71.0, comparable with the indices reported for the Casuarina sites. Stability of woodland monitoring sites also experienced marginal decline compared with the previous year, with stability ranging from 66.0 to 72.5 in 2024 to 65.3 to 73.0 in 2025, with R3 lower than the reference sites.

High ecosystem function at creek diversion sites (C) suggest that diversion sites are performing as good or better than most natural creek (Q) and all reference (CC) monitoring sites. For Eucalypt woodland, reference sites RWood04 and RWood02 were the most ecologically functional with ecosystem function scores of 179 and 177 respectively. The ecosystem function at the four Eucalypt woodland rehabilitation sites and remnant River Red Gum woodland site was higher or equivalent to reference sites RWood01, ecosystem function ranging from 163 to 173.

Other performance targets which have not yet been achieved are primarily dependent upon community maturity, with performance indicators including litter cover, canopy cover, trunk diameter and provision of wildlife habitat expected to develop over time.

Monitoring also indicated that there has been an increase in health condition of the population in all age cohorts for River Red Gum, with 62% of the population being assessed as being in healthy condition. The percentage of the population assessed as being in poor health declined from 11% in 2024 to 8% in 2025, with continuous low to moderate insect damage found across the population. Saplings were overrepresented as having medium to poor health compared to old growth, mature, and young trees, again due to increased insect damage resulting in decreased foliage cover or sapling mortality.

River Red Gum population size has increased overall since 2017 from 102 to 155 individual specimens being identified. This year, 25% of the population were identified as bearing reproductive structures during the reporting period, an increase from 2024, with 19% specimens being observed as bearing reproductive material.

Approximately 61% of the population consists of saplings, consistent with the previous reporting period during which saplings made up approximately 66% of the population. Overall recent regeneration events remain limited.

Table 6.12
Bowmans Creek Riparian Zone – Completion Criteria Status

Rehabilitation Phase	Completion Criteria	Performance Indicator	Unit of Measure	Casuarina Monitoring Site									Mixed Eucalypt Monitoring Site				
				C1	C2	C3	C4	Q3	Q4	Q7	Q9	Q10	R1	R3	R5	R6	RRG01
Phase 3: Landform establishment and stability	Landform suitable for final landuse and generally compatible with surrounding topography and final landform design	Slope	< Degrees (18°)	2	2	18	15	3	15	15	14	3	3	1	18	2	22
	Areas of active erosion are limited	No. Rills/Gullies	No.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phase 4: Growth medium development	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH (5.6-7.3)	6.7	6.3	6.5	6.7	7.3	7.1	7.1	6.9	7.1	6.4	6.5	7.1	6.3	7.4
		Organic Matter	% (>4.5)	5.1	7.2	4.2	5.8	3.8	4.9	5.1	5.0	5.2	3.5	3.9	5.3	6.0	5.4
		Phosphorous	mg/ kg (50)	17.0	23.0	27.0	32.0	16.0	11.0	30.0	13.0	17.0	19.0	44.0	26.0	13.0	37.0
Phase 5: Ecosystem & Land Use Establishment	Landform is stable and performing as it was designed to do	LFA Stability	%	75.1	75.6	65.7	69.3	66.3	75.4	71.1	77.5	73.8	68	65.3	73	70	72.2
		LFA Landscape organisation	%	100	100	93	98	100	100	100	100	100	100	90	100	100	85
	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	% population	50	71	100	100	100	0	0	0	100	100	100	100	100	100
		Total species richness	No./ area	29	23	51	28	45	38	13	42	41	34	51	49	50	37
		Native species richness	>No./ area	3	5	13	6	9	6	3	9	11	10	20	20	23	10
		Exotic species richness	<No./ area	26	18	38	22	36	32	10	33	30	24	31	29	27	27
	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	No./ area	1	9	6	13	1	0	0	0	0	0	0	0	0	1
	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	No./ area	2	2	4	1	1	1	1	3	1	3	3	3	6	3
		Shrubs	No./ area	0	1	3	0	0	0	0	0	1	2	1	0	1	1
		Herbs	No./ area	19	13	30	19	33	27	8	24	29	14	22	28	22	23
		Grasses	No./ area	3	1	8	4	6	6	2	10	5	9	14	7	13	5
Phase 6: Ecosystem & Land Use Development	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	%	54.8	58.8	51	52.6	54.4	50.5	52.8	55	44.3	53.4	50.2	49.9	50.6	47.5
		LFA Nutrient recycling	%	52.8	59.2	49.1	46.4	47.7	48.3	48.1	55.3	44	51.5	47.9	48.3	48.7	45.6
	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	%	48.5	35	19.5	59.5	20.5	69	67	62.5	33	13	12.5	32	24	69.5
		Total Ground Cover	%	97.5	89.5	95	96	89	99	99	99	100	99	97	98.5	100	100
	The vegetation is maturing and/or natural recruitment is occurring at rates similar to those of the local remnant vegetation	Shrubs and juvenile trees 0 - 0.5m in height	No./ area	0	1	0	0	0	0	0	0	0	6	0	0	0	0
		Shrubs and juvenile trees >2m in height	No./ area	1	10	19	12	1	0	0	0	0	9	1	4	30	1
	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	% cover	8.2	6	7	7.5	3	14	22.5	7.5	0	3.2	0	5.5	2	4.5
		Foliage cover >6m	% cover	28	29	26	35	11	33	29	0	7	28	24	0	9	37
	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity	species/ area	1	2	4	1	1	1	1	1	1	3	3	3	6	3

Table 6.12 (Cont'd)
Bowmans Creek Riparian Zone – Completion Criteria Status

Rehabilitation Phase	Completion Criteria	Performance Indicator	Unit of Measure	Casuarina Monitoring Site									Mixed Eucalypt Monitoring Site				
				C1	C2	C3	C4	Q3	Q4	Q7	Q9	Q10	R1	R3	R5	R6	RRG01
Phase 6: Ecosystem & Land Use Development (Cont'd)	Vegetation contains a density of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree density	No./ area	31	86	48	79	5	6	9	2	2	14	25	6	30	6
	The vegetation is in a condition comparable to that of the local remnant vegetation.	Healthy trees	% population	50	33	29	35.4	100	67	42	100	33	71	64	50	33	38
		Medium health	% population	47	60	53	43	0	33	33	0	0	29	32	50	53	38
		Advanced dieback	% population	0	2	11.8	4	0	0	0	0	0	0	4	0	13	0
		Dead Trees	% population	3	4	6	18	0	0	25	0	67	0	0	0	0	25
		Flowers/fruit: Trees	% population	31	2	14	2	0	33	8	100	0	14	4	0	0	25

NA = Not Applicable

Green = Meets or exceeds completion criteria.

Blue = Soil performance indicator target falls within industry guidelines but may not be similar to local soils.

Light Orange = Eucalypt Woodland sites meet or exceed comparable ecological performance targets derived from Casuarina reference sites.

Source: DnA Environmental (2025).

Erosion and decreased soil stability associated with previous cattle presence in riparian areas has been the most significant threat to the health of riparian areas associated with Bowmans Creek. In particular, during drought conditions in 2017 and 2019, increased levels of grazing in riparian areas combined with increased vulnerability of soils and creek banks to erosion threatened rehabilitated areas as well as established remnant vegetation. Subsequently most ACOL farmland areas, including the creek were destocked in 2020 and, with improved seasonal conditions, significant understory growth of grass (and weeds) has occurred. Notwithstanding, some of the old growth trees remain susceptible to degradation as their roots remain exposed and some are on very steep sided banks and may become unstable and fall.

Removal of grazing has led to high abundance of weed species. Effects from targeted weed species controls were noted through observation of dead individuals, however, overall weed abundance remained high and some weeds, such as balloon vine (*Cardiospermum halicacabum*), have increased in abundance significantly and become impenetrable in sections along Bowmans Creek.

Exotic species richness was higher than that of native species at all sites, and the understory for all sites was dominated by exotic species. Fifteen priority and declared weed species were recorded across the Bowmans Creek monitoring sites during the reporting period and will require continued control.

Vegetation - Southern Woodland Conservation Area

A Voluntary Conservation Agreement covering the SWCA was established between ACOL and the Minister for the Environment under the *National Parks and Wildlife Act 1974* on 16 September 2010. The SWCA covers an area of 65.66ha above the existing underground mine (see **Figure 6.1**) and contains remnant Hunter Valley vegetation communities, threatened fauna species and archaeological sites of high significance.

Monitoring of the SWCA was undertaken during the reporting period by DnA Environmental between 5 May and 14 May 2025. Monitoring methods included the use of the Biometric Assessment Method in areas of subsidence repair, NSW Biodiversity Conservation Division monitoring forms and photo points for three established sites (SVCA01, SVCA02 and SVCA03), transects in areas of subsidence repair and additional photo monitoring points. Three eucalypt woodland reference sites were also used to inform benchmark ecological community values and determine appropriate ecological performance targets and completion criteria.

Table 6.13 presents an overview of the performance of each monitoring site within the SWCA against the relevant completion criteria. In summary, all sites met almost all of the specified completion criteria. LFA stability was generally consistent with reference sites with the exception of SVCA05 which failed to meet the relevant criteria. Low values were recorded for SCVA03 for vegetation diversity, density, and ecosystem composition. LFA infiltration and LFA Nutrient Cycling were within range for SVCA02, SVCA03 and SVCA04.

Subsidence crack treatment works involving clearing, excavation and backfilling were undertaken at sites SVCA05 and SVCA06 in 2018. During the 2025 monitoring, there was observed subsidence cracking at SVCA04. Despite this, LFA stability and landscape organisation at sites SVCA04, SVCA02 and SVCA01 had functionality higher than the woodland reference site RWood01. SVCA06 and SVCA05 displayed improvement from previous years, with SVCA06 meeting the minimum observed values for LFA stability, and both sites becoming more aligned with the results of the other monitoring locations for most criteria. It is noted that

SCVA05 failed to meet LFA stability criteria, largely due to recent earthworks which took place in 2022 and 2023 relating to subsidence repair. It is anticipated that these sites will develop towards the completion criteria as they mature.

Further incidences of subsidence cracking and/or development of localised depressions within previously rehabilitated areas highlight the importance of re-inspection and potential for additional rehabilitation. Soil analyses indicate that the soils were typically within local or desirable levels although Iron levels were significantly high in all SVCA sites. Sulfur levels at SVCA02 were moderately high during the 2025 monitoring.

Fourteen priority and declared weed species were recorded across the SVCA monitoring sites, including many priority weed species identified as occurring within one or more woodland reference sites. Exotic perennial grasses considered to be environmental weeds were also recorded in patches throughout the SVCA, ACOL farmland and roadside areas.

Vegetation - Farmland Underground Mining Area

Monitoring of the agricultural grazing lands, including both pasture and woodland, located above the underground mining area was undertaken by DnA Environmental between 5 and 14 May 2025.

Three eucalypt woodland and three native grassland reference sites were used to develop benchmark ecological values and inform ecological performance targets and completion criteria for woodland and grassland areas within the underground mining affected areas.

Table 6.14 presents an overview of the performance of each monitoring site against the relevant completion criteria. In summary, the highest ecosystem function was recorded at sites UGPast05 and SVCA03, with scores of 183.8 and 180.1 respectively. UGWood1 and UGWood2 recorded scores of 160.5 and 161.9 respectively while SVCA04 recorded a score of 138.

For grasslands, the most ecologically functional sites were UGPast05, UGPast01, and UGPast03 with a total sum of LFA indices of 197, 194 and 191 respectively. UGPast05 and UGPast04 were the least ecologically functional sites, with total sum LFA indices of 169 and 168 respectively. The historical data indicated that the ecological capacity of three pasture sites affected by underground mining had improved since 2007.

In woodlands affected by underground mining, changes in native plant cover were relatively minor. Exotic species had a higher diversity at all underground monitoring sites except for UGPast03 and UGPast05. Perennial groundcover was less than criteria at woodland sites UGWood01 and Woodland02 and underground monitoring sites UGPast02 and UGPast06.

Soil characteristics in the underground woodland and grasslands sites were similar to the reference sites and/or desirable agricultural guidelines in all cases. All underground woodland and grasslands sites had acceptable sodium levels and were non sodic. The results of the soil analyses also indicate that the soils in the farmland and SVCA areas tended to have significantly to excessively high concentrations of iron including all reference sites, suggesting iron naturally occurs in high levels in the local area. Sulfur levels were also elevated in numerous sites, also suggesting that sulfur naturally occurs at slightly elevated concentrations in the area.

Table 6.13
Southern Woodland Conservation Area – Completion Criteria Status 2025

Rehabilitation Phase	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Primary Performance Indicators	Unit of Measure	Woodland Ecosystem Range 2025		SVCA01	SVCA02	SVCA03	SVCA04	SVCA05	SVCA06
						Lower	Upper						
Phase 3: Landform establishment and stability	Landform slope, gradient	Landform suitable for final landuse and generally compatible with surrounding topography and final landform design	Slope	Landform is generally compatible within the context of the local topography and final landform design.	< Degrees (18°)	5	25	10	7	3	8	8	7
	Subsidence cracking	No visible subsidence cracking	No. Subsidence Cracks	Woodland impacted by mine subsidence are restored and comparable to the reference sites	No.	0	0	0	0	0	1	0	0
			Sum of subsidence cracks width	Provides an assessment of the extent of subsidence cracking and demonstrates that repair works have been satisfactory	m	0	0	0	0	0	0.4	0	0
Phase 4: Growth medium development	Soil chemical, physical properties and amelioration	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH is typical of the surrounding landscape or falls within desirable ranges provided by the agricultural industry	pH (5.6-7.3)	5.6	6.3	5.9	6.0	6.0	6.1	6.1	6.8
			Organic Matter	Organic Matter levels are typical of the surrounding landscape, increasing or fall within desirable ranges provided by the agricultural industry	% (>4.5)	5.1	10.3	7.6	9.2	5.3	4.8	8.2	4.7
			Phosphorous	Available Phosphorus is typical of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	mg/kg (50)	6.8	13.0	6.8	7.7	12.0	5.5	11.0	8.5
Phase 5: Ecosystem & Land Use Establishment	Landscape Function Analysis (LFA): Landform stability and organisation	Landform is stable and performing as it was designed to do	LFA Stability	The LFA stability index is comparable to or trending towards the local remnant vegetation	%	68.0	71.0	70.3	71.8	80.1	73.7	65	69.4
			LFA Landscape organisation	The Landscape Organisation Index provides a measure of the ability of the site to retain resources and is comparable to the local remnant vegetation	%	88	100	95	100	100	100	73	91
	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	The diversity of shrubs and juvenile trees with a stem diameter < 5cm is comparable to the local remnant vegetation.	species/area	2	3	5	5	0	NA	NA	NA
				The percentage of shrubs and juvenile trees with a stem diameter < 5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation	% population	88	100	98	90	0	NA	NA	NA
			Total species richness	The total number of live plant species is comparable to the local remnant vegetation	No./area	57	65	56	60	49	54	72	63
			Native species richness	The total number of live native plant species is greater than or comparable to the local remnant vegetation	>No./area	39	45	38	42	23	43	44	39
			Exotic species richness	The total number of live exotic plant species is less than or comparable to the local remnant vegetation	<No./area	18	20	18	18	26	11	28	24
	Vegetation density	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	The total density of shrubs or juvenile trees with a stem diameter < 5cm is comparable to the local remnant vegetation	No./area	22	137	197	104	0	NA	NA	NA
				The density of endemic shrubs or juvenile trees with a stem diameter < 5cm is comparable to that of the local remnant vegetation	No./area	22	121	193	94	0	NA	NA	NA

Table 6.13 (Cont'd)
Southern Woodland Conservation Area – Completion Criteria Status 2025

Rehabilitation Phase	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Primary Performance Indicators	Unit of Measure	Woodland Ecosystem Range 2025		SVCA01	SVCA02	SVCA03	SVCA04	SVCA05	SVCA06
						Lower	Upper						
Phase 5: Ecosystem & Land Use Establishment (Cont'd)	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	The number of tree species regardless of age comprising the vegetation community is comparable to the local remnant vegetation	No./area	2	2	3	2	0	3	2	2
			Shrubs	The number of shrub species regardless of age comprising the vegetation community is comparable to the local remnant vegetation	No./area	0	2	3	4	0	4	5	2
			Herbs	The number of herbs or forb species comprising the vegetation community is comparable to the local remnant vegetation	No./area	33	38	30	34	25	26	34	30
			Grasses	The number of grass species comprising the vegetation community is comparable to the local remnant vegetation	No./area	9	15	10	11	13	13	19	19
Phase 6: Ecosystem & Land Use Development	Landscape Function Analysis (LFA): Landform function and ecological performance	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	LFA infiltration index is comparable to or trending towards the local remnant vegetation	%	45.7	56.3	46.5	55.4	58.2	56	40.8	46.4
			LFA Nutrient recycling	LFA nutrient recycling index is comparable to or trending towards the local remnant vegetation	%	46.8	52.7	46.3	52.2	54.2	52.4	39.2	45.7
	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	Percent ground cover provided by live perennial vegetation (<0.5m in height) is comparable to the local remnant vegetation	%	7	35	38	6	68	31	17.8	37.5
			Total Ground Cover	Total groundcover is the sum of protective ground cover components (as described above) and that it is comparable to the local remnant vegetation	%	52	100	99	100	100	98	76	93
	Native ground cover abundance	Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	The percent ground cover abundance of live perennial vegetation (<0.5m in height) is comparable to the local remnant vegetation	%	7	35	38	6	68	31	17.8	37.5
	Ecosystem growth and natural recruitment	The vegetation is maturing and/or natural recruitment is occurring at rates similar to those of the local remnant vegetation	shrubs and juvenile trees 0 - 0.5m in height	The number of shrubs or juvenile trees <0.5m in height provides an indication of establishment success and/or natural ecosystem recruitment and is comparable to the local remnant vegetation	No./area	7	33	152	54	0	NA	NA	NA
			shrubs and juvenile trees 0.5 - 1m in height	The number of shrubs or juvenile trees 0.5-1m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and is comparable to the local remnant vegetation	No./area	1	22	36	33	0	NA	NA	NA
			shrubs and juvenile trees 1.5 - 2m in height	The number of shrubs or juvenile trees 1.5-2m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and is comparable to the local remnant vegetation	No./area	0	24	3	9	0	NA	NA	NA

Table 6.13 (Cont'd)
Southern Woodland Conservation Area – Completion Criteria Status 2025

Rehabilitation Phase	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Primary Performance Indicators	Unit of Measure	Woodland Ecosystem Range 2025		SVCA01	SVCA02	SVCA03	SVCA04	SVCA05	SVCA06
						Lower	Upper						
Phase 6: Ecosystem & Land Use Sustainability (Cont'd)	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	Projected foliage cover provided by perennial plants in the 0.5 - 2m vertical height stratum indicates the community structure is comparable to the local remnant vegetation	% cover	1	2	0	2	2	1.5	0	2
			Foliage cover 2 - 4m	Projected foliage cover provided by perennial plants in the 2 - 4m vertical height stratum indicates the community structure is comparable to the local remnant vegetation	% cover	0	8	2	2.5	0	3	0	6
			Foliage cover >6m	Projected foliage cover provided by perennial plants >6m vertical height stratum indicates the community structure is comparable to the local remnant vegetation	% cover	6	23	23.5	36	0	20.5	14	3
	Tree diversity	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity	The diversity of trees or shrubs with a stem diameter >5cm is comparable to the local remnant vegetation	Species/ area	1	2	2	2	0	NA	NA	NA
				The percentage of maturing trees and shrubs with a stem diameter >5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation	%	100	100	100	100	0	NA	NA	NA
	Tree density	Vegetation contains a density of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree density	The density of shrubs or trees with a stem diameter > 5cm is comparable to the local remnant vegetation	No./ area	15	80	25	20	0	NA	NA	NA
	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation.	Healthy trees	The percentage of the tree population which are in healthy condition and that the percentage is comparable to the local remnant vegetation	% population	16	59	30	43	0	NA	NA	NA
			Flowers/fruit: Trees	The presence of reproductive structures such as buds, flowers or fruit provides evidence that the ecosystem is maturing, capable of recruitment and can provide habitat resources comparable to that of the local remnant vegetation	% population	0	6	0	30	0	NA	NA	NA

Green = Meets or exceeds completion criteria.
Blue = Soil performance indicator target falls within industry guidelines but may not be similar to local soils.
NA = Not Applicable.

Source: DnA Environmental (2025) – Modified after Table 5-9.

Table 6.14
Farmland – Completion Criteria Status 2025

Rehabilitation Phase	Completion criteria	Performance Indicators	Unit of measure	Pasture						Woodland		
				UGPast01	UGPast02	UGPast03	UGPast04	UGPast05	UGPast06	UGWood01	UGWood02	UGWood03
Phase 3: Landform establishment and stability	Landform suitable for final land use and generally compatible with surrounding topography and final landform design	Slope	< Degrees (18°)	2	2	3	5	2	2	2	1	4
	No visible subsidence cracking	No. Subsidence Cracks	No.	0	0	0	1	0	2	0	1	0
		Sum of subsidence cracks width	m	0	0	0	1.20	0	2.20	0	1.3	0
Phase 4: Growth medium development	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH (5.6-7.3)	6.2	6.2	6.0	6.2	6.6	6.4	5.2	5.7	6.0
		Organic Matter	% (>4.5)	7.0	6.8	5.6	5.2	8.2	4.1	4.9	3.9	5.5
		Phosphorous	mg/kg (50)	54.0	140.0	8.3	8.2	150.0	14.0	6.9	4.5	11.0
Phase 5: Ecosystem & Land Use Establishment	Landform is stable and performing as it was designed to do	LFA Stability	%	79.3	78.4	80	74.4	83.8	73.7	65.5	67.9	71
		LFA Landscape organisation	%	100	100	100	100	100	100	95	94	100
Phase 6: Ecosystem & Land Use Development	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	%	56.6	55.2	57.8	46	57.8	46.9	45	46.2	43.9
		LFA Nutrient recycling	%	57.6	53.1	53.1	47.7	55.5	48.5	42.9	45.5	44.8
	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	%	81.5	31	73.5	76	62	28.5	5	2.5	24
		Total Ground Cover	%	100	100	100	98	100	98.5	89.5	88	91
	Native ground cover abundance is comparable to that of the local remnant vegetation	Percent plant cover <0.5m	% cover	81.5	31	73.5	76	62	28.5	5	2.5	24
	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	% cover	5.5	3.5	4	3	0	0	2	11.5	3.5
		Foliage cover 2 - 4m	% cover	0	0	0	0	0	0	9.5	15	3.5
		Foliage cover 4 - 6m	% cover	0	0	0	0	0	0	5	17	5
		Foliage cover >6m	% cover	0	0	0	0	0	0	3	11	1

Green = Meets or exceeds completion criteria.

Blue = Soil performance indicator target falls within industry guidelines but may not be similar to local soils.

NA = Not Applicable.

Source: DnA Environmental (2025)

Subsidence impacts over several years near UGWood01 and UGWood02 have resulted in vegetation loss and/or reduction in health, including loss of larger specimens. Significant surface cracking near SVCA04 was also observed. SVCA06 recorded improved levels of ground cover, while SVCA05 continues to have observed subsidence impacts, however slight improvements of ground cover were observed this year. No obvious signs of subsidence were observed in UGWood03, SVCA01 and SVCA02, however, significant ponding was observed downslope of the monitoring areas. No new surface cracking was observed at any pasture site, however, surface cracking previously observed at UGPast04 and UGPast06 remained constant with the previous monitoring period.

Eleven priority and declared weed species were recorded across the underground mining monitoring sites, with the most common species being Galenia (*Galenia pubescens*) and Fireweed (*Senecio madagascariensis*).

Reportable Incidents

No reportable incidents were recorded during the reporting period.

Further Improvements

As a result of the monitoring undertaken during the reporting period the following improvements will continue to be investigated during future reporting periods.

- Strategic grazing management will be reintroduced to effectively manage weed biomass and fuel loads once effective subsidence have been complete.
- Within the Bowmans Creek Riparian corridor, consideration of investigations to identify crucial erosion areas and where rehabilitation and restoration works are required.
- Habitat enhancement plantings, particularly within the narrow casuarina woodland areas, will also be considered. Plantings will include a high proportion of shrubs, native grasses, and reeds to aid with erosion control.

Ongoing weed control will also continue to be undertaken, including manual methods and use of cut and paste herbicide where existing native trees and shrubs are present to minimise collateral mortality associated with broadcast spraying.

6.7 HERITAGE

Management of heritage was undertaken in accordance with the April 2023 Heritage Management Plan. The following heritage inspections and salvage works were undertaken by Stratum Archaeology Pty Ltd during the reporting period in accordance with Aboriginal Heritage Impact Permits and S140 Excavation Permit (historic heritage).

- Inspections/assessments were undertaken for:
  - Historic shepherds hut.
  - Arther Fletcher RUMEx testing area.
  - Overflow carpark fence.
  - LW208 and LW207B subsidence cracking repair works.

- Annual inspection of archaeological sites outlined within the Heritage Management Plan.
- Desktop due diligence reviews of pipeline trenching in previously cleared areas.

Where relevant, all works were undertaken with representatives for ACOL Registered Aboriginal Parties and all recovered artefacts were placed in the ACOL secure temporary artefact storage room at the ACOL administration building.

Ongoing consultation with the Aboriginal community also continued through the ACCF, of which two meetings were held during the reporting period, the first on 2 June and the second on 18 November 2025. During the ACCF meetings, Company personnel and representatives of the Aboriginal community discussed current and future mine activities, upcoming cultural heritage and archaeological fieldwork, and any issues associated with the management of cultural heritage on site.

During the reporting period, the Heritage Management Plan was reviewed and updated as part of the Extraction Plan for LW403-406. Currently no further improvements or changes to heritage management are planned during the next reporting period.

6.8 SUBSIDENCE

Environmental Management

To date, six Extraction Plans have been prepared/approved for the ACP. Environmental assessments, public safety management plans, subsidence assessments and subsidence monitoring plans have been incorporated into Extraction Plans as required. Copies of all relevant Extraction Plans and approvals are available on the ACP website.

Environmental Performance

Underground longwall mining operations commenced in February 2007, with mining of the PG seam (LW1 to LW8) and ULLD seam (LW101 to LW106A) since completed. Second workings within LW206A and LW206B were completed 16 October 2022 and 6 March 2023 respectively. Longwall extraction of LW207A and LW207B, which commenced 30 May 2023 and 3 September 2024 and were completed 20 July 2024 and 13 December 2024 respectively. Longwall extraction of LW208 commenced 02 July 2025.

Subsidence monitoring was undertaken in accordance with the *Ashton Coal Mine Longwalls 205 to 208 Extraction Plan – October 2020* and included both regular surveys following longitudinal and transverse subsidence lines as well as visual inspections of environmental, land and infrastructure features. Subsidence monitoring for each longwall includes survey lines located over the start and end line for each panel as well as various traverse cross lines relevant to the panel, surface or strata features. **Table 6.15** summarises the maximum incremental and cumulative subsidence parameters for each of the monitoring locations relevant during the reporting period.

Table 6.15
Subsidence Monitoring Results

Location	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Subsidence Attributable to Longwall (m)	Results Consistent with Extraction Plan Predictions
LW207B				
LW7 CL2 - PG	2.02	-29.90	0.99	Yes
XL13	2.23	-61.30	1.51	Yes
Lemington Rd	1.38	-13.80	1.38	Yes
Source: Ashton Coal Operations Pty Limited (2025) – bi-monthly subsidence monitoring reports.				

Subsidence monitoring indicated that no exceedance of the incremental and cumulative subsidence predictions occurred at the locations monitored during the reporting period. Furthermore, no significant cracking was observed on Lemington Road during the reporting period. All observed cracking was in accordance with modelling/expectations and was on Ashton owned land and therefore was not a public safety issue. All observed surface cracking was remediated on an as needs basis and access tracks remediated and re-graded to remain serviceable. Pumping of water where ponding of water was observed as a consequence of subsidence in areas which were typically flat prior to mining operations, was conducted as needed to maintain access to services and infrastructure on site.

No impacts were recorded for the Ausgrid 11kV power lines and poles. Impacts were recorded on the 33kV transmission lines, identified during all monitoring events for the LW207B location. The impacts identified were managed according to the relevant management plans.

There were no further recorded or observed subsidence impacts, incidents, service difficulties or community complaints during the reporting period.

Reportable Incidents and Further Improvements

The results of subsidence monitoring indicate that subsidence-related impacts are generally in accordance with predicted impact levels, with no reportable incidents during the reporting period. Monitoring will continue to be undertaken in accordance with the approved Extraction Plans during the next reporting period. No further improvements to subsidence management or monitoring are considered necessary at this stage.

6.9 WASTE MANAGEMENT

Environmental Management and Performance

In accordance with *Schedule 2, Condition 39* of DA 309-11-2001-i, 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) – sludge, effluent, empty drums, lead acid batteries, oil filters, oily water, waste grease and waste oil.
- Non-Hazardous (Recycled) – paper and cardboard, confidential documents, scrap steel and timber.
- Hazardous (Disposal) – medical and sanitary waste, oily rags, hydraulic hose and chemical anchors.
- Non-Hazardous (Disposal) – diesel particulate filters and mixed solid waste.

As part of ACOL's Environmental Management Strategy and as outlined in the current RMP for the site, appropriate waste segregation and recycling are encouraged through the provision of appropriate on site recycling facilities. Furthermore, as part of the waste collection service, a weekly review is undertaken by a JR Richards supervisor to identity any additional recycling opportunities.

The approximate volume of each waste stream generated during the previous five reporting periods (inclusive) is presented in **Table 6.16** together with the proportion of waste recycled.

The proportion of waste recycled is generally consistent with the previous reporting period, increasing from 47.21% in 2024 to 53.02% in 2025. The total proportion of waste recycled over the past two reporting periods remains high compared to prior years.

Table 6.16
Approximate Waste Volumes 2021 to 2025

Waste Class	Waste Stream	Total Volume (kg)[1]				
		2021	**2022**	**2023**	**2024**	**2025**
Hazardous (Recycled)	Sludge	13,158	17,646	9,268	114,928	1,680
	Paint	-	-	1,850	3,414	3,656
	Effluent (Off Site)	-	-	500	-	
	Empty Drums	3,759	3,527	3,590	2,112	1,720
	Lead Acid Batteries	696	1,038	2,660	970	398
	Oil Filters	2,500	2,011	1,056	3,004	2,662
	Oily Water (Off Site)	72,284	96,987	68,627	40,690	6,733
	Waste Coolant	3,506	-	4,800	3,600	8,274
	Waste Grease	346	326	1,320	684	54
	Waste Oil	32,900	43,100	34,064	32,300	55,200
	Nicad Batteries	-	-	-	-	127
	eWaste	-	-	770	-	800
	Sub-total	**129,149**	**164,635**	**128,505**	**201,702**	**81,304**
Non-Hazardous (Recycled)	Paper and Cardboard	11,481	9,537	6,815	7,025	8,115
	Confidential Documents	187	165	453	278	724
	Scrap Metal	214,080	271,210	209,236	220,545	580,000
	Timber (Uncontaminated)	13,060	3,340	8,140	16,060	20,580
	Sub-total	**238,808**	**284,252**	**224,644**	**243,908**	**609,419**
Hazardous (Disposal)	Medical and Sanitary Waste	270	477	290	383	668
	Hydraulic Hose	794	-	210	596	-
	Chemicals Disposed	-	-		-	56,652
	Oily Rags	466	246	222	158	50
	Chemical Anchors	585	1,239	1,654	1,872	2,308
	Sub-total	**2,115**	**1,962**	**2,376**	**3,009**	**59,678**
Non-Hazardous (Disposal)	Diesel Particulate Filters	28,857	43,721	38,791	31,642	29,042
	Mixed Solid Waste	466,169	455,211	464,501	457,116	515,889
	Treated Timber	-	-	4,340	6,540	7,400
	Sub-total	**495,026**	**498,932**	**507,632**	**495,298**	**552,331**
Total Waste		**673,280**	**718,969**	**865,098**	**949,781**	**1,302,732**
Recycled Waste		**271,920**	**295,050**	**367,957**	**448,887**	**690,723**
Recycled Waste (%)		**40.39%**	**41.04%**	**42.53%**	**47.26%**	**53.02%**

Note 1: Combined waste volume generated by both the ACP open cut and underground mining operations.

Source: J R Richards & Sons total waste management report – ACP open cut and underground.

During the reporting period, Ashton Coal implemented the following initiatives to reduce waste generation, promote resource reuse, and raise awareness among site personnel.

1. Internal Awareness Campaign: A waste volumes newsletter was distributed across site teams, highlighting current waste generation trends and providing statistics to encourage proactive waste reduction.

2. Targeted Scrap Metal Recovery: In September 2025, a focused effort was undertaken to identify and remove redundant scrap metal items from site, enabling recycling and preventing unnecessary storage. The effectiveness of this campaign is evident from the high volume of scrap metal recycled during the reporting period compared to previous reporting periods.

3. Asset Reuse and Sale: A previously stored conveyor system was partially sold and repurposed, preventing disposal and supporting circular economy practices.

Reportable Incidents and Further Improvements

There were no reportable incidents relating to waste during the reporting period. Waste volumes will continue to be monitored into the future and opportunities to minimise waste or increase recycling implemented, where appropriate

7. WATER MANAGEMENT

7.1 WATER TAKE AND BALANCE

The ACP has three primary water demands: aboveground dust suppression, underground supply, and supply to the CHPP. **Table 7.1** presents the water take under each of the applicable water licences for the ACP over the 2024/2025 water year (i.e. 1 July 2024 to 30 June 2025). Total water take for the previous five reporting periods (inclusive) is also presented.

Table 7.1
Water Take – 2024/2025 Water Year

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WAL	Reference Number (Security Level)	Water Sharing Plan, Source and Management Zone	Entitlement (ML)	Passive Take / Inflows (ML)	Active Pumping (ML)	Total (ML)
Surface Water						
984	20AL201282 (General Security)	Hunter Regulated Water Sharing Plan, surface water, zone 3A (Glennies Creek)	9	49.58	376.20	425.78
997	20AL201311 (High Security)	Hunter Regulated Water Sharing Plan, surface water, zone 3A (Glennies Creek)	11			
8404	20AL200491 (High Security)	Hunter Regulated Water Sharing Plan, surface water, zone 3A (Glennies Creek)	80			
15583	20AL204249 (General Security)	Hunter Regulated Water Sharing Plan, surface water, zone 3A (Glennies Creek)	354			
		Total	***454***			
1120	20AL201624 (High Security)	Whole Water Source (Hunter Regulated River Water Source)	3	2.59	0	2.59
1121	20AL201625 (General Security)	Hunter Regulated Water Sharing Plan, surface water, zone 1B (Hunter River from Goulburn River Junction to Glennies Ck Junction)	335			
19510	20AL211015 (High Security)	Hunter Regulated Water Sharing Plan, surface water, zone 1B (Hunter River from Goulburn River Junction to Glennies Creek Junction)	130			
		Total	***468***			
23912	20AL211423 (Unregulated)	Hunter Unregulated and Alluvial Water Sources 2009, surface water, Whole Water Source (Jerry's Water Source) (Bowmans Creek)	14	47.95	0	47.95
36702	20AL212975 (Unregulated)	Hunter Unregulated and Alluvial Water Sources 2009, Surface water, Jerry's Management Zone (Jerry's Water Source) (Bowmans Creek)	116			
36703	20AL212976 (Unregulated)d	Hunter Unregulated and Alluvial Water Sources 2009, Surface water, Jerry's Management Zone (Jerry's Water Source) (Bowmans Creek)	150			
		Total	***280***			
29566	20AL212287 (Unregulated)	Hunter Unregulated and Alluvial Water Sources 2009, Aquifer, Jerry's Management Zone (Jerry's Water Source)	358	71.62	0	71.62
1358	20AL203056 (Supplementary)	Hunter Regulated Water Sharing Plan, surface water, zone 3A (Glennies Creek)	4	0	0	0
6346	20AL203106 (Supplementary)	Hunter Regulated Water Sharing Plan, surface water, zone 1B (Hunter River from Goulburn River Junction to Glennies Creek Junction)	15.5	0	0	0

Table 7.1 (Cont'd)
Water Take – 2023/2024 Water Year

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WAL	Reference Number	Water Sharing Plan, Source and Management Zone	Entitlement (ML)	Passive Take / Inflows (ML)	Active Pumping (ML)	Total (ML)
Groundwater						
41501	20AL216171	North Coast Fractured and Porous Rock Groundwater Sources 2016, Sydney Basin-North Coast Groundwater Source	100	778.88	0	778.88
41552	20AL219014		511			
41529	20AL818991		400			
41553	20AL219015		81			
		Total	***1092***			
		Total 2024/2025		950.62	376.20	1,326.82
		Total 2023/2024		733.86	195.41	929.27
		Total 2022/2023		*1,259.53*	*275.45*	*1,534.98*
		Total 2021/2022		*485.50*	*318.80*	*804.30*
		Total 2020/2021		*399.45*	*470.10*	*869.55*

Source: Ashton Coal Operations Pty Limited.

Water take is measured and partitioned in accordance with the protocol detailed within the Water Management Plan (WMP), which incorporates a combination of site observations, measurements and predictions of the site water balance model. Water take occurs via two separate methods: incidental (or passive) take, and pumped surface water take. Incidental take occurs through mining-induced fracturing of aquifers which report to the underground workings. This water is removed from the mine by a network of dewatering pumps. Pumped surface water take involves active pumping from Glennies Creek and the Hunter River to provide higher quality water for a variety of uses including potable water, use in equipment and as fire-fighting water at the mine.

Both passive and active water take during the reporting period remained within licenced entitlements associated with individual WALs.

In addition to measuring water take, ACOL separately reports the ACP's water balance annually in accordance with the Mineral Council of Australia's *Water Accounting Framework for the Minerals Industry* (2012). **Table 7.2** provides a summary of the water inputs and outputs as well as the changes in water storage at the ACP during the reporting period.

Table 7.2
Input / Output Water Balance – 2025 Calendar Year

Page 1 of 2

Input / Output	Component	Sub – Component	Water Volume (ML)[1]
2025 Inputs	Surface Water	Precipitation and Runoff	1,075.1
		Rivers and Creeks	327.5
		External Surface Water Storages	0
	Groundwater	Aquifer Interception	1,565.4
		Bore Fields	0
		Entrainment	50.8
	Third Party Water	Contract / Municipal	0.8
		Waste Water	0
		Total Inputs	**3,019.6**

Table 7.2 (Cont'd)
Input / Output Water Balance – 2025 Calendar Year

Input / Output	Component	Sub–Component	Water Volume (ML)[1]
2025 Outputs	Surface Water	Discharge	0.0
		Environmental Flows	0.0
	Groundwater	Seepage	1,457.5
		Reinjection	0.0
	Supply to Third Party		0.0
	Other	Evaporation	128.1
		Entrainment	1,020.2
		Other (e.g. ventilation moisture loss)	158.3
	Total Outputs		**2,764.1**
Total Inputs minus Total Outputs			255.5

Note 1: Volumes represent a combination of measured, simulated and estimated volumes with variable levels of confidence (low to high).

Source: ATC Williams.

7.2 SURFACE WATER

Environmental Management

Surface water management at the ACP is conducted in accordance with the approved WMP and associated surface water monitoring program. The ACP site is a zero discharge site. No discharge off site occurred during the reporting period and no compensatory water was required by or provided to private landholders during the reporting period.

Environmental Performance

Water quality for the creeks and river surrounding ACP is monitored monthly by an independent consultant at sixteen (16) approved monitoring sites (see **Figure 7.1**) with sample analysis by a NATA accredited laboratory. Surface water quality (SWQ) monitoring data for the reporting period is summarised in **Table 7.3** and presented graphically in **Figure 7.2**. Data since 2012 is presented in **Figure 7.3**.

SWQ trigger levels specified within the WMP (and reproduced in **Table 7.3**) must be exceeded on three consecutive readings, or differ significantly from the preceding three readings, before an action response is required. **Table 7.4** provides a summary of instances during the reporting period where trigger levels were exceeded on three (or more) occasions.

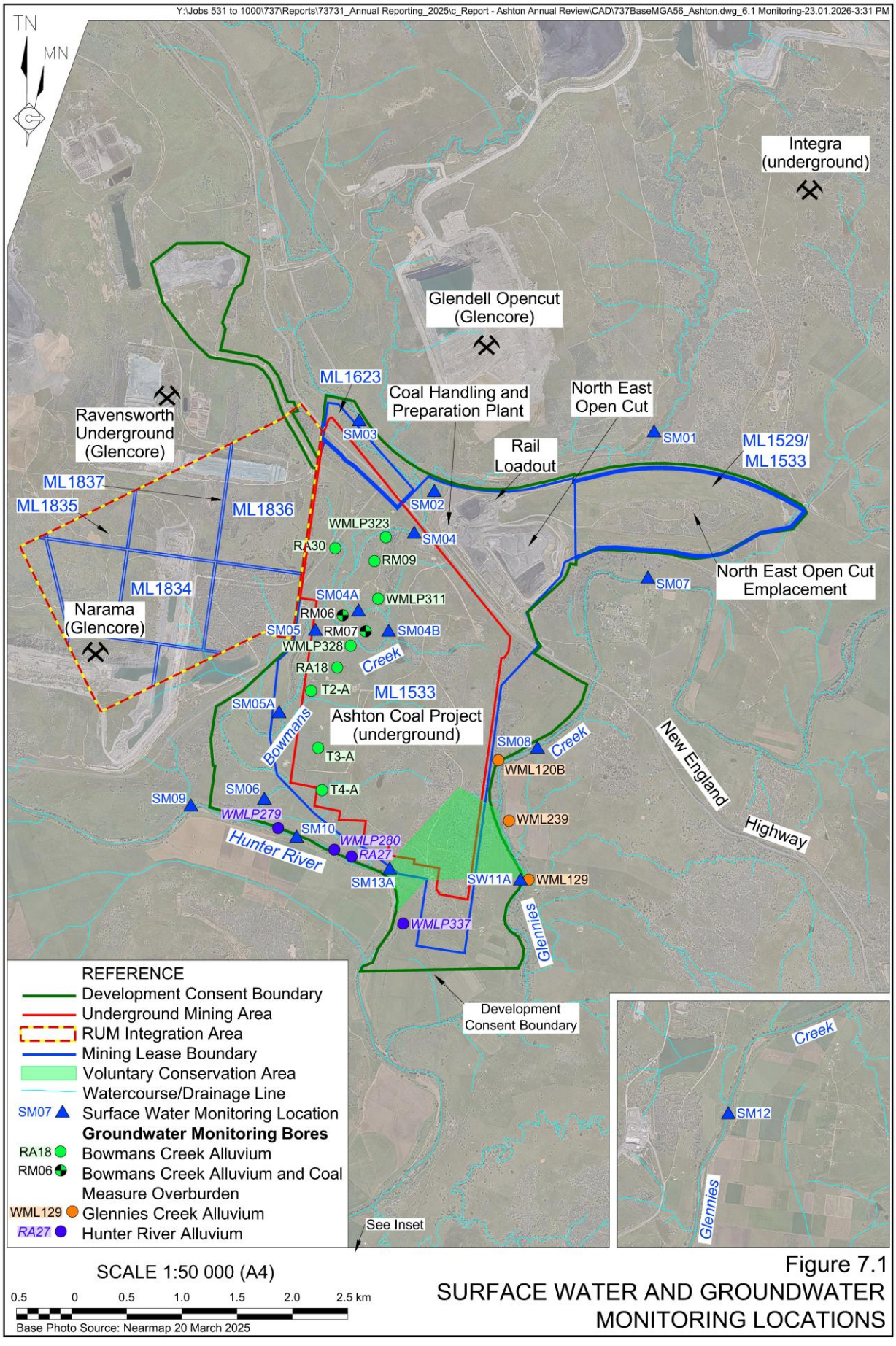

Figure 7.1
SURFACE WATER AND GROUNDWATER MONITORING LOCATIONS

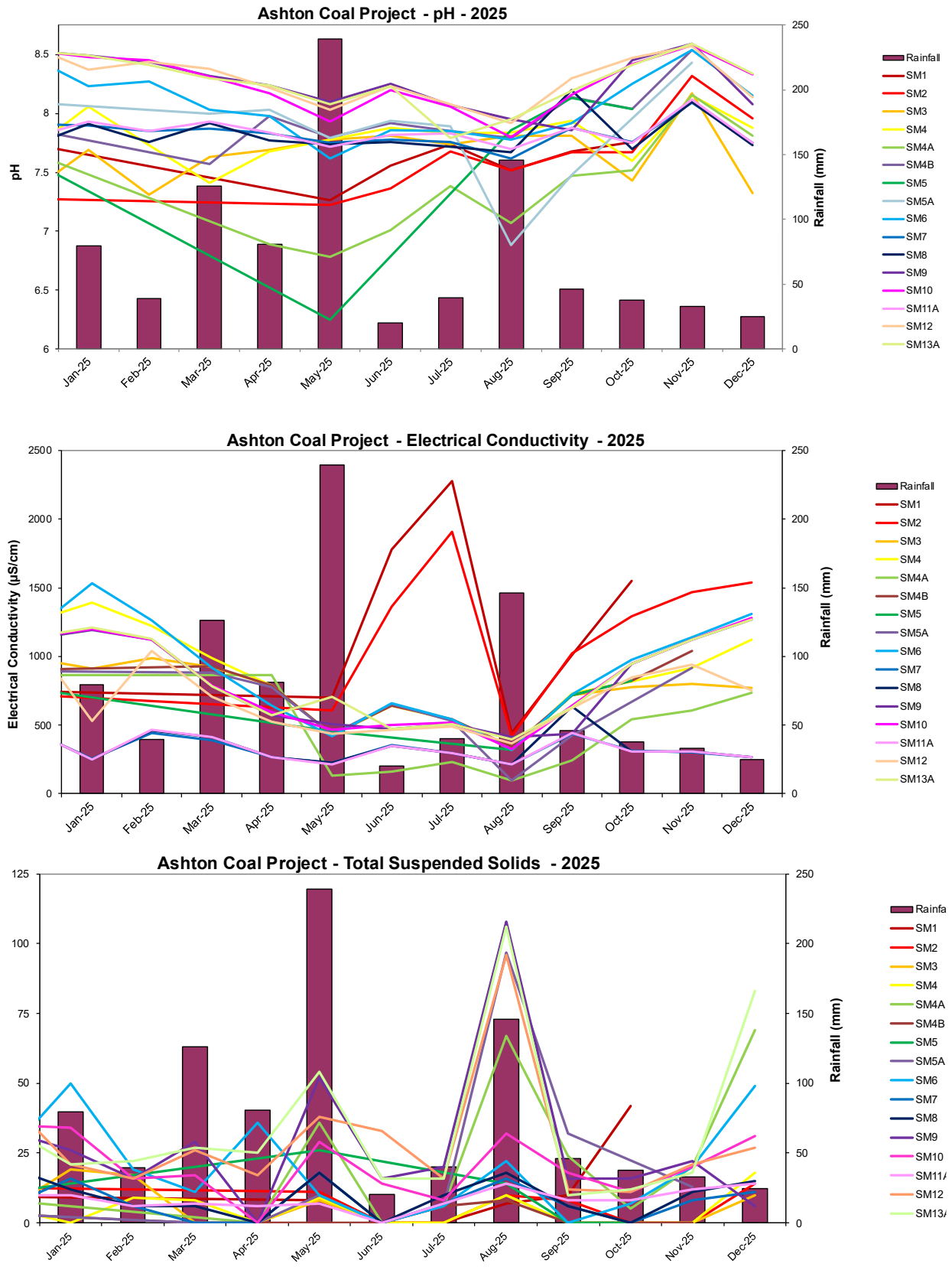

Figure 7.2
SURFACE WATER QUALITY MONITORING RESULTS – 2025

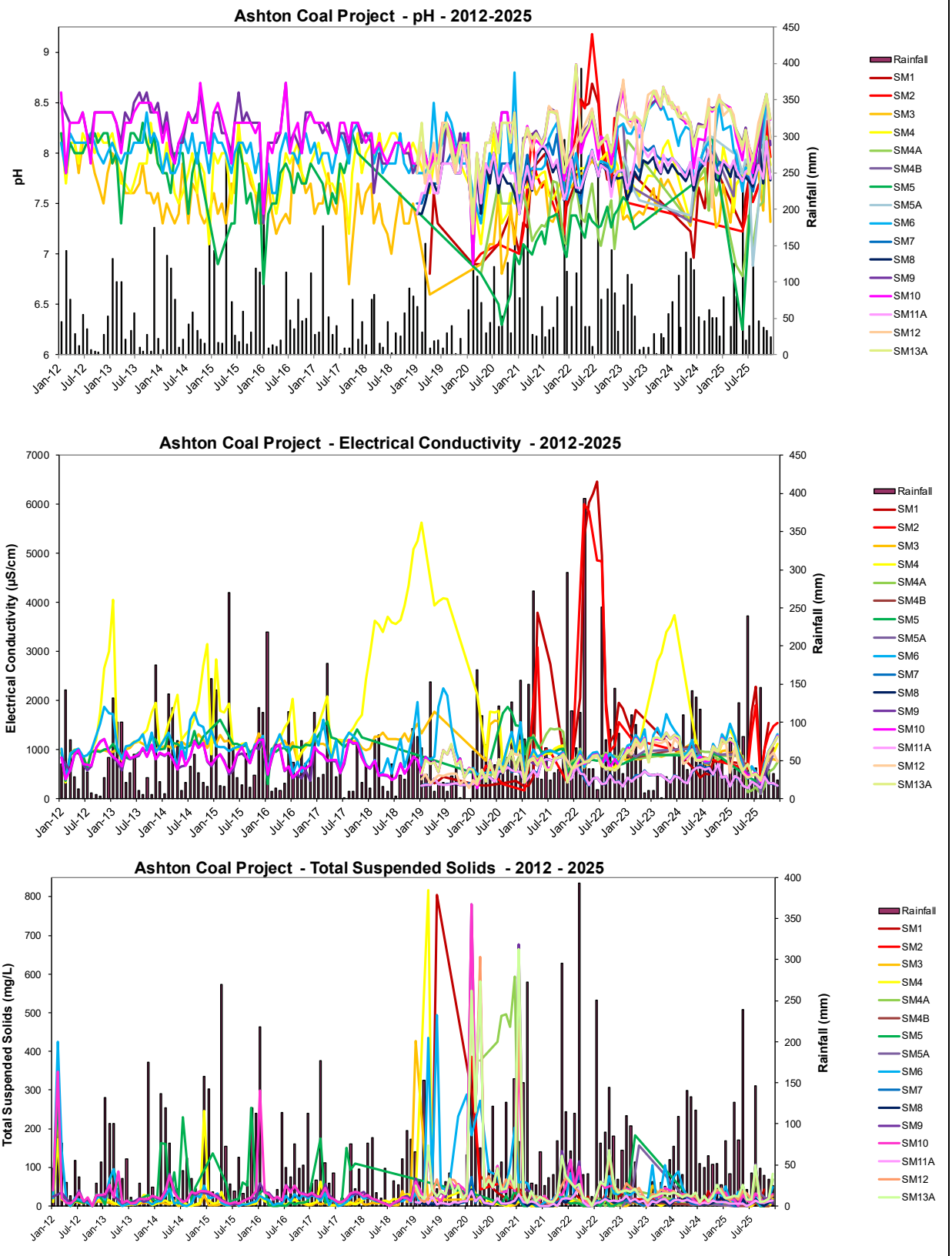

Figure 7.3
SURFACE WATER QUALITY MONITORING RESULTS – 2012 TO 2025

Table 7.3
Surface Water Monitoring Summary – 2025

Sampling Site^	pH	pH Trigger Value[1]	EC (µS/cm)	EC Trigger Value[2]	TDS (mg/L)	TDS Trigger Value[2]	TSS (mg/L)	TSS Trigger Value[2]
Bettys Creek								
SM1	7.26 – 7.76 (7.59)	<6.97 - >7.70 [<6.60 - >8.00]	440 – 2,280 (1,293)	>1,198 [>1,811]	418 – 1,410 (904)	>794 [>1,193]	<5 – 42 (13)	>122 [>273]
SM2	7.31 – 7.95 (7.60)	<6.87 - >7.63 [<6.60 - >7.90]	416 – **1,910** (1,202)	>1,144 [>1,803]	400 – **1,150** (794)	>732 [>1,105]	<5 – 14 (8)	>116 [>116]
Bowmans Creek								
SM3	7.31 – 8.17 (7.68)	<7.42 - >7.88 [<7.20 - >8.10]	318 – 986 (715)	>1,440 [>1,620]	253 – 886 (448)	>878 [>965]	<5 – 19 (8)	>20 [>62]
SM4	7.41 – 8.15 (7.82)	<7.71 - >8.09 [<7.4 - >8.4]	321 – 1,390 (824)	>3,656 [>10,790]	260 – 966 (504)	>2,270 [>6,331]	<5 – 18 (7)	>37 [>104]
SM4A	**6.78** – 8.16 (**7.34**)	<7.67 - >8.01 [<7.40 - >8.30]	92 – 862 (400)	>1,140 [>1,796]	162 – 468 (276)	>653 [>1,067]	<5 – 69 (29)	>19 [>44]
SM4B	7.57 – 8.54 (7.98)	NYA	341 – 1,040 (730)	NYA	275 – 635 (451)	NYA	<5 - 8 (5)	NYA
SM5	6.25 – 8.13 (7.57)	<7.66 - >7.97 [<7.50 - > 8.10]	319 – 820 (577)	>1,542 [>1,796]	258 – 524 (405)	>891 [>1,031]	<5 – 26 (13)	>20 [>31]
SM5A	6.88 – 8.43 (7.81)	NYA	97 – 915 (588)	NYA	243 – 529 (379)	NYA	<5 – 97 (22)	NYA
SM6	8.20 – 8.54 (8.04)	<7.84 - >8.23 [<7.60 - >8.40]	315 – **1,530** (869)	>1,108 [>1,831]	264 – 1080 (533)	>642 [>810]	<5 – 50 (20)	>26 [>60]
Glennies Creek								
SM7	7.62 – 8.09 (7.82)	<7.66 - >8.03	211 - 442 (312)	>577	138 – 378 (217)	>342	<5 – 18 (9)	>19
SM8	7.67 – 8.20 (7.83)	<7.62 - >7.96	183 – 457 (308)	>562	146 – 368 (225)	>334	<5 – 18 (10)	>22
SM11A	7.70 - 8.12 (7.84)	<7.74 - >8.02	211 – 463 (314)	>564	144 – 364 (213)	>332	<5 – 14 (9)	>20
Hunter River								
SM9	7.86 – **8.59** (8.24)	<8.00 - >8.32	405 – **1,297** (779)	>942	291 – **917** (485)	>541	<5 – 108 (28)	>34
SM10	7.80 – **8.58** (8.24)	<8.00 - >8.32	325 – **1,280** (791)	>942	265 – **902** (485)	>526	<5 – 34 (20)	>42
SM12	7.92 – **8.57** (**8.26**)	<7.84 - >8.24	366 – **1,040** (643)	>728	290 – **555** (393)	>415	<5 – 96 (28)	>36
SM13A	7.79 – **8.59** (8.25)	<8.02 - >8.32	393 – **1,270** (811)	>927	308 – **842** (489)	>516	10 – 106 (34)	>41

( ) = Average[3] [ ] = no / low flow trigger value NS – Not Sampled (Dry) ^ See **Figure 7.1** * Single data point

NYA – Not Yet Available. Sites SM4B and SM5A have recently been established and insufficient data is available to set appropriate trigger levels. Once sufficient data has been collected, trigger levels will be set and the WMP updated as appropriate.

Bold Red Text – Exceedance of Trigger Level for three consecutive samples.

Note 1: pH trigger values are less than the 20th and 5th percentile of baseline values (i.e. to December 2011) for each site during flow and no / low flow conditions respectively.

Note 2: EC and TSS trigger values are greater than the 80th and 95th percentile of baseline values (i.e. to December 2011) for each site during flow and no / low flow conditions respectively.

Note 3: Instances where TSS <5 was recorded a value of 5 was utilised for the purpose of calculating the average.

Source: Ashton Coal Operations Pty Limited.

Table 7.4
Consecutive Surface Water Trigger Level Exceedances

Parameter	Monitoring Location[1]	Period
pH	SM4A	April – November
	SM9	September 2024[2] – February 2025, August – November
	SM10	September 2024[2] – February 2025, October – December
	SM12	July 2024[2] – March, September – October
	SM13A	September 2024[2] – February 2025, October – December
EC	SM2	October – December
	SM6	November 2024[2]– February 2025
	SM9	September 2024[2] – February 2025, October - December
	SM10	September 2024[2] – February 2025, October – December
	SM12	October – December
	SM13A	September 2024[2] – February 2025, October - December
TDS	SM2	October – December
	SM9	September 2024[2] – February 2025, October – December
	SM10	September 2024[2] – February 2025, October – December
	SM12	October – December
	SM13A	September 2024[2] – February 2025, October – December

Note 1: see **Figure 7.1**.
Note 2: Consecutive exceedance commencing previous reporting period.

In summary, three (or more) consecutive exceedances of pH, EC, or TDS trigger values were recorded across seven monitoring sites during the reporting period. The Hunter River sites (SM9, SM10, SM12 and SM13A) recorded EC and TDS exceedances at all locations during the period September 2024 to February 2025 and October 2025 to December 2025.

In accordance with the Water Management Plan the trigger level exceedances were investigated. Investigations were undertaken as an external assessment by ATC Williams. Investigations conclude the low variability of pH in the Hunter River monitoring sites from upstream of Bowmans Creek (SM9) to downstream of Glennies Creek (SM12A) indicate exceedances of the trigger levels are not likely caused by mining-related effects. The low variability of EC and TDS in the Hunter River upstream of Bowmans Creek (SM9) to the downstream monitoring sites (SM10 and SM13A) and Glennies Creek (SM12A) also indicate exceedances are not likely caused by mining-related effects.

ATC Williams suggest events of higher and lower pH are linked to periods of low and high flows, while the EC and TDS exceedances could be driven by increasing salinity in streamflow as a result of drying conditions, or other activities conducted upstream of the ACP. No data indicates mining-related effects.

Reportable Incidents

As the external assessment of trigger action response levels determined water quality was not affected by the ACP, in accordance with the approved WMP, the exceedance of trigger levels was not reportable. No reportable incidents occurred during the reporting period.

Further Improvements

Exceedances of trigger levels will continue to be investigated in accordance with the approved WMP.

7.3 GROUNDWATER

Environmental Management

Groundwater management at the ACP is conducted in accordance with the approved WMP and associated groundwater monitoring program. A groundwater model based on mine plans and past groundwater monitoring results is employed to predict changes to the local hydrological regime and potential impacts on groundwater associated with ACP activities. In order to determine if groundwater impacts associated with ACP operations remain consistent with those predicted, a groundwater monitoring network has been established (see **Figure 7.1**) targeting the following aquifers.

- Saturated quaternary sediments (alluvium) including:
  - Bowmans Creek Alluvium (BCA);
  - Glennies Creek Alluvium (GCA); and
  - Hunter River Alluvium (HRA).
- Shallow Permian sandstone and minor coal seams, referred to as coal measures overburden (CMOB).
- Permian coal measures of varying thickness targeted by mining (Coal Measure).

As part of the approved WMP, impact assessment criteria and TARPs have been developed to investigate and, if necessary, respond to any monitoring results that are inconsistent with predicted impacts / defined criteria.

Environmental Performance

Groundwater monitoring was undertaken by Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) throughout the reporting period including both water level and water quality. A detailed annual groundwater summary prepared by AGE is presented as **Appendix 2**, with key monitoring observations from the AGE report summarised in the following sections.

Groundwater Levels

Monitoring results for the regulatory BCA bores indicated that groundwater levels remained relatively stable or declining, except for in May and August where heavy rainfall caused a temporary increase. Groundwater levels remained above the established triggers in all bores for the entire duration of the reporting period. Groundwater levels in the other BCA bores were generally stable, increasing from early 2025 to August before declining for the remainder of the reporting period, reflecting rainfall patterns.

Monitoring results for GCA bores indicated that groundwater levels were relatively stable. WMLP343 was unable to be sampled until August 2025 due to sediment buildup in the screen interval. Airlift development is planned to address the sediment buildup. Groundwater levels remained above the established triggers in all bores for the entire duration of the reporting period.

Groundwater Quality

As previously recorded, pH within alluvial bores was slightly acid to slightly alkaline and groundwater within Coal Measure and CMOB bores was generally neutral to slightly alkaline within the following ranges.

- BCA – pH 6.42 to pH 7.90
- GCA – pH 6.48 to pH 8.32
- HRA – pH 6.31 to pH 8.51
- Coal Measure – pH 6.46 to pH 8.64
- CMOB - pH 6.79 to pH 7.95

The pH levels for the BCA, GCA and HRA bores, including WMLP349 and WMLP358, recorded multiple exceedances of groundwater pH trigger values during the reporting period. These exceedances are attributed triggers not being representative of long-term climatic conditions. The pH levels recorded for coal measure and CMOB bores remained stable and with only minimal deviations occurring as result of natural variation.

During the reporting period the electrical conductivity (EC) within all monitored aquifers ranged from fresh to brackish as follows.

- BCA – 213µS/cm to 3,878µS/cm
- GCA – 230µS/cm to 1,049µS/cm
- HRA – 378µS/cm to 3,169µS/cm
- Coal Measure – 104µS/cm to 4,604µS/cm
- CMOB – 437µS/cm to 1,940µS/cm

Groundwater EC levels recorded for BCA, GCA and HRA bores remained relatively stable to slightly declining over the reporting period with the exception of WMLP358 which consistently exceeded the trigger levels throughout the year with four recorded exceedances. The investigation by AGE concluded that the variability in rainfall recharge during the period used to derive the triggers was not representative of average long term rainfall variation at ACOL. AGE recommends revising trigger thresholds to better reflect natural variability. Exceedances were also recorded at HRA bores WMLP279 and WMLP337 in April. Coal measure and CMOB EC levels were variable throughout the reporting period, with most bores showing an overall decrease. WML181 recorded a general increase in EC consistent with the previous reporting period.

Analysis of major ions indicated that the similar CMOB, BCA and HRA water types are distinguishable from the GCA and the Coal Measure water types, due to the differing water source and recharge/discharge mechanism associated with each body. Dissolved metals, select nutrients, turbidity and cyanide concentrations were also compared against ANZECC|ARMCANZ

livestock limits (ANZECC and ARMCANZ, 2000). There were no exceedances of the assessed analytes during the reporting period, including phosphorus, which had recorded an exceedance of the lower limit in the previous reporting period.

Generally, the site has experienced minimal impacts to the BCA, and no mining impacts to the GCA and HRA alluvial aquifers and impacts are within predictions in the coal measures.

Reportable Incidents

No reportable incidents occurred during the reporting period. Whilst the trigger action response within the WMP was enacted for pH and EC results within multiple bores, these were subsequently investigation by AGE. These investigations recommended revised pH and EC triggers be derived for monitoring bores using the latest data collected which better represent seasonal climate variability.

Further Improvements

Monitoring will continue in accordance with the current Water Management Plan (WMP). Review of pH and EC trigger levels will also be undertaken and updates proposed as appropriate.

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) 2024 (ha)	This Reporting Period (Actual) 2025 (ha)	Next Reporting Period (Forecast)[3] 2026 (ha)
Total mine footprint[1]	1,326.4[4]	1,326.4[4]	1,326.4[4]
Total active disturbance[1]	245.0	245.5	245.0
Land being prepared for rehabilitation	0	0	0
Land under active rehabilitation[1]	738.5	739.8	739.8
Completed rehabilitation[2]	0	0	0

Note 1: Includes subsidence remediation areas.
Note 2: Areas which have been formally relinquished or signed off by the relevant agency.
Note 3: Estimates of additional areas of subsidence remediation have not been included within forecast values.
Note 4: Includes the ACOL-operated RUM.

Rehabilitation of other disturbance associated with the various minor surface disturbing activities, as outlined in the Ground Disturbance Permits (see Section 4.3) will be undertaken during future reporting periods.

No permanent buildings were structurally altered, renovated or removed during the reporting period and no rehabilitation trials or research was undertaken during the reporting period. A summary of rehabilitation monitoring and activities is provided as follows.

North-east Open Cut Rehabilitation

Monitoring of NEOC rehabilitation was undertaken between 5 to 14 May 2025 by DnA Environmental. Revised completion and performance criteria were developed during the 2021 reporting period in consideration of relevant rehabilitation guidelines and have subsequently been utilised for performance evaluation.

Monitoring of the NEOC rehabilitation area includes assessment of areas rehabilitated to *mixed woodland habitat* (formerly "Trees Over Grass") and *exotic pastures*. Rehabilitation of the NEOC overburden emplacement commenced in 2005, with the entire ~140ha of rehabilitation being completed in 2012. There is currently ~68ha of rehabilitated exotic pasture and ~71ha of native trees and shrubs.

During the 2019 reporting period it was decided, following advice from DnA Environmental, that livestock grazing was no longer considered an appropriate post-mining landuse option for the NEOC rehabilitation. Instead, a single final land use domain, *"Mixed eucalypt woodland habitat",* consisting of additional woodland habitat of various densities and a higher diversity of shrubs, will cover the areas formerly referred to as *Pasture* and *Trees-over-Grass*.

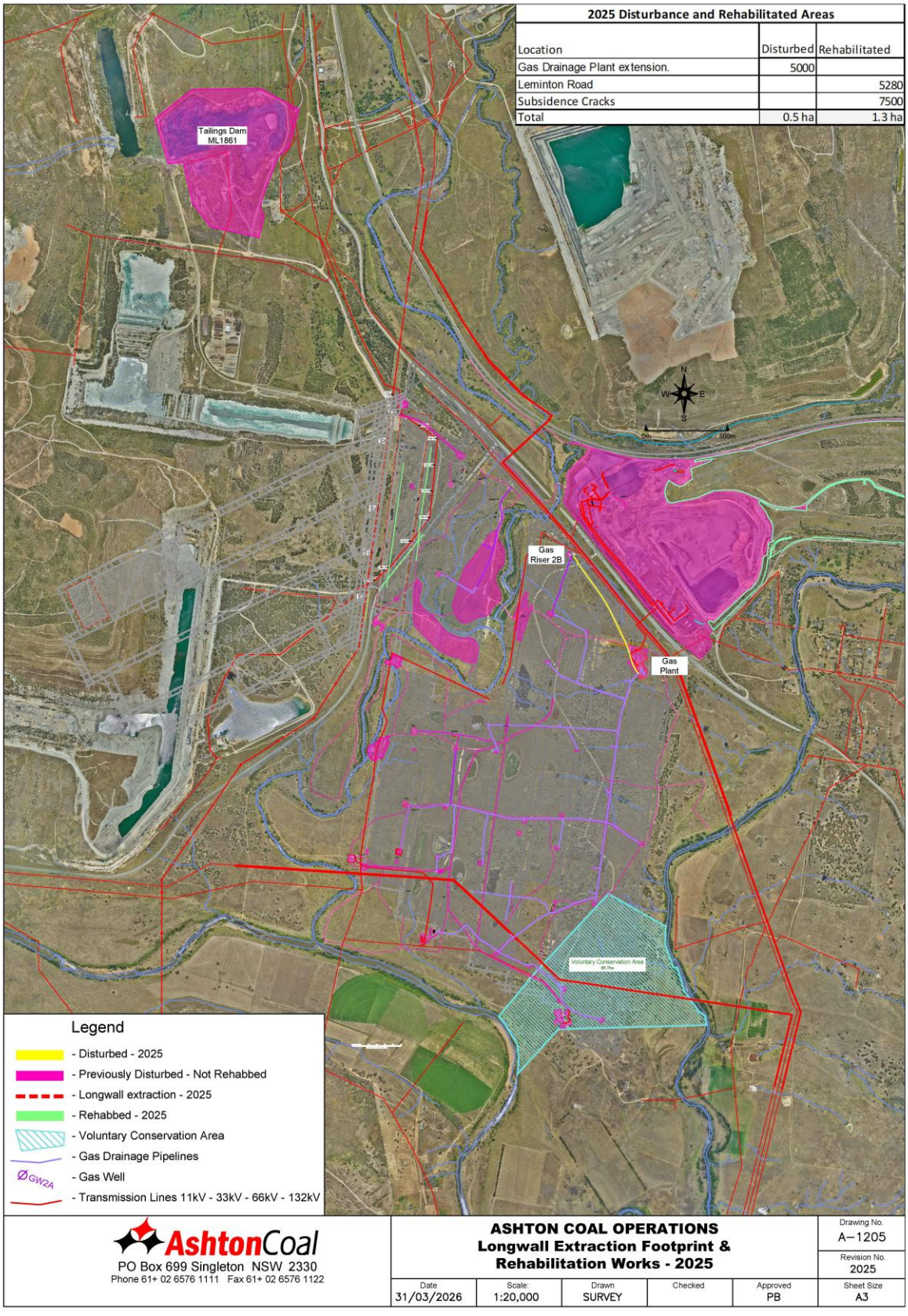

Figure 8.1
REHABILITATION ACTIVITIES – UNDERGROUND AREA (1 JANUARY – 31 DECEMBER 2025)

To reflect significant rehabilitation progress and ecosystem development, monitoring methodology were revised during the 2020 reporting period. In summary, the monitoring methodology was reduced from quadrat based to transect based surveys for all rehabilitation sites on the NEOC in 2020, with these methodologies (quadrat versus transect) being undertaken during autumn in alternating years. During the 2025 reporting period, transect based monitoring was undertaken.

It is intended to convert approximately 15ha of exotic pasture areas into areas of eucalypt woodland habitat over a five-year period (subject to suitable meteorological conditions). This updated rehabilitation strategy has been reflected within the Rehabilitation Management Plan (RMP).

Rehabilitation monitoring continued to assess the performance of both the existing mixed woodland habitat and exotic perennial pastures, with three woodland rehabilitation sites and four exotic pasture rehabilitation sites being monitored in 2025. Rehabilitation performance is compared against the RMP proposed completion criteria using performance indicators obtained from non-mining-disturbed reference sites. Three mixed eucalypt woodland and three native grassland reference sites were established in 2019. The range values of each performance indicator will be measured annually to reflect seasonal conditions and disturbance events.

Rehabilitation performance is assessed against the completion criteria summarised in **Table 8.2**. Completion criteria targets are met if they are within the specified target ranges recorded at corresponding woodland or grassland reference sites, as represented by an appropriately coloured box.

The outcomes of the 2025 monitoring demonstrate that many completion targets have been met, with some exceptions. Ecological performance indicators for the mixed eucalypt woodland habitat and exotic pastures demonstrate these rehabilitated areas have generally developed into highly functional and stable communities, functionally comparable to the local woodlands and native grasslands.

Some parts of the woodland rehabilitation may have low perennial groundcover due to the high densities of trees, while some areas may also be affected by adverse soil chemistry and/or disturbance by macropods, especially when conditions have been dry. Notwithstanding the above, DnA Environmental state that there is little need for management intervention of the existing woodland habitats of the NEOC, particularly in the light of the revised rehabilitation objectives.

Observations in the vicinity of rehabilitation habitat structures (large upside-down tree trunks) show a high abundance of native species known to be dispersed by birds. In particular, *Einadia nutans* (climbing saltbush) and *Enchylaena tomentosa* (ruby saltbush) were in high abundance in the immediate vicinity of the erected trunk, however, weed species (e.g. *Solanum sp*., *Lycium ferocissimum*) may also be introduced in these areas. DnA Environmental suggest that additional habitat structures such as large trees, logs, rock piles and nest boxes would likely increase available habitat within the NEOC.

Table 8.2
North East Open Cut Rehabilitation Area – Rehabilitation Sites Completion Criteria Status 2025

Rehabilitation Phase	Completion criteria	Performance Indicators	Unit of measure	Exotic Pasture Sites				Woodland Sites		
				M2008 01	M2008 02	M2009 01	M2010 01	M2008 03	M2012 03	M2012 04
Phase 3: Landform Establishment	Landform suitable for final land use and generally compatible with surrounding topography and final landform design	Slope	Degrees (<18°)	14	14	14	14	4	2	1
	Areas of active erosion are limited	No. Rills/Gullies	No.	0	0	0	0	0	0	0
		Cross-sectional areas of rills	m^2	0	0	0	0	0	0	0
Phase 4: Growth Medium Development	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH (5.6-7.3)	7.0	6.8	7.8	6.8	7.8	8.8	8.0
		EC	dS/m (<0.150)	0.071	0.111	0.174	0.199	0.123	0.172	0.084
		Organic Matter	% (>4.5)	7.4	9.0	12.4	13.4	6.7	6.4	8.0
		Phosphorous	mg/kg (50)	9.7	490.0	130.0	130.0	72.0	6.7	5.7
		Nitrate	mg/kg (>12.5)	0.8	4.3	8.1	29.6	9.2	1.1	0.4
Phase 5: Ecosystem & Land Use Establishment	Landform is stable and performing as it was designed to do.	LFA Stability	%	70.5	70.1	74.1	76.6	67.2	67.1	67.3
		LFA Landscape organisation	%	97	89	98	100	99	97	100
	Pasture productivity is comparable to analogue sites.	Green Dry Matter Biomass	kg/ha	1800	1500	750	900	NA	NA	NA
Phase 6: Ecosystem & Land Use Development	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	%	43.7	46	50.6	53.6	49.5	44.9	55.2
		LFA Nutrient recycling	%	44.5	45.3	48.7	50.2	49.2	45.3	56.8

Green = Meets or exceeds completion criteria.

Blue = Performance indicator target falls within industry guidelines or desirable ranges but may not be similar to reference sites

NA = Not Applicable.

Table 8.2 (Cont'd)
North East Open Cut Rehabilitation Area – Rehabilitation Sites Completion Criteria Status 2025

Rehabilitation Phase	Completion criteria	Performance Indicators	Unit of measure	Exotic Pasture Sites				Woodland Sites		
				M2008 01	M2008 02	M2009 01	M2010 01	M2008 03	M2012 03	M2012 04
Phase 6: Ecosystem & Land Use Development (Cont'd)	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation.	Litter cover	%	47	47.5	23.5	28	78	88.2	91.5
		Annual plants	<%	14	0	5.5	27	1.5	1	0
		Cryptogram cover	%	1.5	0	0	0	0	0	0
		Rock	%	0.5	1	0	0	0.5	2	1.7
		Log	%	0	0	0	0	0	0	0
		Bare ground	<%	2.5	6	1	1	2.5	5	3.3
		Perennial plant cover (< 0.5m)	%	34.5	45.5	70	44	17.5	3.8	3.5
		Total Ground Cover	%	97.5	94.0	99	99	97.5	95	96.7
	Native groundcover abundance is comparable to that of the local remnant vegetation.	Percent plant cover <0.5m.	% cover	34.5	45.5	70	44	17.5	3.8	3.5
	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation.	Foliage cover 0.5m – 2m	% cover	1	2	2	4	2.5	0.2	2
		Foliage cover >6m	% cover	5	0	0	0	12	7	24

Green = Meets or exceeds completion criteria.

Blue = Performance indicator target falls within industry guidelines or desirable ranges but may not be similar to reference sites

NA = Not Applicable.

Source: DNA (2025)

DnA Environmental recommended that, whilst areas of exotic perennial pastures previously established on the NEOC are likely to persist, additional sowing of exotic species should be avoided, as these highly competitive species can restrict germination and establishment of native tree and shrub seed and reduce the diversity of desirable grasses and herbs in the longer-term.

Pest and Weed Control

A programmed range of pest and weed control activities were also undertaken across ACP rehabilitation areas, biodiversity conservation areas and buffer land during the reporting period. Pest control activities during the reporting period targeted feral pigs, rabbits and hares, wild dog and foxes.

Two 1080 baiting programs were undertaken during autumn and spring 2025. The baiting program accounted for a total of 8 wild dogs and 41 foxes. A feral pig management program involving cage trapping was implemented throughout 2025 in response to observed feral pigs and feral pig wallows on site. A total of 37 feral pigs were trapped and dispatched during the reporting period.

ACOL maintains an open range shooting program at the ACP site as part of a kangaroo culling program approved and licenced by the NSW National Parks and Wildlife Service; however, no kangaroo culling activities were undertaken during the reporting period.

Active weed control treatment was also completed across land owned by ACOL, targeting African boxthorn (*Lycium ferocissimum*) (88ha), African olive (*Olea europaea* subsp. *cuspidata*) (0.6ha), castor oil (*Ricinus communis*) (75.4ha), green cestrum (*Cestrum parqui*) (41.6ha), mother of millions (*Kalanchoe daigremontiana*) (65ha), pampas grass (*Cortaderia species*) (<0.1ha), prickly pear (*Opuntia stricata*) (52.9ha), St John's wort (*Hypercum perforatum*) (123ha), tiger pear *(Opuntia aurantiaca*) (52/9ha), general woody weeds (75.1ha), and general weeds. **Figure 8.2** displays the areas treated for weeds during the reporting period.

Source: ENRIGHT Land Management (2025) – Map 1

Figure 8.2
WEED TREATMENT AREAS – 2025

8.2 ACTIONS FOR THE NEXT REPORTING PERIOD

Rehabilitation during the next reporting period will principally relate to rehabilitation of disturbance associated with gas drainage network development and other minor infrastructure projects, as needed. Should favourable meteorological conditions persist, the first block of the woodlands rehabilitation conversion program may be undertaken within the NEOC area.

Rehabilitation of subsidence impacts will also be undertaken, as required, including surface crack backfilling, compaction, and vegetation enhancement. Ongoing repairs will be made to any subsidence-damaged infrastructure, including the right of way access road, in accordance with the approved subsidence monitoring and management plans.

Maintenance works, such as erosion and sediment control, and ongoing control of weeds and feral pests will also be undertaken as required. Additional feral pest control options may also be investigated including those targeting feral cats, hares, rabbits and feral pigs. Other measures to improve biodiversity outcomes, as outlined in Section 6.6 of this Annual Review, will also be investigated and implemented as appropriate.

9. COMMUNITY

9.1 COMMUNITY COMPLAINTS

One complaint was received during the 2025 reporting period relating to noise.

All previous complaints, including the above, have been recorded in the complaints register (available on the Ashton Coal Website) with a summary of all complaints received over the life of the mine presented as **Figure 9.1**. There has been a decreasing trend in complaints, with the greatest reduction occurring following completion of the NEOC. Previously the nature of complaints was predominantly noise, followed by dust and blasting.

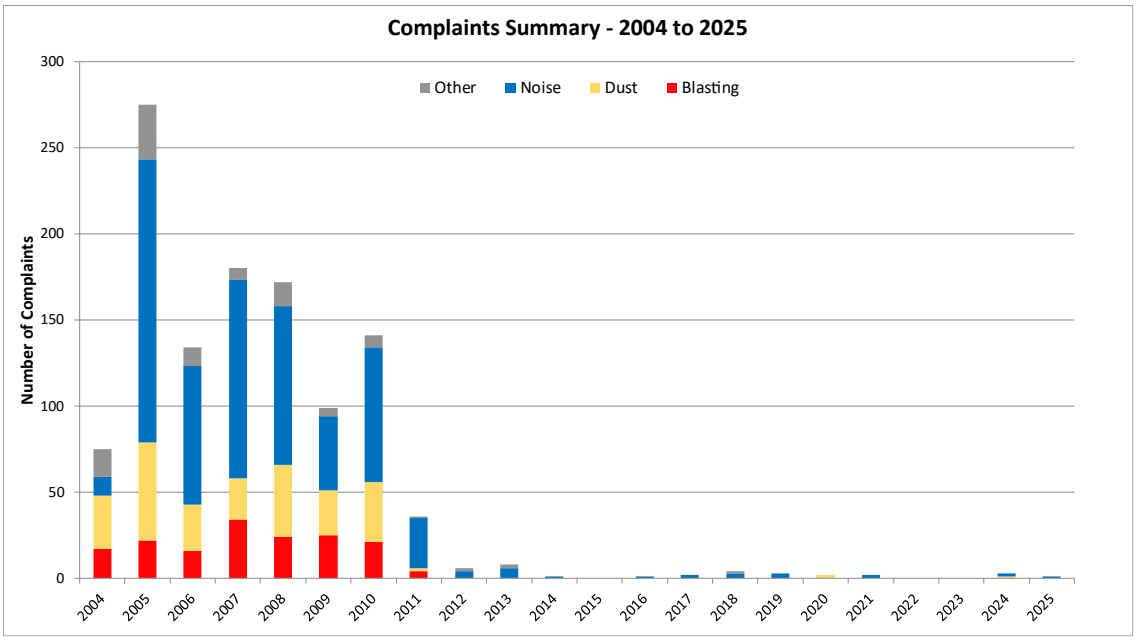

Figure 9.1
COMMUNITY COMPLAINTS – MINE LIFE

9.2 COMMUNITY LIAISON

The principal formal community consultation undertaken is via the Ashton Community Consultative Committee. In accordance with *Condition 7* of *Schedule* 5 of DA 309-11-2001-i, ACOL has established a Community Consultative Committee for the ACP. During the reporting period, the committee consisted of:

- three representatives of the local community (John McInerney, Debbie Richards, Michael Bestic);
- a representative from Singleton Council (Clr. Godfrey Adamthwaite); and
- at least two representatives from ACOL (Phillip Brown, Michael Bartlett, Karl Norman or Elise Albury.).

The committee was chaired by Mrs Margaret MacDonald-Hill, an independent chairperson appointed as the independent Chair by the Secretary of DPE (now DPHI).

The committee held a total of three meetings during the reporting period (27 February, 24 July and 30 October 2025). The meetings have continued to provide an opportunity for ACOL to keep the community up to date with activities undertaken and programmed at the ACP and for community members to table issues relating to the ACP for ACOL's consideration. It is noted that ACOL provided presentations during each meeting to provide updates on mine development, environmental monitoring and performance, subsidence management, planning, and other relevant matters.

Copies of minutes, presentations and annual CCC Chairperson's reports to DPHI are available on the Yancoal website at https://www.yancoal.com.au/our-sites/ashton/ashton-documents/.

ACOL also undertakes engagement through the ACCF. The ACCF is a community engagement process in place to ensure ongoing dialogue between the Aboriginal Community and Ashton Coal. ACCF meetings regularly discuss planned mining operations, potential impacts to Country, upcoming projects and salvage works. Two meetings were held during the reporting period in June and November 2025 and regular meetings will continue during the next reporting period (see Section 6.7 for further information).

9.3 COMMUNITY SUPPORT PROGRAM

ACOL provides support to local community groups, initiatives and sponsorships through the Community Support Program. Following applications made via ACOL's website (https://www.yancoal.com.au/document/guidelines-community-support-program-2025-2/), opportunities to generate positive community impacts through either monetary grants or in-kind support are identified with a focus on four categories including: social and community, environment and education, health, and training.

During the reporting period, a total of $79,560 was allocated directly by ACOL to the following community groups and causes.

- Singleton Australian Christian College – upgrade to the basketball facilities
- Cessnock Goodstart Early Learning Centre – assistance
- Hunter Valley Physical Culture – funding of events
- Singleton Combined Early Childhood Services – art project and exhibition
- Rotary Club of Singleton – support for Singleton art prize
- Singleton Neighbourhood Centre – new uniforms
- Singleton PCYC – upgrade to dining area
- Singleton United Hospital Auxiliary – purchase of new equipment
- University of Newcastle – Engineering and Science Challenge and SMART Science Tour

10. INDEPENDENT AUDIT

In accordance with the requirements of DA 309-11-2001i (MOD11), an independent environmental audit of the ACP was commenced during the 2022 reporting period with a site inspection undertaken on 18 January 2023. The audit covered the period from 31 September 2019 to 18 January 2023. The Independent Environmental Audit report was accepted by the (then) DPE in October 2023 and is available on the Ashton Coal website at www.ashtoncoal.com.au.

An independent environmental audit was conducted during the 2025 reporting period. The report will be uploaded to the Ashton Coal website upon finalisation and acceptance by DPHI.

Table 10.1 provides a summary of the 2022 Independent Audit recommendations and ACOL's response to the audit. Outcomes of the 2025 audit will be reviewed following finalisation of the audit report and further discussed in the Annual Review for the next reporting period.

Table 10.1
2022 Independent Audit – Action Response Plan Status

Condition	Non-Compliance	Corrective Action	ACOL Comments	Proposed Action	Action Date	Status Update
DA 309-11-2001-i						
Schedule 3 Condition 12	Ashton exceeded the 24-hour PM10 three times between 12 September 2021 and 29 October 2021. These exceedances were reported in the 2021 annual review. The most recent modification of the development consent has now formalised that the exceedance of 24-hour PM10 criteria is only applicable if the incremental impact is due to the Ashton Coal Mine Complex on its own. Therefore, no corrective action is required.	No corrective action proposed	Modification 11 to Development Consent DA No. 309-11-2001-I approved on 6th July 2022 changed the Air Quality Criteria to report only if the incremental impact is due to Ashton Mine Complex on its own (Schedule 3 Condition 12).	Nil	Nil	No further action required.
Schedule 5 Condition 1	At the time of the audit, the approved EMS (Version F, dated September 2020) did not identify MOD11 and the updated mining leases currently applicable to the site. Following the approval of MOD11, Ashton Coal wrote to DPE informing them that a review of management plans had been undertaken and that the EMS would be updated to reflect the most recent statutory approvals relevant to the development. The EMS has been submitted to DPE and is pending approval. As no further action can be undertaken to achieve compliance with this condition, no corrective action is proposed.	No corrective action proposed.	No action required. EMS modified due to Modification 11 to Development Consent DA No. 309-11-2001-I and is currently with DPE for consideration.	Nil	Nil	The updated EMS was approved by the (then) DPE on 20.04.2023. No further action required.
Statement of Compliance Modification 6, Condition 7.1	The bed and bank of Bowmans Creek are required to be surveyed every five years. This assessment was due to be undertaken in 2022, however was delayed until 2023.	Ensure that the geomorphological assessment is undertaken in 2023.	The delay in carrying out the survey was due to unavailability of Dr Chris Gippell to undertake the work and COVID restrictions. Soil Conservation Service will now undertake the survey.	Soil Conservation Service to undertake the survey.	30.06.2023	**Complete** The creek was surveyed by SEAM Spatial December 2023 and Dr Chris Gippell has undertaken the required survey and the report completed.

Table 10.1 (Cont'd)
2022 Independent Audit – Response to Audit

Condition	Non-Compliance	Corrective Action	ACOL Comments	Proposed Action	Action Date	Status Update
EPL 11879 (Cont'd)						
M2.1	A non-compliance against this condition was recorded in the 2020 and 2021 EPA Annual Return, where sampling frequency for air quality was not continuous. The auditor notes that the EPL has recently been modified to included Condition M2.4. Condition M2.4 defines continuous as 95% of the time for the annual return periods for condition M2.2. Non-compliances reported in previous annual return periods had data capture percentages above 95%, and would therefore be compliant under the current EPL and therefore no corrective action has been recommended.	No corrective action proposed.	The EPL was varied on 3 November 2022 to include Condition M2.4 which defines "continuous" to mean the operation of requirement to achieve a minimum pollutant and/or meteorological data capture rate of 95% for the duration of the Annual Return reporting period. No further action required.	Nil	Nil	No further action required.
M2.2	Condition M2.2 requires PM10 to be monitored continuously. PM10 was not monitored continuously in 2020 and 2021 due to outages and maintenance works. Refer to M2.1 for discussion regarding data capture in relation to the provisions of M2.4.		The EPL was varied on 3 November 2022 to include Condition M2.4 which defines "continuous" to mean the operation of requirement to achieve a minimum pollutant and/or meteorological data capture rate of 95% for the duration of the Annual Return reporting period. No further action required.	Nil	Nil	No further action required.
M2.3	One monthly surface water sample was unable to be collected from SM9 (EPL Point 6) in March 2021, due to boggy conditions preventing safe access to sampling location. As this has not occurred again since the non-compliance was reported, no corrective actions are proposed.	No corrective action proposed.	127mm of rainfall had fallen in the preceding 30 days prior to the sampling date. The sampling sheet has been modified to identify mandatory EPL sampling points to ensure that all required samples are undertaken.	Nil	Nil	No further action required.

Table 10.1 (Cont'd)
2022 Independent Audit – Response to Audit

Condition	Non-Compliance	Corrective Action	ACOL Comments	Proposed Action	Action Date	Status Update
EPL 11879 (Cont'd)						
M4.1	Weather monitoring was not undertaken continuously in 2020 and 2021 as per the requirements of this condition. Refer to M2.1 for discussion regarding data capture in relation to the provisions of M2.4.	No corrective action proposed.	The EPL was varied on 3 November 2022 to include Condition M2.4 which defines "continuous" to mean the operation of requirement to achieve a minimum pollutant and/or meteorological data capture rate of 95% for the duration of the Annual Return reporting period. No further action required.	Nil	Nil	No further action required.
M7.1	Data capture was not undertaken at 10-minute intervals during 2021. Refer to M2.1 for discussion regarding data capture in relation to the provisions of M2.4.		The EPL was varied on 3 November 2022 to include Condition M2.4 which defines "continuous" to mean the operation of requirement to achieve a minimum pollutant and/or meteorological data capture rate of 95% for the duration of the Annual Return reporting period. No further action required.	Nil	Nil	No further action required.
R1.5	The Annual Return for the 2019 reporting period was submitted on 31 March 2020, greater than 60 days since the reporting period finished on 31 December 2019. The Annual returns for 2020 and 2021 reporting period were submitted to the EPA within the 60 day timeframe. No corrective actions are proposed.	No corrective action proposed.		Nil	Nil	No further action required.
Standard Conditions Mining Regulation 2016 Schedule 8A Part 2						
16 (2)	The Forward Program is not on the website as per the requirements of this condition, therefore constituting an administrative non-compliance.	Publish the Forward Program on the website.	The Forward Program was submitted to the Resource Regulator on the 25th January 2023. The Forward Program is available on the website.	Nil	Nil	No further action required.

Table 10.1 (Cont'd)
2022 Independent Audit – Response to Audit

Condition	Non-Compliance	Corrective Action	ACOL Comments	Proposed Action	Action Date	Status Update
Standard Conditions Mining Regulation 2016 Schedule 8A Part 2 (Cont'd)						
16 (3)	The Forward Program is not on the website as per the requirements of this condition, therefore constituting an administrative non-compliance.		The Forward Program was submitted to the Resource Regulator on the 25th January 2023. The Forward Program is available on the website.	Nil	Nil	No further action required.
DA 309-11-2001-i						
Schedule 3 Condition 40	A bushfire management plan has been prepared for the site, however, was last updated in 2014.	Whilst not a statutory non-compliance, it is recommended that the bushfire management plan is reviewed and updated.	The Bushfire Management plan is an internal document and was in draft form having been reviewed in 2019.	Update Bushfire Management Plan	31.03.2023	**Complete** The Bushfire Management Plan was further updated in October 2023.
EL 11879						
O5.1	Ashton informed the auditors that minor amendments have been made to the PIRMP. It is recommended that the PIRMP be formally updated through a new revision.	Ensure that the PIRMP is updated as per the outcomes of the PIRMP test. Publish the updated PIRMP to the project website and make available to site staff.		Update PIRMP and publish on the ACOL website	31.03.2023	**Complete** The PIRMP on the Ashton website is dated 8 January 2024

11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

During the reporting period there were no:

- non-compliances with the mining leases or water access licences; or
- official cautions, warning letters, penalty notices or prosecution proceedings.

Two internal incidents were recorded during the reporting period as follows.

- On 7 June 2025 visible dust was observed on the tailings dam. Investigations into the incident determined that the cause was significant wind conditions in the region. No further actions were required and the event was determined not to be a reportable incident.

- On 9 June 2025 and 10 June 2025, a diesel spill was identified from a medium service cart during the pre-start. Investigations into these incidents determined the cause to be a leak coming from the Banlaw fitting. This accessory was replaced and the spill was contained and cleaned appropriated. No further actions were required and the events were determined not to be a reportable incident.

12. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Activities planned to be completed during the next reporting period are outlined in Section 4.4 and planned improvements in environmental management practices in Sections 6 and 7 and summarised in **Table 5.1**.

Appendices

Appendix 1 Noise Compliance Assessment Report 2025
Appendix 2 Annual Groundwater Monitoring Review 2025

Appendix 1

Noise Compliance

Assessment Report 2025

(No. of pages including blank pages = 437)

Level 3 175 Scott Street
Newcastle NSW 2300
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02 4907 4800

www.emmconsulting.com.au

20 January 2026

Phillip Brown
Environment and Community Relations Superintendent
Ashton Coal Operations Pty Ltd
PO Box 699
Singleton NSW 2330

Re: EPL 11879 - Noise compliance assessment report 2025

Dear Phillip,

1 Introduction

EMM Consulting Pty Limited (EMM) has been engaged by Ashton Coal Operations Pty Limited (Ashton Coal) to prepare this Noise Compliance Assessment Report for the period 1 January to 31 December 2025. The Noise Compliance Assessment Report is required as per Condition R5.1 of Environment Protection Licence (EPL) 11879 which is reproduced as follows:

> R5.1 Noise Compliance Assessment Report
>
> A noise compliance assessment report must be submitted to the EPA on an annual basis with the Annual Return as set out in section R1. The report must be prepared by an accredited acoustic consultant and determine compliance with noise limits at noise monitoring points specified in conditions P1.4 and L4.2 to L4.4.

EMM is an accredited acoustical consultant and a member of both the Association of Australasian Acoustical Consultants (AAAC) and Australian Acoustical Society (AAS).

2 EPL amendments

EPL 11879 was varied once during the 2025 reporting period, on 20 August 2025. This variation of EPL 11879 was administrative in nature and does not affect the assessment of noise from the site.

3 Compliance

Monthly attended noise monitoring was undertaken by EMM for the period relevant to this report.

As presented in the attached monthly reports (refer Appendix A to Appendix L for complete noise monitoring reports), results of routine attended monitoring confirm that noise emissions from Ashton Coal operations satisfied the relevant EPL noise limits (Condition L4.1 of EPL 11879) at all assessment locations during the 12-month period.

4 Conclusion

Monthly attended noise monitoring undertaken during the relevant reporting period (1 January to 31 December 2025) demonstrated that noise emissions from Ashton Coal night-time operations satisfied the relevant limits at all monitoring points in accordance with EPL 11879.

We trust the preceding meets your current requirements. If you have any questions or need anything further, please do not hesitate to contact our office.

Yours sincerely

Teanuanua Villierme
Associate Acoustics Consultant
tvillierme@emmconsulting.com.au

Appendix A

Monthly attended noise monitoring report – January 2025

EMM
creating opportunities

Ashton Coal

Monthly attended noise monitoring - January 2025

Prepared for Ashton Coal Operations Pty Ltd

January 2025

Ashton Coal

Monthly attended noise monitoring - January 2025

Ashton Coal Operations Pty Ltd

E241180 RP#1

January 2025

Version	Date	Prepared by	Reviewed by	Comments
1	22 January 2025	Lucas Adamson	Robert Kirwan	Draft
2	24 January 2025	Lucas Adamson	Robert Kirwan	Final

Approved by

Robert Kirwan
Associate Acoustics Consultant
24 January 2024

Level 3 175 Scott Street
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This report has been prepared in accordance with the brief provided by Ashton Coal Operations Pty Ltd and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. The contents of this report are private and confidential. This report is only for Ashton Coal Operations Pty Ltd's use in accordance with its agreement with EMM and is not to be relied on by or made available to any other party without EMM's prior written consent. Except as permitted by the Copyright Act 1968 (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Ashton Coal Operations Pty Ltd (and subject to the terms of EMM's agreement with Ashton Coal Operations Pty Ltd).

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ABN: 28 141 736 558

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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

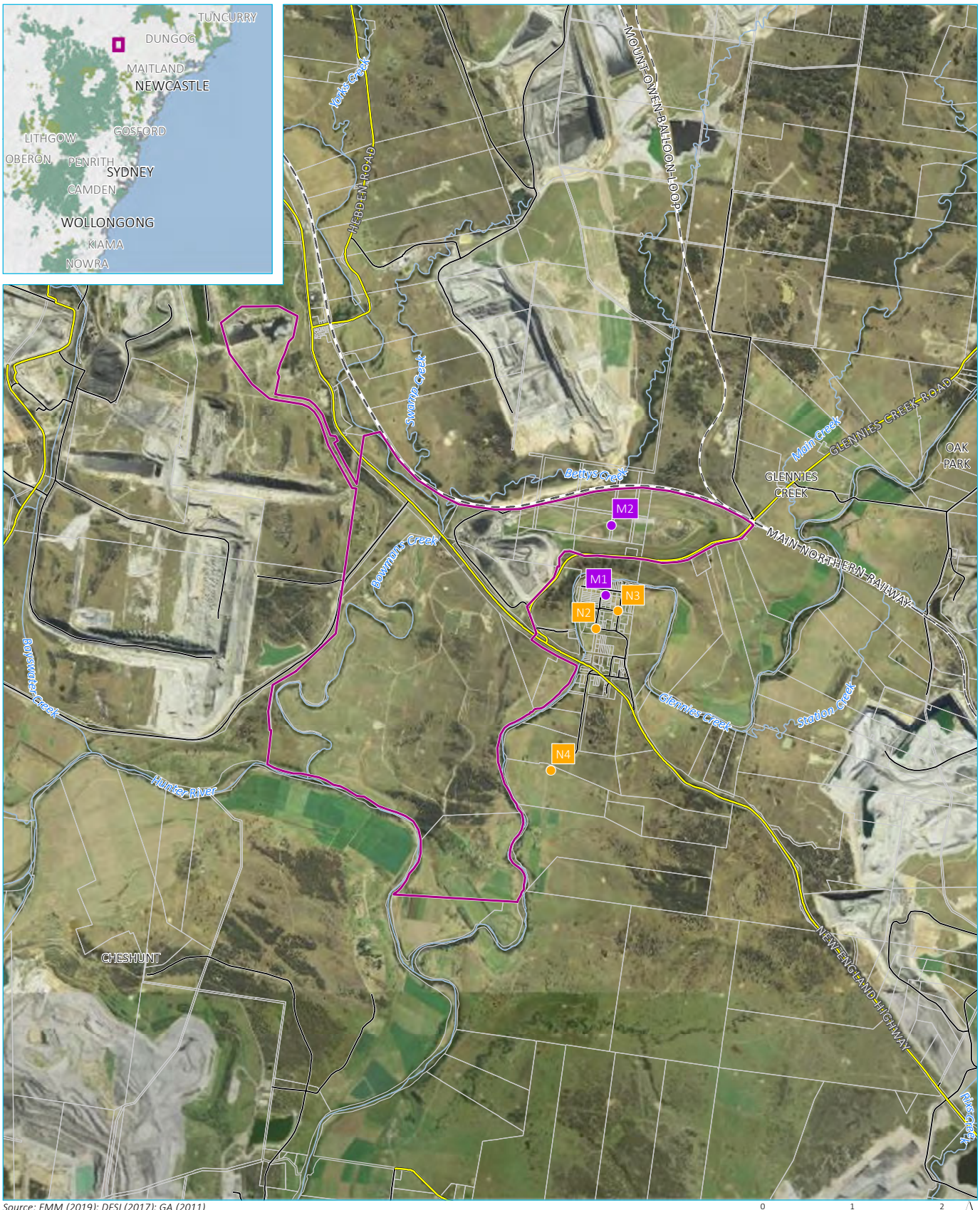
Attended environmental noise monitoring described in this report was done during the night period of Monday 20 January 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

EMM creating opportunities

\\emmsvr1\EMM\Jobs\2019\H190081 - Ashton Coal Noise Monitoring\8 GIS\02_Maps\N001_NoiseMonitoring_20190312_02.mxd 12/03/2019

1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for one per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for one per cent of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 per cent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	The vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 3 November 2022. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply if:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 metres above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15-minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 metres above local ground level) minus temperature measured at M1 (at 10 metres above local ground level)
- ΔH = the vertical height difference between M2 and M1 (equal to 73 metres).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Lucas Adamson. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA28 sound level meter	370304	8/11/2026	IEC 61672-1:2002
Svantek SV-36 calibrator	138017	2/9/2026	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Section 5 of this report.

Table 4.1 Total measured noise levels, dB – January 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N4	20/01/2025	22:00	50	46	44	43	43	41	37
N3	20/01/2025	22:43	58	58	57	55	56	47	38
N2	20/01/2025	23:05	56	51	47	43	41	34	32

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height – January 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north	Cloud cover 1/8s
N4	20/01/2025	22:00	19.1	1.6	140	1
N3	20/01/2025	22:43	19.3	0.9	160	1
N2	20/01/2025	23:05	18.7	<0.5	-	1

4.2 Site only noise levels

4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – January 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N4	20/01/2025	22:00	2.1	130	D	-1.0	Yes	36	46	IA	IA	Nil	Nil
N3	20/01/2025	22:43	2.1	144	E	-0.1	Yes	36	46	IA	IA	Nil	Nil
N2	20/01/2025	23:05	2.0	149	E	0.4	Yes	36	46	IA	IA	Nil	Nil

Notes: 1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.

2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.

3. Degrees magnetic north, "-" indicates calm conditions.

4. IA in the site level column means that the site was deemed inaudible at that location.

5. NM (not measurable) in the site level column means that the site was audible but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

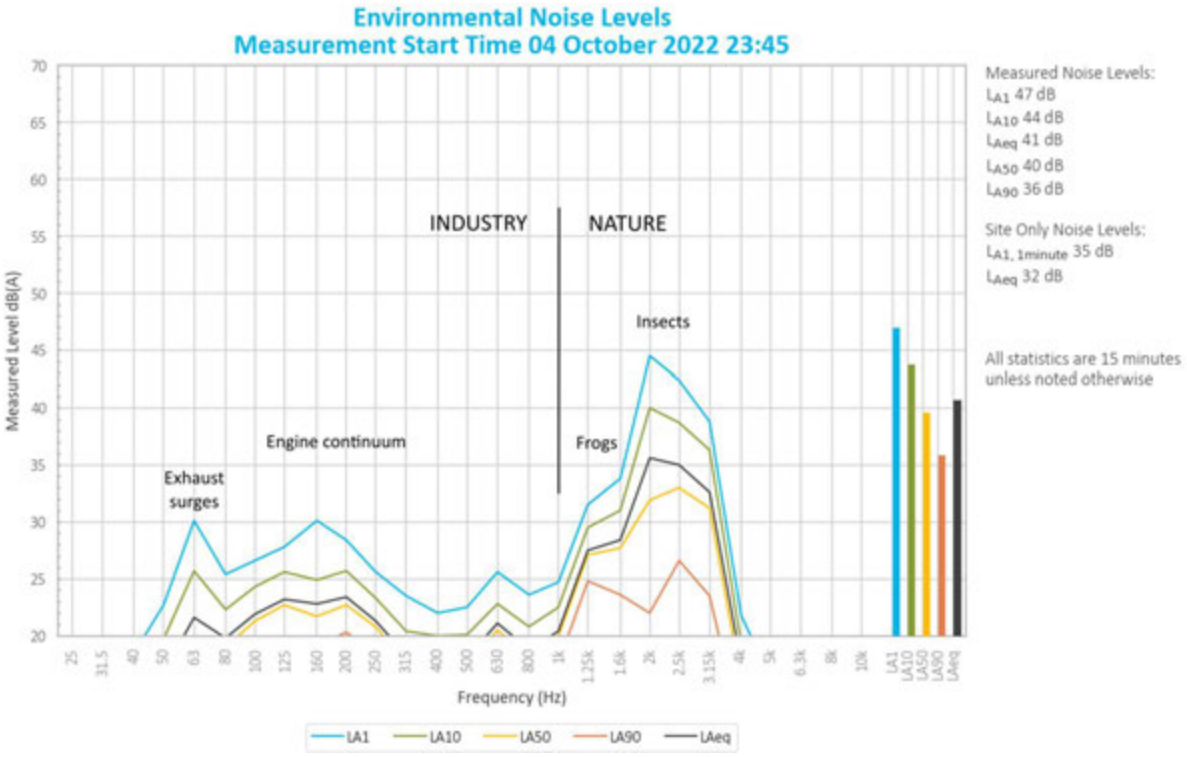


Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

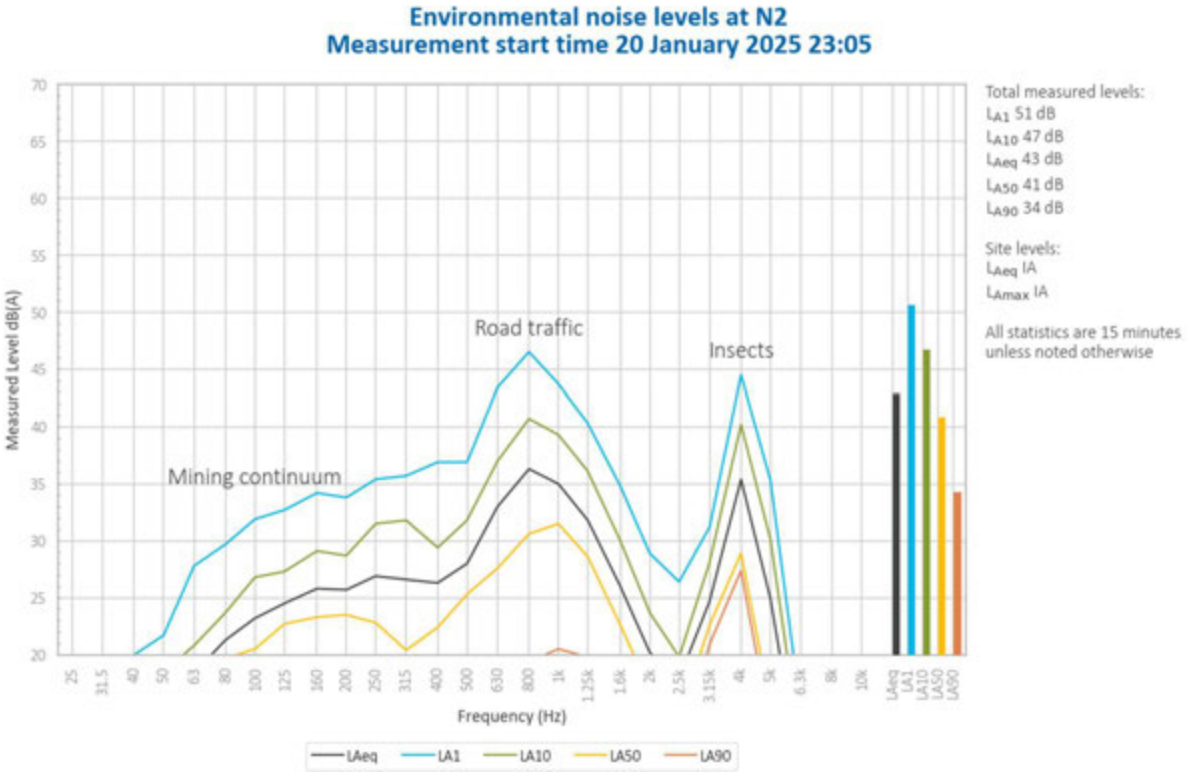


Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity and insects were the main contributors to measured levels.

Noise from a nearby pump, trains and dogs was also noted.

5.2.1 Cumulative mining noise at N2

Other mining operations in the vicinity were consistently audible during the operator-attended noise survey at monitoring location N2. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <27 dB (i.e. Other mine noise of $L_{Aeq,15minute}$ <30 dB less 3 dB as per NPfI methodology) which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

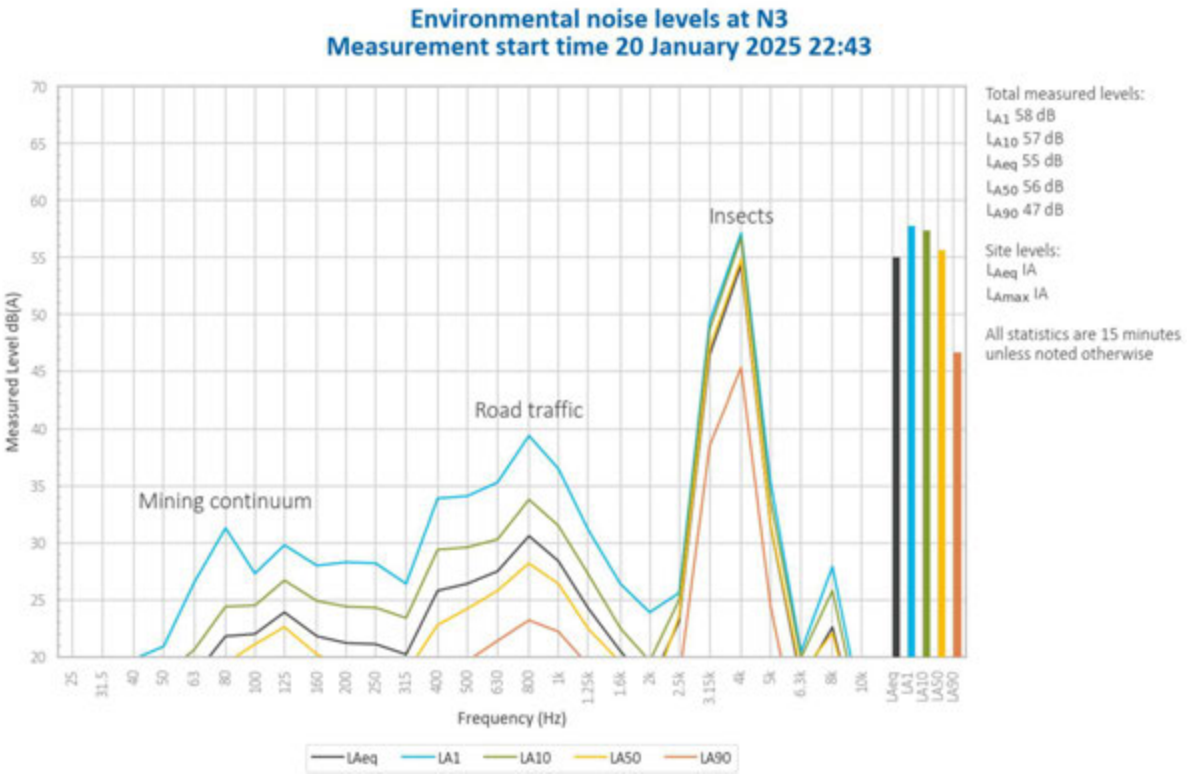


Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity and insects were the main contributors to measured levels.

Noise from trains and dogs was also noted.

5.3.1 Cumulative mining noise at N3

Other mining operations in the vicinity were frequently audible during the operator-attended noise survey at monitoring location N3. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <32 dB (i.e. Other mine noise of $L_{Aeq,15minute}$ <35 dB less 3 dB as per NPfI methodology) which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

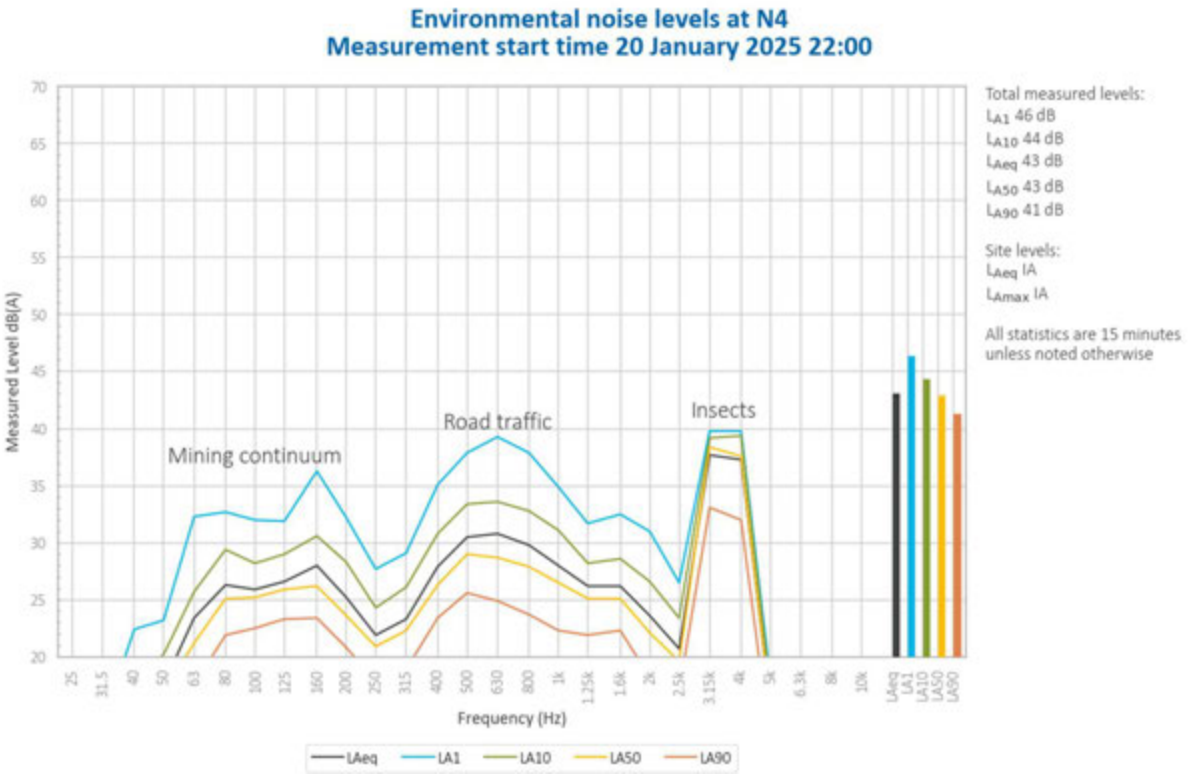


Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity and insects were the main contributors to measured levels.

Noise from trains and dogs was also noted.

5.4.1 Cumulative mining noise at N4

Other mining operations in the vicinity were frequently audible during the operator-attended noise survey at monitoring location N3. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <27 dB (i.e. Other mine noise of $L_{Aeq,15minute}$ <30 dB less 3 dB as per NPfI methodology) which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Ltd (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Monday 20 January 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the January 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

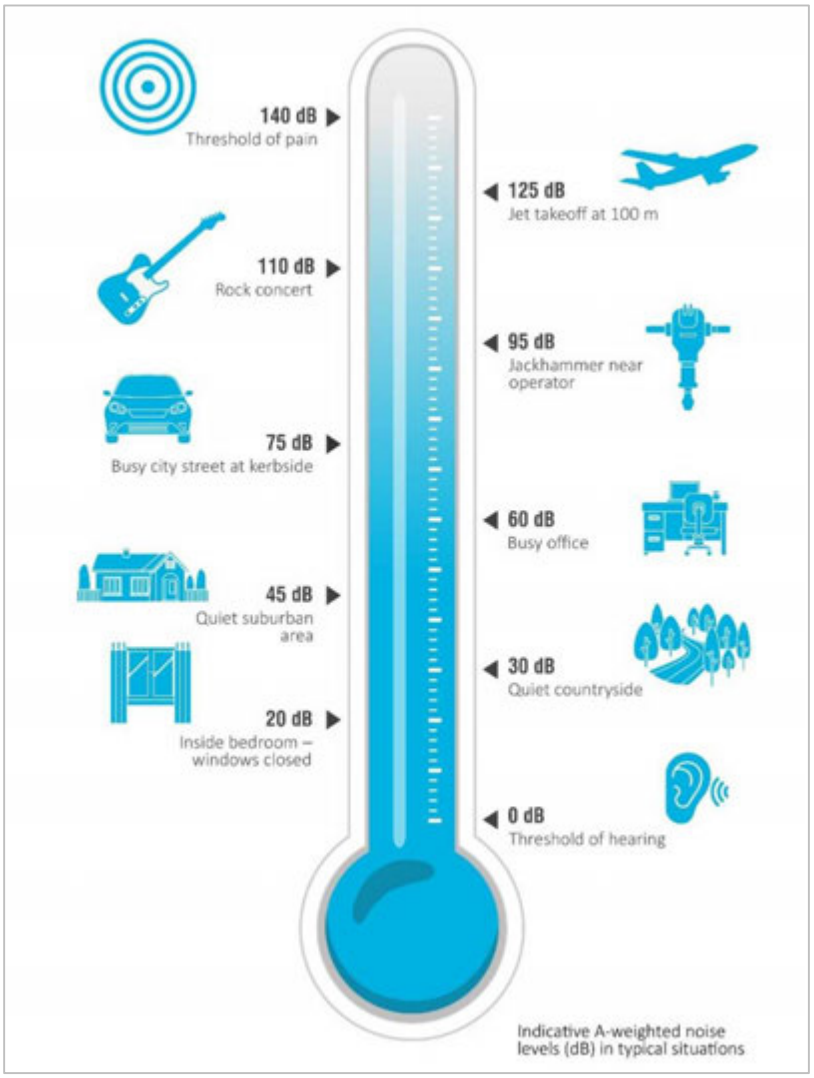

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

Environment Protection Licence

24	Groundwater monitoring	Monitoring up-gradient of Glennies Creek alluvium at coordinates 319294, 6404588 (Easting, Northing), identified as WML120B in Figure 1.
25	Groundwater monitoring	Monitoring mid-gradient of Glennies Creek alluvium at coordinates 319468, 6403528 (Easting, Northing), identified as WML129 in Figure 1.
26	Groundwater monitoring	Monitoring down-gradient of Glennies Creek alluvium at coordinates 318965, 6402842 (Easting, Northing), identified as WMLP336 in Figure 1.
27	Groundwater monitoring	Monitoring up-gradient of Barrett coal seam at coordinates 318431, 6407214 (Easting, Northing), identified as GM1 in Figure 1.
28	Groundwater monitoring	Monitoring up-gradient of Pikes Gully coal seam at coordinates 319292, 6404580 (Easting, Northing), identified as WML120A in Figure 1.
29	Groundwater monitoring	Monitoring mid-gradient of Pikes Gully coal seam at coordinates 319220, 6403928 (Easting, Northing), identified as WML262 in Figure 1.
30	Groundwater monitoring	Monitoring up-gradient of Upper Liddell coal seam at coordinates 319215, 6403958 (Easting, Northing), identified as WML181 in Figure 1.
31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam at coordinates 319188, 6404325 (Easting, Northing), identified as WML183 in Figure 1.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring at coordinates 320522, 6406815 (Easting, Northing), identified as Repeater on Figure 2.
13	Noise monitoring	Monitoring at coordinates 320554, 6405839 (Easting, Northing), identified as N3 on Figure 2 and representative of Noise Assessment Group 2.

14	Noise monitoring	Monitoring at coordinates 320297, 6405670 (Easting, Northing), identified as N2 on Figure 2 and representative of Noise Assessment Group 1.
15	Noise monitoring	Monitoring at coordinates 319776, 6404101 (Easting, Northing), identified as N4 on Figure 2 and representative of Noise Assessment Group 3.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Monitoring of temperature at 'M1' at coordinates 320259, 6405971 (Easting, Northing).

P1.5 For the purposes of Condition P1.1, P1.2 and P1.3, Figure 1 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Surface Infrastructure" dated 30/08/19 (EPA reference DOC19/761196).

P1.6 For the purpose of Condition P1.4, Figure 2 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Monitoring" dated 30/08/19 (EPA reference DOC19/761196).

P1.7 The datum for grid references in this Licence is the Geodetic Datum of Australia 1994 (GDA94), Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The Licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and summarised in the EPA

reference DOC19/761196.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of Condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at EPA Identification Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using EPA Identification Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	LAeq (15 minute)	LAeq (15 minute)	LAeq (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	LAeq (period)	LAeq (period)	LAeq (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C51090

EQUIPMENT TESTED : Acustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 138017
Class: 1
Owner: EMM Consulting
Suite 01, 20 Chandos St
St Leonards NSW 2065
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	1000	hPa ±1 hPa	**Date of Receipt :**	30/08/2024
Temperature	24	°C ±1° C	**Date of Calibration :**	02/09/2024
Relative Humidity	28	% ±5%	**Date of Issue :**	03/09/2024

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

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

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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ACOUSTICS AND VIBRATIONS
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Unit 14, 22 Hudson Avenue, Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

NATA
WORLD RECOGNISED ACCREDITATION
Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM51832

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	Rion		
Type No:	NA-28	**Serial No:**	00370304
Mic. Type:	UC-59	**Serial No:**	10421
Pre-Amp. Type:	NH-23	**Serial No:**	60313
Filter Type:	1/3 Octave	**Test No:**	F051834

Owner: EMM Consulting
Suite 01, 20 Chandos St
St Leonards NSW 2065

Tests Performed: IEC 61672-3:2013 & IEC 61260-3:2016

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	993	hPa ±1 hPa	**Date of Receipt :**	05/11/2024
Temperature	24	°C ±1° C	**Date of Calibration :**	08/11/2024
Relative Humidity	47	% ±5%	**Date of Issue :**	08/11/2024

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Bruce Meldrum

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Appendix B

Monthly attended noise monitoring report – February 2025

EMM
creating opportunities

Ashton Coal

Monthly attended noise monitoring - February 2025

Prepared for Ashton Coal Operations Pty Ltd

February 2025

Ashton Coal

Monthly attended noise monitoring - February 2025

Ashton Coal Operations Pty Ltd

E241180 RP#1

February 2025

Version	Date	Prepared by	Reviewed by	Comments
1	26 February 2025	Lucas Adamson	Robert Kirwan	Draft
2	28 February 2025	Lucas Adamson	Robert Kirwan	Final

Approved by

Robert Kirwan
Associate Acoustics Consultant
28 February 2025

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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

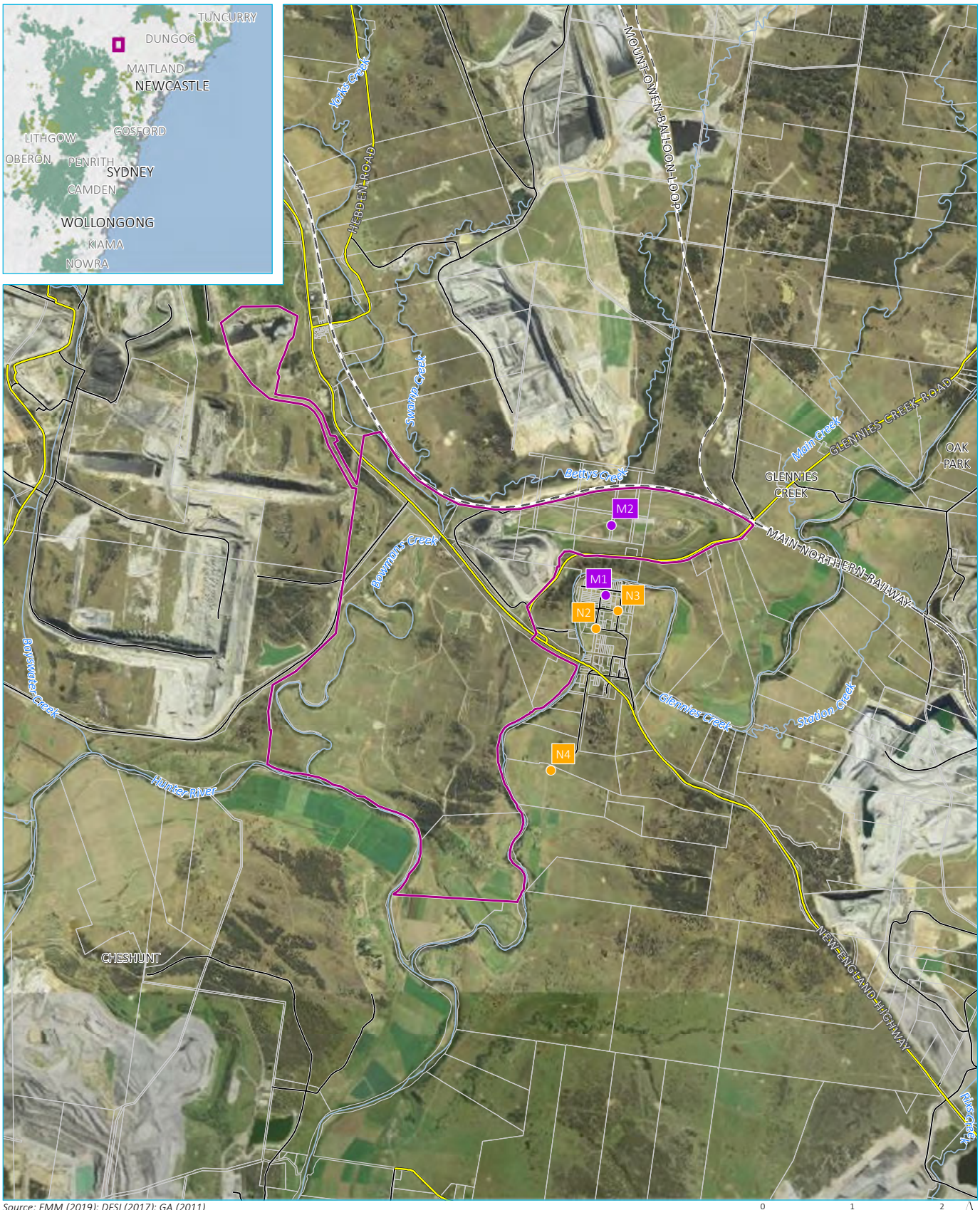
Attended environmental noise monitoring described in this report was done during the night period of Monday 17 February 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

EMM creating opportunities

\\emmsvr1\EMM\Jobs\2019\H190081 - Ashton Coal Noise Monitoring\8 GIS\02_Maps\N001_NoiseMonitoring_20190312_02.mxd 12/03/2019

1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for one per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for one per cent of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 per cent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	The vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 3 November 2022. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply if:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 metres above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15-minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 metres above local ground level) minus temperature measured at M1 (at 10 metres above local ground level)
- ΔH = the vertical height difference between M2 and M1 (equal to 73 metres).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Isaac Hepworth. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA28 sound level meter	00701424	1/6/2025	IEC 61672-1:2002
Pulsar 105 calibrator	78226	26/2/2026	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Section 5 of this report.

Table 4.1 Total measured noise levels, dB – February 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N4	17/02/2025	22:01	51	46	45	43	43	40	37
N3	17/02/2025	22:28	62	57	52	46	38	35	31
N2	17/02/2025	22:50	57	54	49	46	43	36	29

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height – February 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north	Cloud cover 1/8s
N4	17/02/2025	22:01	19.6	<0.5	-	0
N3	17/02/2025	22:28	18.9	<0.5	-	0
N2	17/02/2025	22:50	18.8	<0.5	-	0

4.2 Site only noise levels

4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – February 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N4	17/02/2025	22:01	1.3	89	E	-0.1	Yes	36	46	IA	IA	Nil	Nil
N3	17/02/2025	22:28	1.4	93	E	1.0	Yes	36	46	IA	IA	Nil	Nil
N2	17/02/2025	22:50	0.9	110	F	1.5	Yes	36	46	<20	<20	Nil	Nil

Notes: 1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.

2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.

3. Degrees magnetic north, "-" indicates calm conditions.

4. IA in the site level column means that the site was deemed inaudible at that location.

5. NM (not measurable) in the site level column means that the site was audible but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

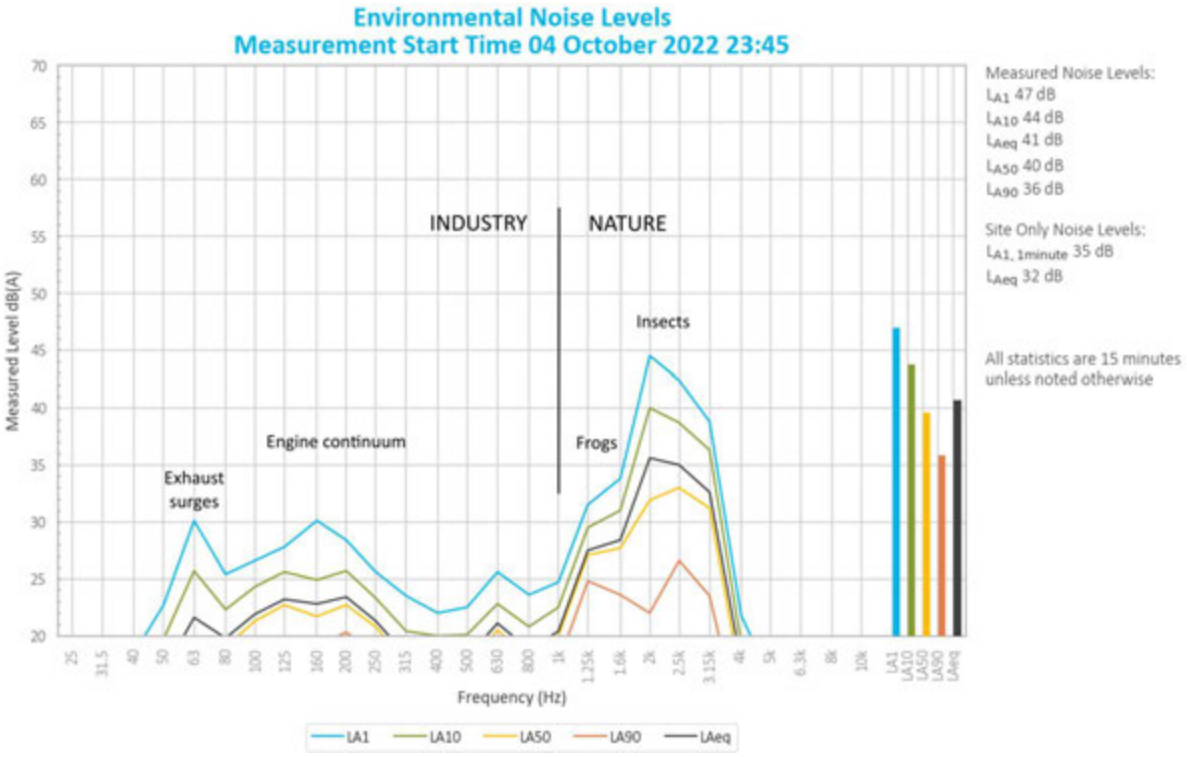


Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

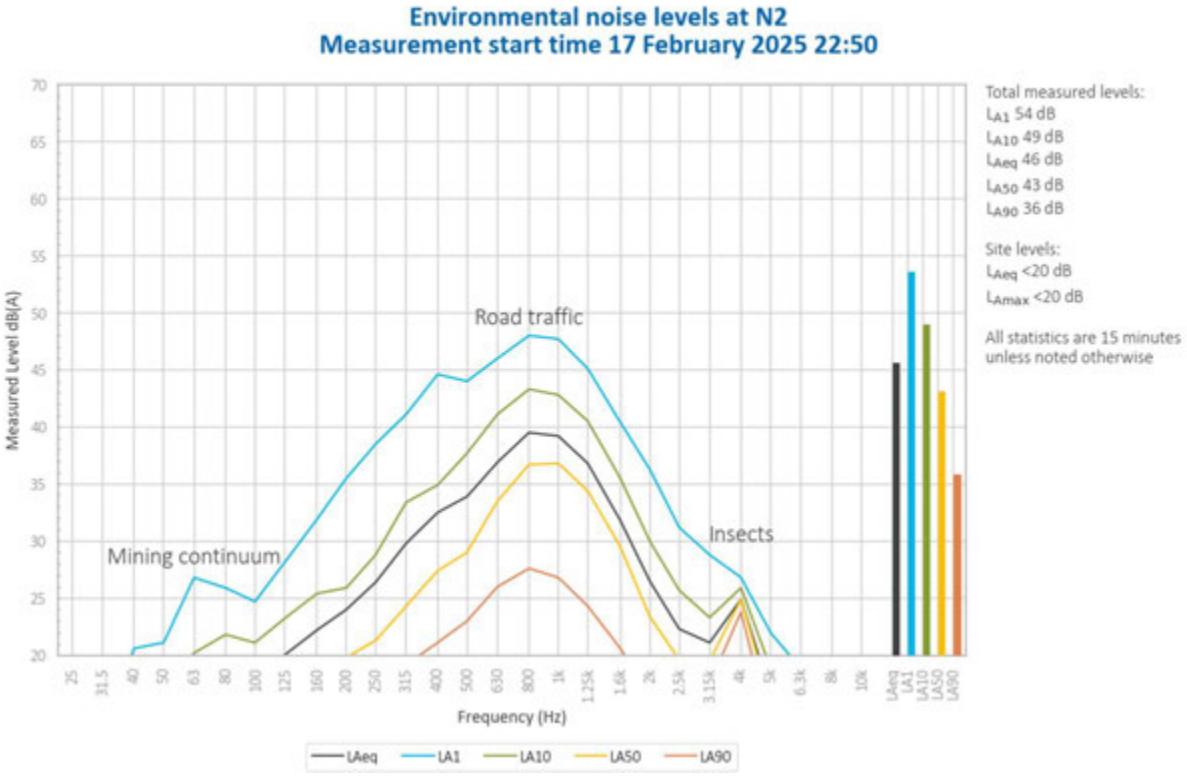


Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal mine hum was consistently audible throughout the entire measurement. This generated a site $L_{Aeq,15minute}$ and $L_{A1,1minute}$ of <20 dB.

Road traffic, other mines in the vicinity, frogs and insects were the main contributors to measured levels.

Noise from trains was also noted.

5.2.1 Cumulative mining noise at N2

Other mining operations in the vicinity were frequently audible during the operator-attended noise survey at monitoring location N3. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <27 dB (i.e. Other mine noise of $L_{Aeq,15minute}$ <30 dB less 3 dB as per NPfI methodology) which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

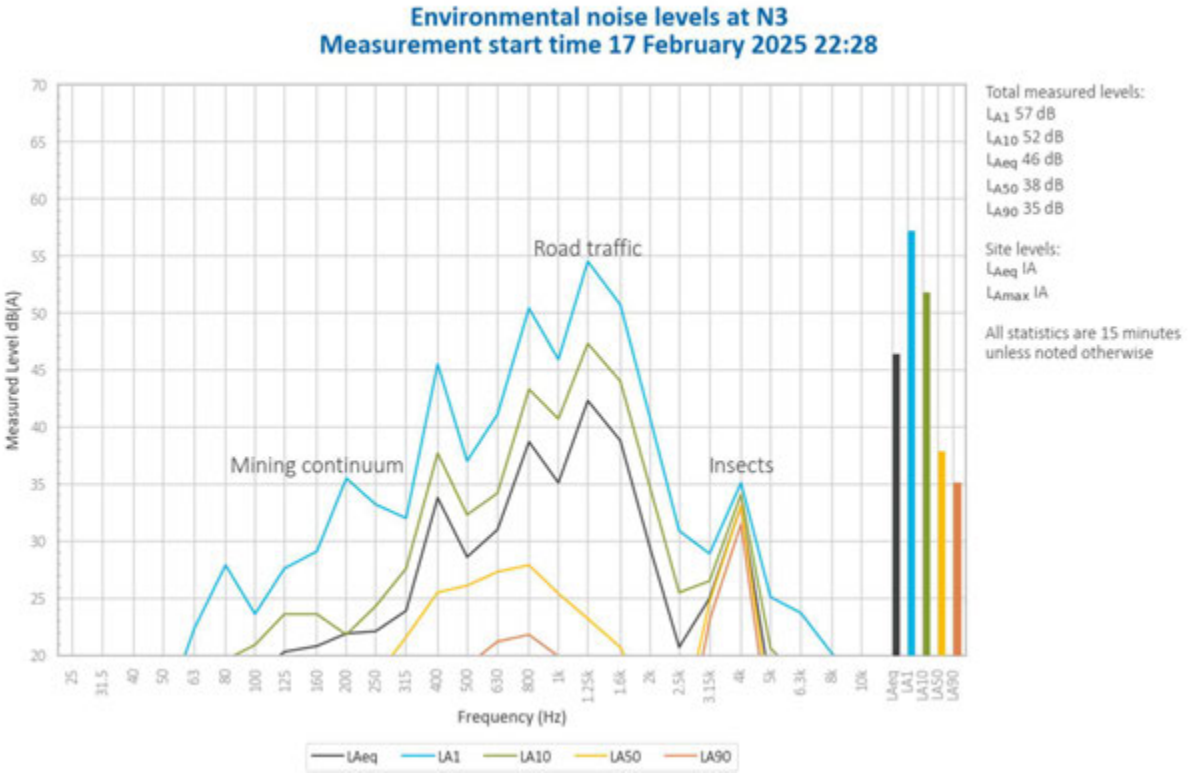


Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity, frogs and insects were the main contributors to measured levels.

Noise from trains, residents and dogs was also noted.

5.3.1 Cumulative mining noise at N3

Other mining operations in the vicinity were frequently audible during the operator-attended noise survey at monitoring location N3. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <22 dB (i.e. Other mine noise of $L_{Aeq,15minute}$ <25 dB less 3 dB as per NPfI methodology) which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

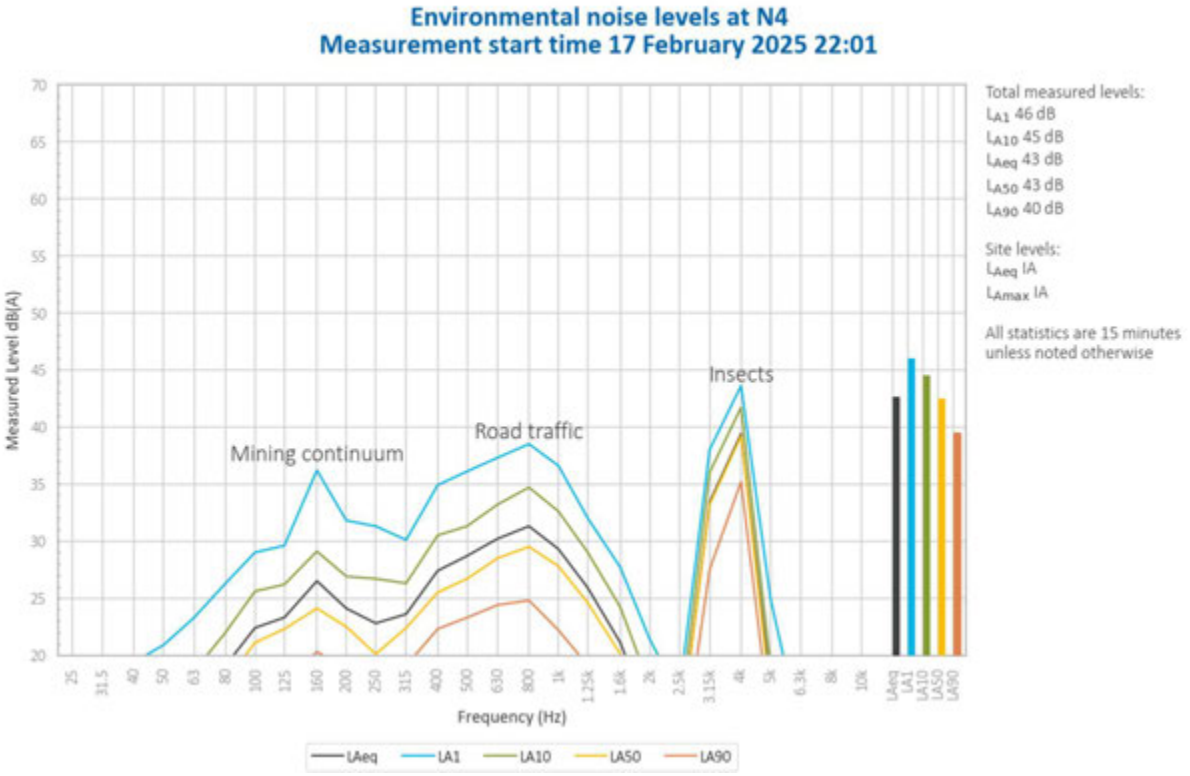


Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity and insects were the main contributors to measured levels.

Noise from trains, birds, bats and dogs was also noted.

5.4.1 Cumulative mining noise at N4

Other mining operations in the vicinity were consistently audible during the operator-attended noise survey at monitoring location N2. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <32 dB (i.e. Other mine noise of $L_{Aeq,15minute}$ <35 dB less 3 dB as per NPfI methodology) which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Ltd (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Monday 17 February 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the February 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

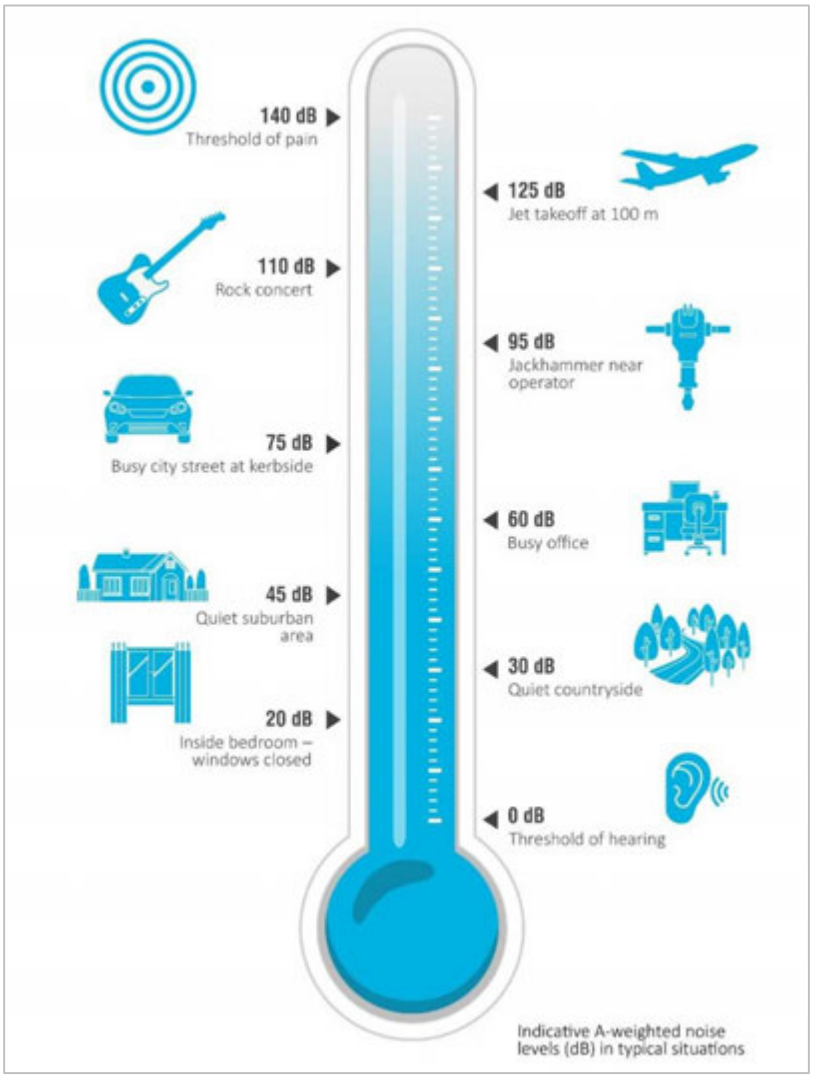

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

Environment Protection Licence

24	Groundwater monitoring	Monitoring up-gradient of Glennies Creek alluvium at coordinates 319294, 6404588 (Easting, Northing), identified as WML120B in Figure 1.
25	Groundwater monitoring	Monitoring mid-gradient of Glennies Creek alluvium at coordinates 319468, 6403528 (Easting, Northing), identified as WML129 in Figure 1.
26	Groundwater monitoring	Monitoring down-gradient of Glennies Creek alluvium at coordinates 318965, 6402842 (Easting, Northing), identified as WMLP336 in Figure 1.
27	Groundwater monitoring	Monitoring up-gradient of Barrett coal seam at coordinates 318431, 6407214 (Easting, Northing), identified as GM1 in Figure 1.
28	Groundwater monitoring	Monitoring up-gradient of Pikes Gully coal seam at coordinates 319292, 6404580 (Easting, Northing), identified as WML120A in Figure 1.
29	Groundwater monitoring	Monitoring mid-gradient of Pikes Gully coal seam at coordinates 319220, 6403928 (Easting, Northing), identified as WML262 in Figure 1.
30	Groundwater monitoring	Monitoring up-gradient of Upper Liddell coal seam at coordinates 319215, 6403958 (Easting, Northing), identified as WML181 in Figure 1.
31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam at coordinates 319188, 6404325 (Easting, Northing), identified as WML183 in Figure 1.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring at coordinates 320522, 6406815 (Easting, Northing), identified as Repeater on Figure 2.
13	Noise monitoring	Monitoring at coordinates 320554, 6405839 (Easting, Northing), identified as N3 on Figure 2 and representative of Noise Assessment Group 2.

14	Noise monitoring	Monitoring at coordinates 320297, 6405670 (Easting, Northing), identified as N2 on Figure 2 and representative of Noise Assessment Group 1.
15	Noise monitoring	Monitoring at coordinates 319776, 6404101 (Easting, Northing), identified as N4 on Figure 2 and representative of Noise Assessment Group 3.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Monitoring of temperature at 'M1' at coordinates 320259, 6405971 (Easting, Northing).

P1.5 For the purposes of Condition P1.1, P1.2 and P1.3, Figure 1 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Surface Infrastructure" dated 30/08/19 (EPA reference DOC19/761196).

P1.6 For the purpose of Condition P1.4, Figure 2 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Monitoring" dated 30/08/19 (EPA reference DOC19/761196).

P1.7 The datum for grid references in this Licence is the Geodetic Datum of Australia 1994 (GDA94), Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The Licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and summarised in the EPA

reference DOC19/761196.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of Condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at EPA Identification Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using EPA Identification Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	LAeq (15 minute)	LAeq (15 minute)	LAeq (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	LAeq (period)	LAeq (period)	LAeq (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
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Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C23317

Client Details	EMM Consulting Level 3, 175 Scott Street Newcastle NSW 2300
Equipment Tested/ Model Number :	NA-28
Instrument Serial Number :	00701424
Microphone Serial Number :	01916
Pre-amplifier Serial Number :	01463
Firmware Version :	2.0

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	24°C	**Ambient Temperature :**	22.6°C
Relative Humidity :	46%	**Relative Humidity :**	46.6%
Barometric Pressure :	100.6kPa	**Barometric Pressure :**	100.6kPa

Calibration Technician :	Max Moore	**Secondary Check:**	Dylan Selge
Calibration Date :	1 Jun 2023	**Report Issue Date :**	2 Jun 2023

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

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.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13dB*	*Temperature*	*±0.1°C*
1kHz	*±0.13dB*	*Relative Humidity*	*±1.9%*
8kHz	*±0.14dB*	*Barometric Pressure*	*±0.014kPa*
Electrical Tests	*±0.13dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C24155

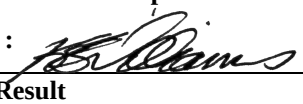
Client Details EMM Consulting
Level 3, 175 Scott Street
Newcastle NSW 2300

Equipment Tested/ Model Number : Model 105
Instrument Serial Number : 78226

Atmospheric Conditions

Ambient Temperature : 25.3 °C
Relative Humidity : 53.6 %
Barometric Pressure : 100.41 kPa

Calibration Technician : Peter Elters
Secondary Check: Rhys Gravelle
Calibration Date : 26 Feb 2024
Report Issue Date : 26 Feb 2024

Approved Signatory :  Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	*Pass*
Frequency Generated	*Pass*
Total Distortion	*Pass*

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.03	1000.30

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.10 dB*	*Temperature*	*±0.1 °C*
Frequency	*±0.07 %*	*Relative Humidity*	*±1.9 %*
Distortion	*±0.20 %*	*Barometric Pressure*	*±0.11 kPa*

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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Appendix C

Monthly attended noise monitoring report – March 2025

EMM
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Ashton Coal

Monthly attended noise monitoring - March 2025

Prepared for Ashton Coal Operations Pty Ltd

March 2025

Ashton Coal

Monthly attended noise monitoring - March 2025

Ashton Coal Operations Pty Ltd

E241180 RP#3

March 2025

Version	Date	Prepared by	Reviewed by	Comments
1	21 March 2025	Lucas Adamson	Robert Kirwan	Draft
2	25 March 2025	Lucas Adamson	Robert Kirwan	Final

Approved by

Robert Kirwan
Associate Acoustics Consultant
25 March 2025

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This report has been prepared in accordance with the brief provided by Ashton Coal Operations Pty Ltd and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. The contents of this report are private and confidential. This report is only for Ashton Coal Operations Pty Ltd's use in accordance with its agreement with EMM and is not to be relied on by or made available to any other party without EMM's prior written consent. Except as permitted by the Copyright Act 1968 (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Ashton Coal Operations Pty Ltd (and subject to the terms of EMM's agreement with Ashton Coal Operations Pty Ltd).

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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

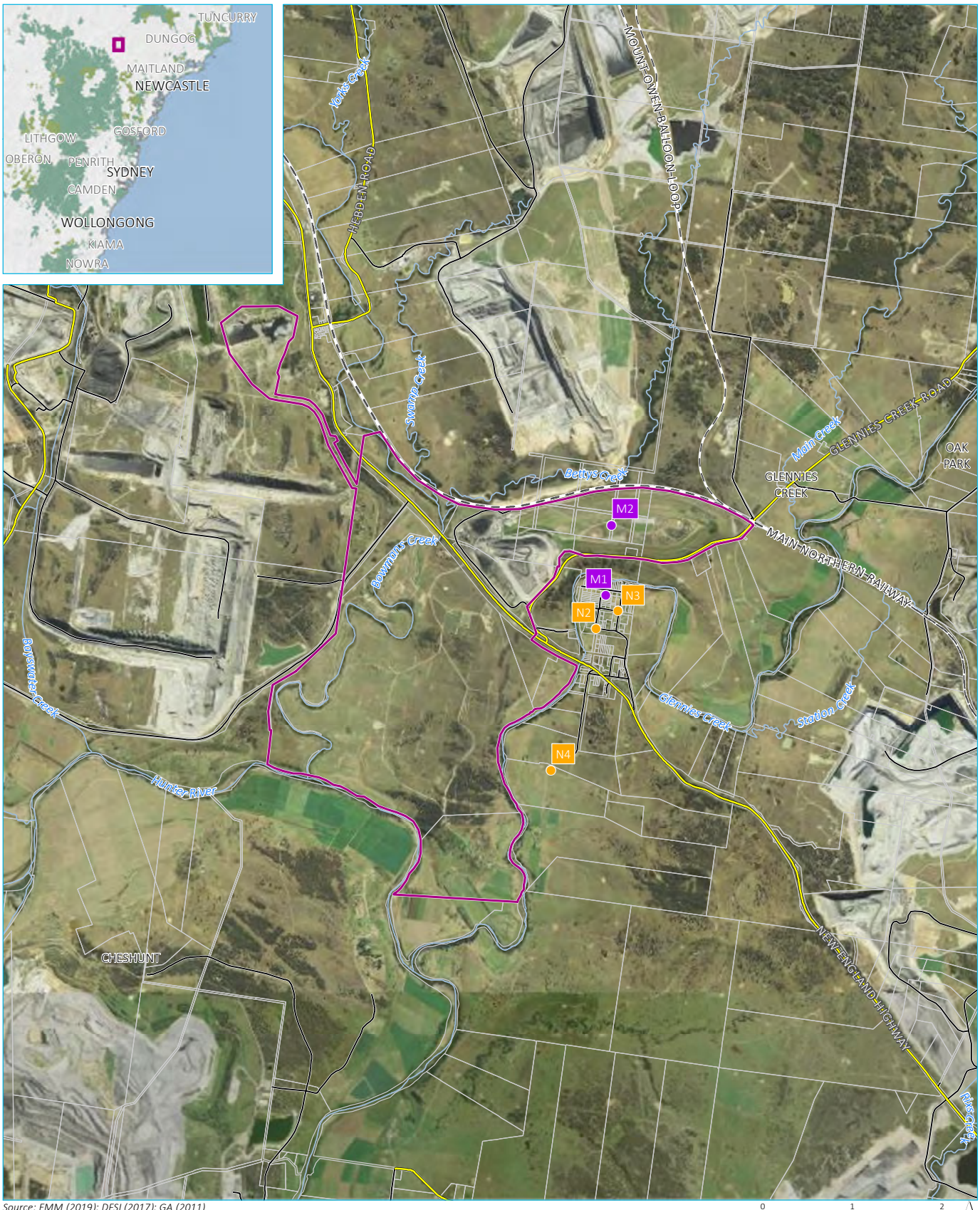
Attended environmental noise monitoring described in this report was done during the night period of Monday 17 March 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

EMM creating opportunities

\\emmsvr1\EMM\Jobs\2019\H190081 - Ashton Coal Noise Monitoring\8 GIS\02_Maps\N001_NoiseMonitoring_20190312_02.mxd 12/03/2019

1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for one per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for one per cent of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 per cent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	The vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 3 November 2022. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply if:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 metres above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15-minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 metres above local ground level) minus temperature measured at M1 (at 10 metres above local ground level)
- ΔH = the vertical height difference between M2 and M1 (equal to 73 metres).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Lucas Adamson. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Brüel & Kjær 2250 sound level meter	2759405	20/12/2025	IEC 61672-1:2013
Svantek SV36 acoustic calibrator	162796	28/1/2027	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Section 5 of this report.

Table 4.1 Total measured noise levels, dB – March 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N2	17/03/2025	22:00	58	54	49	45	41	36	29
N4	17/03/2025	22:22	49	45	41	37	35	30	27
N3	17/03/2025	22:43	63	58	50	47	43	35	30

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height – March 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north	Cloud cover 1/8s
N2	17/03/2025	22:00	16.6	<0.5	-	8
N4	17/03/2025	22:22	16.4	<0.5	-	8
N3	17/03/2025	22:43	16.5	<0.5	-	8

4.2 Site only noise levels

4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – March 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N2	17/03/2025	22:00	1.4	119	E	-0.3	Yes	36	46	IA	IA	Nil	Nil
N4	17/03/2025	22:22	1.4	96	E	-0.4	Yes	36	46	IA	IA	Nil	Nil
N3	17/03/2025	22:43	1.3	97	E	-0.1	Yes	36	46	IA	IA	Nil	Nil

Notes: 1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.

2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.

3. Degrees magnetic north, "-" indicates calm conditions.

4. IA in the site level column means that the site was deemed inaudible at that location.

5. NM (not measurable) in the site level column means that the site was audible but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

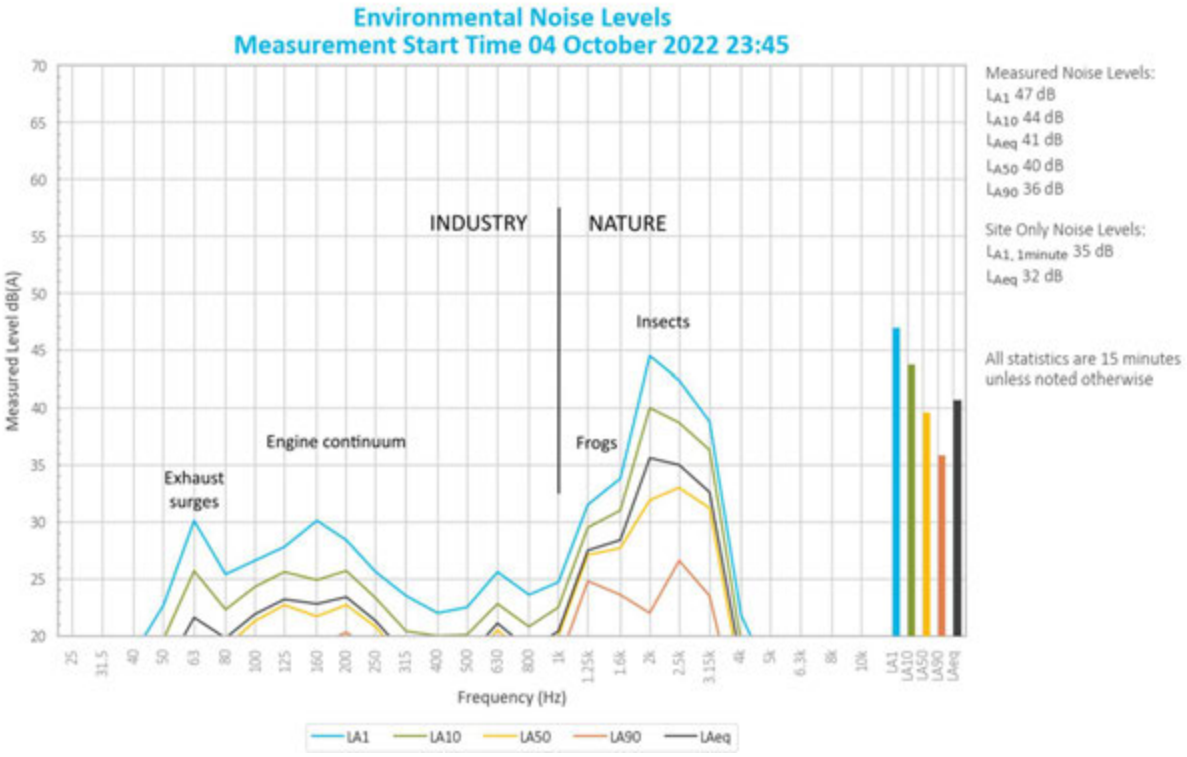


Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

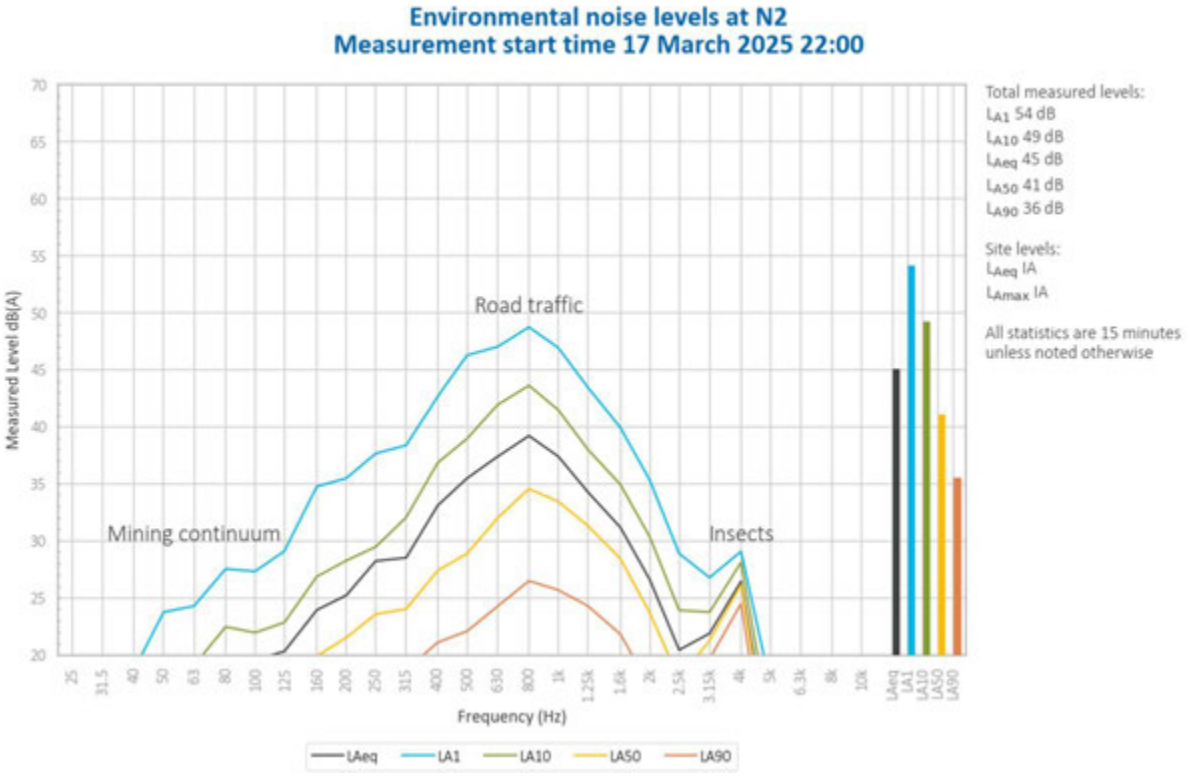


Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity, frogs and insects were the main contributors to measured levels.

Noise from birds and dogs was also noted.

5.2.1 Cumulative mining noise at N2

Other mining operations in the vicinity were frequently audible during the operator-attended noise survey at monitoring location N2. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <27 dB (i.e. Other mine noise of $L_{Aeq,15minute}$ <30 dB less 3 dB as per NPfI methodology) which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

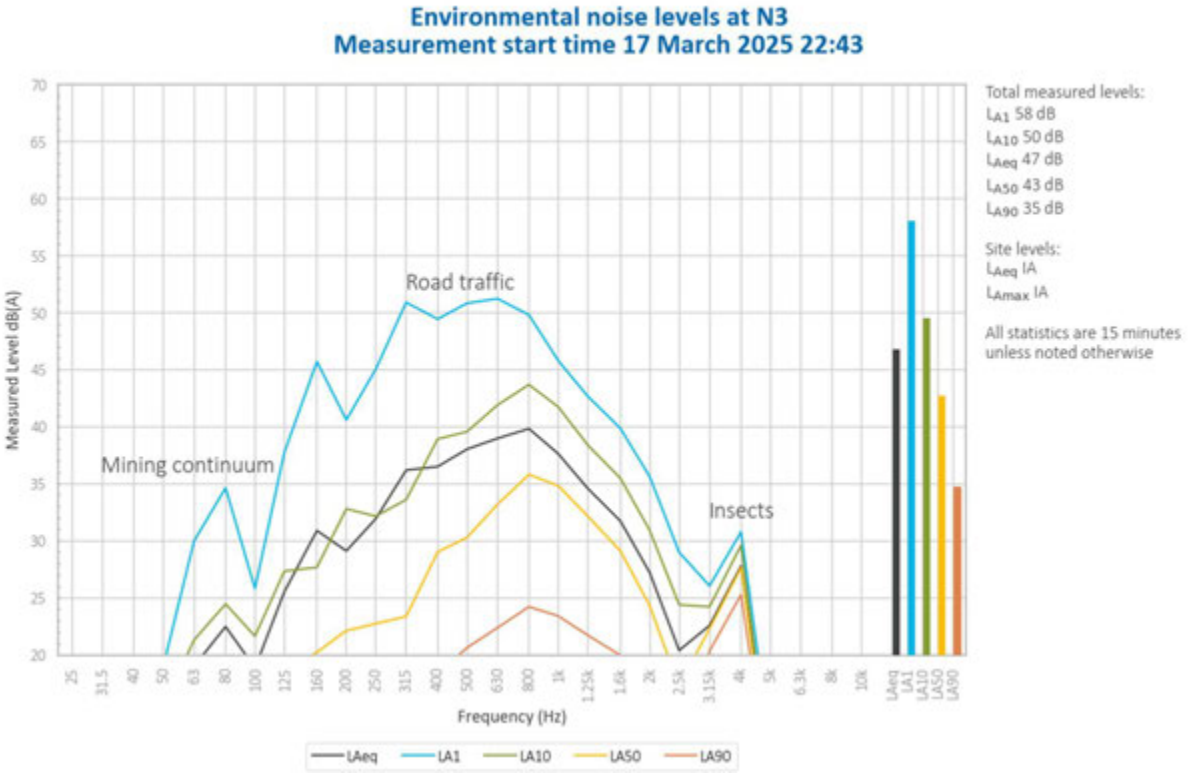


Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity, frogs and insects were the main contributors to measured levels.

Noise from dogs was also noted.

5.3.1 Cumulative mining noise at N3

Other mining operations in the vicinity were frequently audible during the operator-attended noise survey at monitoring location N3. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <27 dB (i.e. Other mine noise of $L_{Aeq,15minute}$ <30 dB less 3 dB as per NPfI methodology) which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

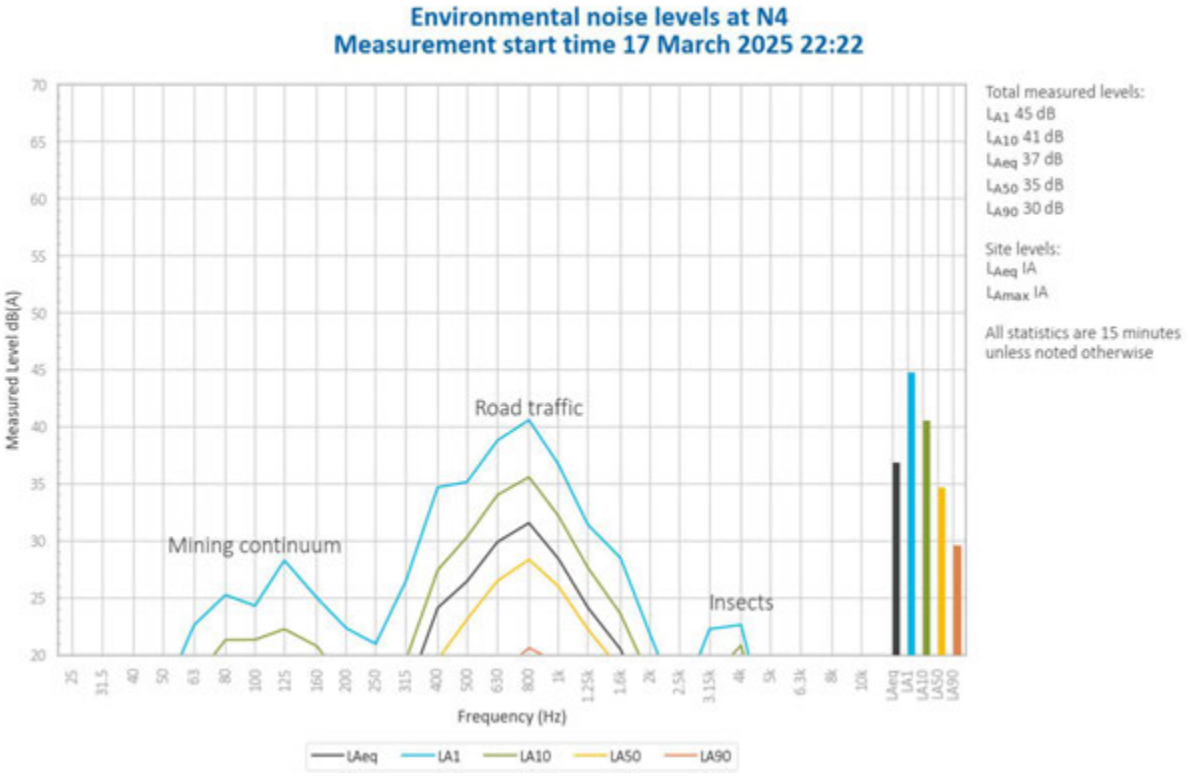


Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity, insects and frogs were the main contributors to measured levels.

Noise from nearby powerlines was also noted.

5.4.1 Cumulative mining noise at N4

Other mining operations in the vicinity were consistently audible during the operator-attended noise survey at monitoring location N4. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <27 dB (i.e. Other mine noise of $L_{Aeq,15minute}$ <30 dB less 3 dB as per NPfI methodology) which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Ltd (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Monday 17 March 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the March 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

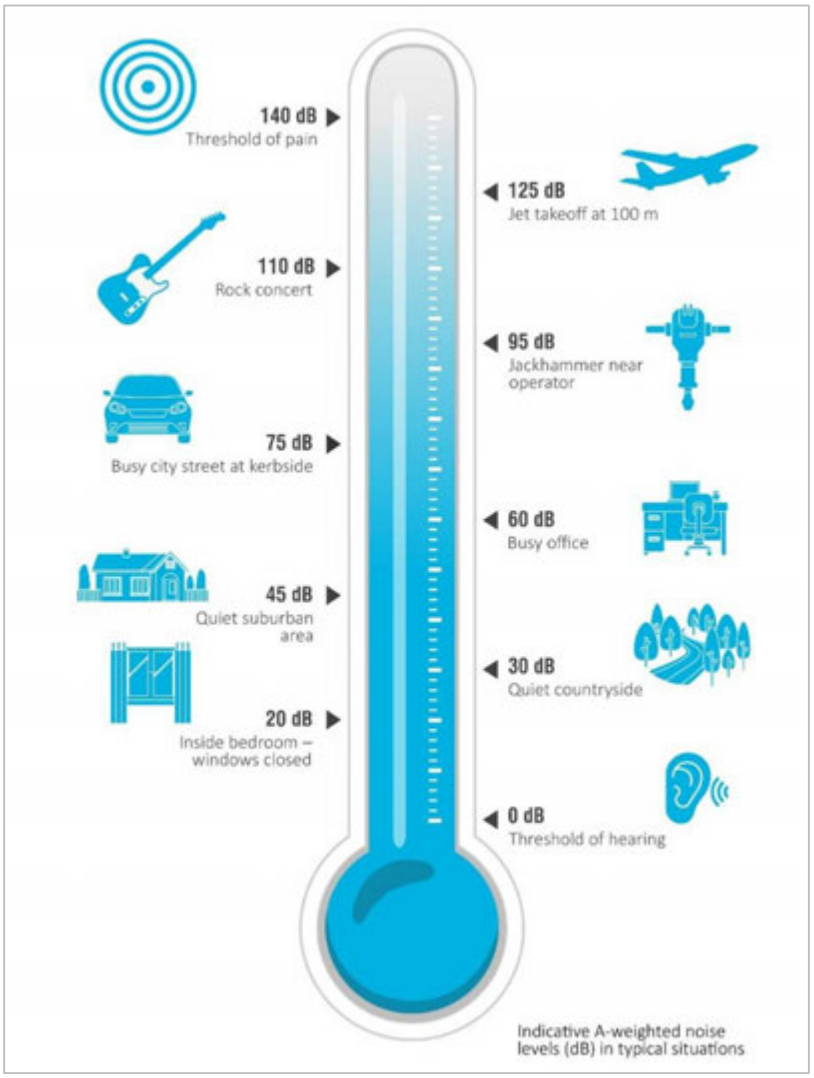

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

Environment Protection Licence

24	Groundwater monitoring	Monitoring up-gradient of Glennies Creek alluvium at coordinates 319294, 6404588 (Easting, Northing), identified as WML120B in Figure 1.
25	Groundwater monitoring	Monitoring mid-gradient of Glennies Creek alluvium at coordinates 319468, 6403528 (Easting, Northing), identified as WML129 in Figure 1.
26	Groundwater monitoring	Monitoring down-gradient of Glennies Creek alluvium at coordinates 318965, 6402842 (Easting, Northing), identified as WMLP336 in Figure 1.
27	Groundwater monitoring	Monitoring up-gradient of Barrett coal seam at coordinates 318431, 6407214 (Easting, Northing), identified as GM1 in Figure 1.
28	Groundwater monitoring	Monitoring up-gradient of Pikes Gully coal seam at coordinates 319292, 6404580 (Easting, Northing), identified as WML120A in Figure 1.
29	Groundwater monitoring	Monitoring mid-gradient of Pikes Gully coal seam at coordinates 319220, 6403928 (Easting, Northing), identified as WML262 in Figure 1.
30	Groundwater monitoring	Monitoring up-gradient of Upper Liddell coal seam at coordinates 319215, 6403958 (Easting, Northing), identified as WML181 in Figure 1.
31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam at coordinates 319188, 6404325 (Easting, Northing), identified as WML183 in Figure 1.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring at coordinates 320522, 6406815 (Easting, Northing), identified as Repeater on Figure 2.
13	Noise monitoring	Monitoring at coordinates 320554, 6405839 (Easting, Northing), identified as N3 on Figure 2 and representative of Noise Assessment Group 2.

14	Noise monitoring	Monitoring at coordinates 320297, 6405670 (Easting, Northing), identified as N2 on Figure 2 and representative of Noise Assessment Group 1.
15	Noise monitoring	Monitoring at coordinates 319776, 6404101 (Easting, Northing), identified as N4 on Figure 2 and representative of Noise Assessment Group 3.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Monitoring of temperature at 'M1' at coordinates 320259, 6405971 (Easting, Northing).

P1.5 For the purposes of Condition P1.1, P1.2 and P1.3, Figure 1 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Surface Infrastructure" dated 30/08/19 (EPA reference DOC19/761196).

P1.6 For the purpose of Condition P1.4, Figure 2 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Monitoring" dated 30/08/19 (EPA reference DOC19/761196).

P1.7 The datum for grid references in this Licence is the Geodetic Datum of Australia 1994 (GDA94), Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The Licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and summarised in the EPA

reference DOC19/761196.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of Condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at EPA Identification Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using EPA Identification Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	LAeq (15 minute)	LAeq (15 minute)	LAeq (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	LAeq (period)	LAeq (period)	LAeq (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C52587

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 162796
Class: 1
Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	995	hPa ±1 hPa	**Date of Receipt :**	28/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	28/01/2025
Relative Humidity	45	% ±5%	**Date of Issue :**	29/01/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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Measurements

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Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

CERTIFICATE OF CALIBRATION

Certificate No: CAU2300941

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2250	No: 2759405
Microphone:	Brüel & Kjær	4189	No: 2983733
Preamplifier:	Brüel & Kjær	ZC-0032	No: 22666
Supplied Calibrator:	None		
Software version:	BZ7224 Version 4.7.4	Pattern Approval:	-
Instruction manual:	BE1712-22	Identification:	N/A

CUSTOMER:

EMM Consulting Pty Limited
20 Chandos Street
St Leonards NSW 2065

CALIBRATION CONDITIONS:

Preconditioning:	4 hours at 23 °C
Environment conditions:	*see actual values in **Environmental conditions** sections*

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1.
Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
The measurements included in this document are traceable to Australian/National standards.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.6 - DB: 8.60) and test procedure 2250-4189.

RESULTS:

	Initial calibration		Calibration prior to repair/adjustment
X	Calibration without repair/adjustment		Calibration after repair/adjustment

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration:20/12/2023

Certificate issued:21/12/2023

Calibration Technician: Sajeeb Tharayil

Approved signatory: Sajeeb Tharayil

Reproduction of the complete certificate is allowed. Part of the certificate may only be reproduced after written permission.

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Appendix D

Monthly attended noise monitoring report – April 2025

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Ashton Coal

Monthly attended noise monitoring - April 2025

Prepared for Ashton Coal Operations Pty Ltd

May 2025

Ashton Coal

Monthly attended noise monitoring - April 2025

Ashton Coal Operations Pty Ltd

E241180 RP#4

May 2025

Version	Date	Prepared by	Reviewed by	Comments
1	1 May 2025	Isaac Hepworth	Robert Kirwan	Draft
2	6 May 2025	Isaac Hepworth	Robert Kirwan	Final

Approved by

Robert Kirwan
Associate Acoustics Consultant – Team Leader
6 May 2025

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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

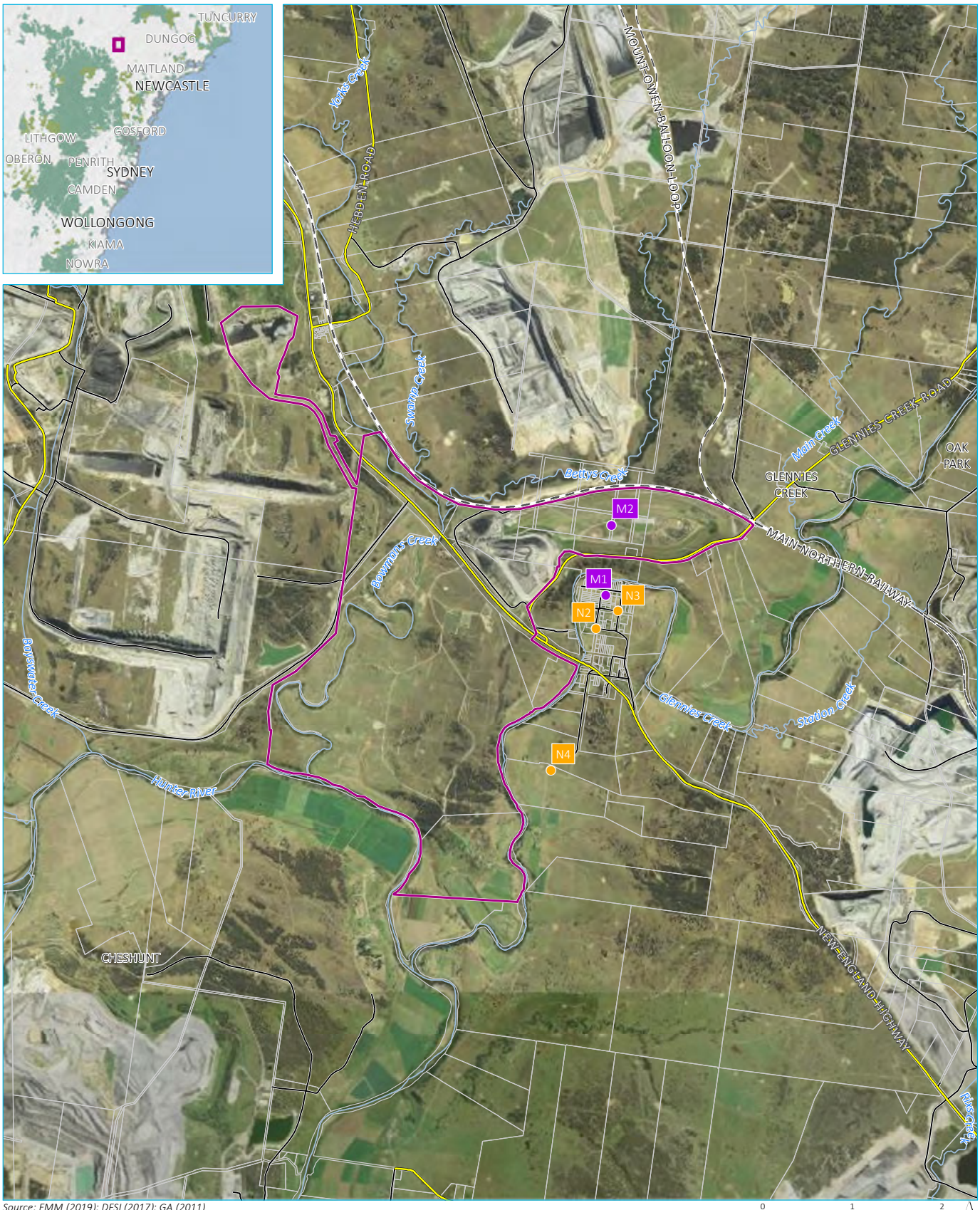
Attended environmental noise monitoring described in this report was done during the night period of Thursday 24 April 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

EMM creating opportunities

\\emmsvr1\EMM\Jobs\2019\H190081 - Ashton Coal Noise Monitoring\8 GIS\02_Maps\N001_NoiseMonitoring_20190312_02.mxd 12/03/2019

1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for one per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for one per cent of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 per cent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	The vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 3 November 2022. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply if:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 metres above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15-minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 metres above local ground level) minus temperature measured at M1 (at 10 metres above local ground level)
- ΔH = the vertical height difference between M2 and M1 (equal to 73 metres).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Isaac Hepworth. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA28 sound level meter	01070590	27/05/2026	IEC 61672-1:2002
Pulsar 105 acoustic calibrator	96080	04/03/2026	IEC 60942:2003

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Section 5 of this report.

Table 4.1 Total measured noise levels, dB – April 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N4	24/04/2025	22:00	54	51	50	47	45	40	34
N3	24/04/2025	22:27	49	44	41	38	36	32	29
N2	24/04/2025	22:49	60	57	50	46	41	33	27

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height –April 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north	Cloud cover 1/8s
N4	24/04/2025	22:00	20.7	0.5	240	2
N3	24/04/2025	22:27	23.9	<0.5	-	2
N2	24/04/2025	22:49	22.1	<0.5	-	1

4.2 Site only noise levels

4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – April 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N4	24/04/2025	22:00	1.5	149	F	2.1	Yes	36	46	<20	<20	Nil	Nil
N3	24/04/2025	22:27	1.6	147	F	2.2	Yes	36	46	IA	IA	Nil	Nil
N2	24/04/2025	22:49	1.7	140	F	2.3	Yes	36	46	IA	IA	Nil	Nil

Notes:
1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.
2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.
3. Degrees magnetic north, "-" indicates calm conditions.
4. IA in the site level column means that the site was deemed inaudible at that location.
5. NM (not measurable) in the site level column means that the site was audible but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

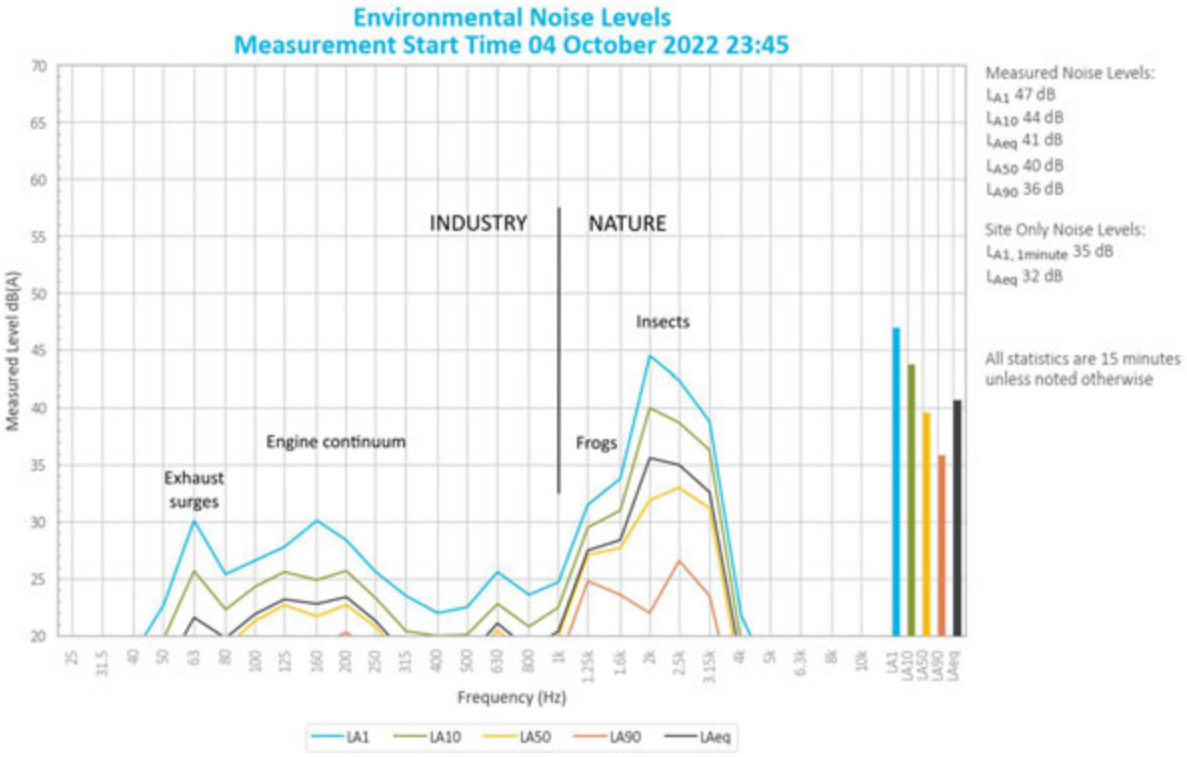


Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

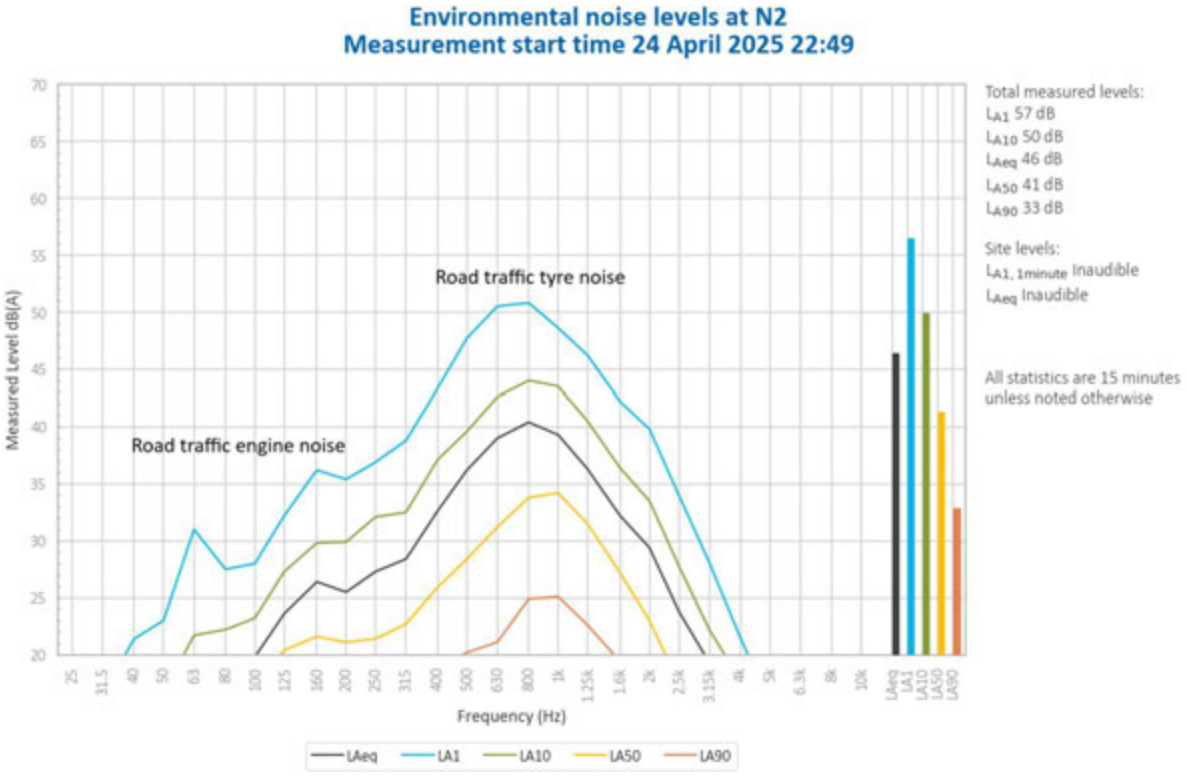


Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity, trains and dogs were the main contributors to measured levels.

Noise from frogs and insects was also noted.

5.2.1 Cumulative mining noise at N2

Other mining operations in the vicinity were frequently audible during the operator-attended noise survey at monitoring location N2. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <25 dB, which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

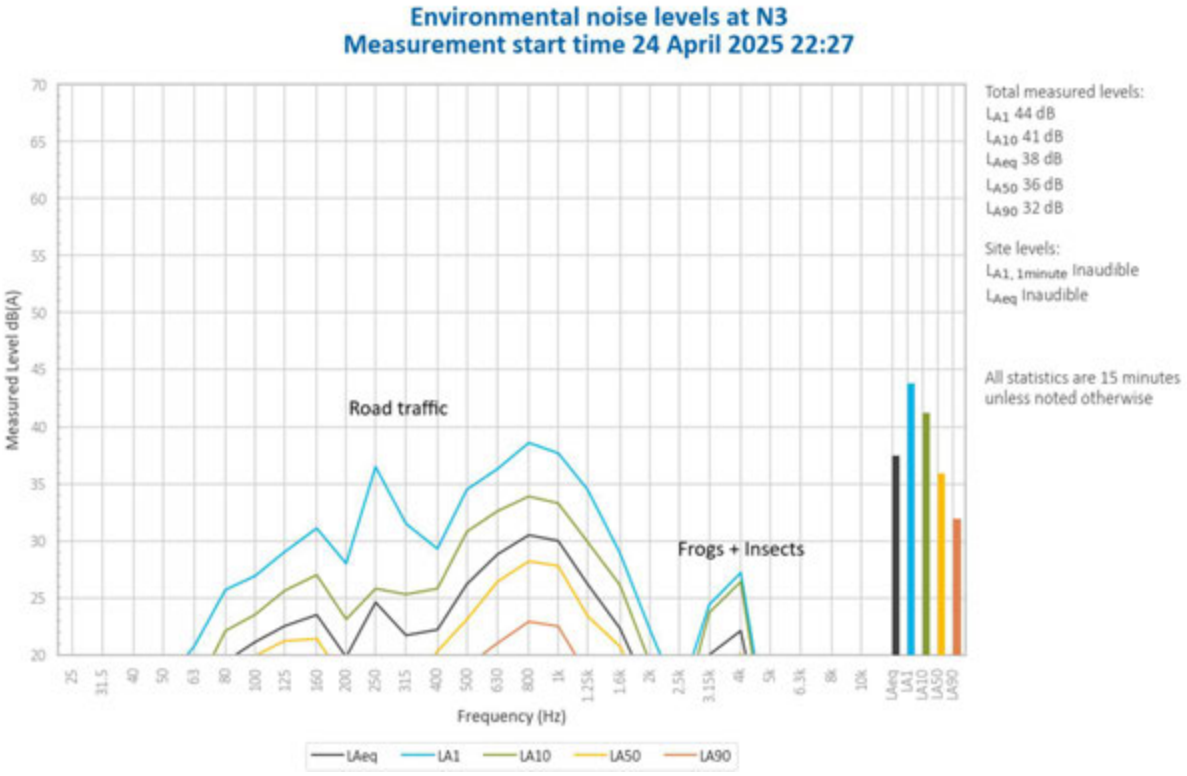


Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity, trains, frogs and insects were the main contributors to measured levels.

Noise from dogs was also noted.

5.3.1 Cumulative mining noise at N3

Other mining operations in the vicinity were frequently audible during the operator-attended noise survey at monitoring location N3. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <25 dB, which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

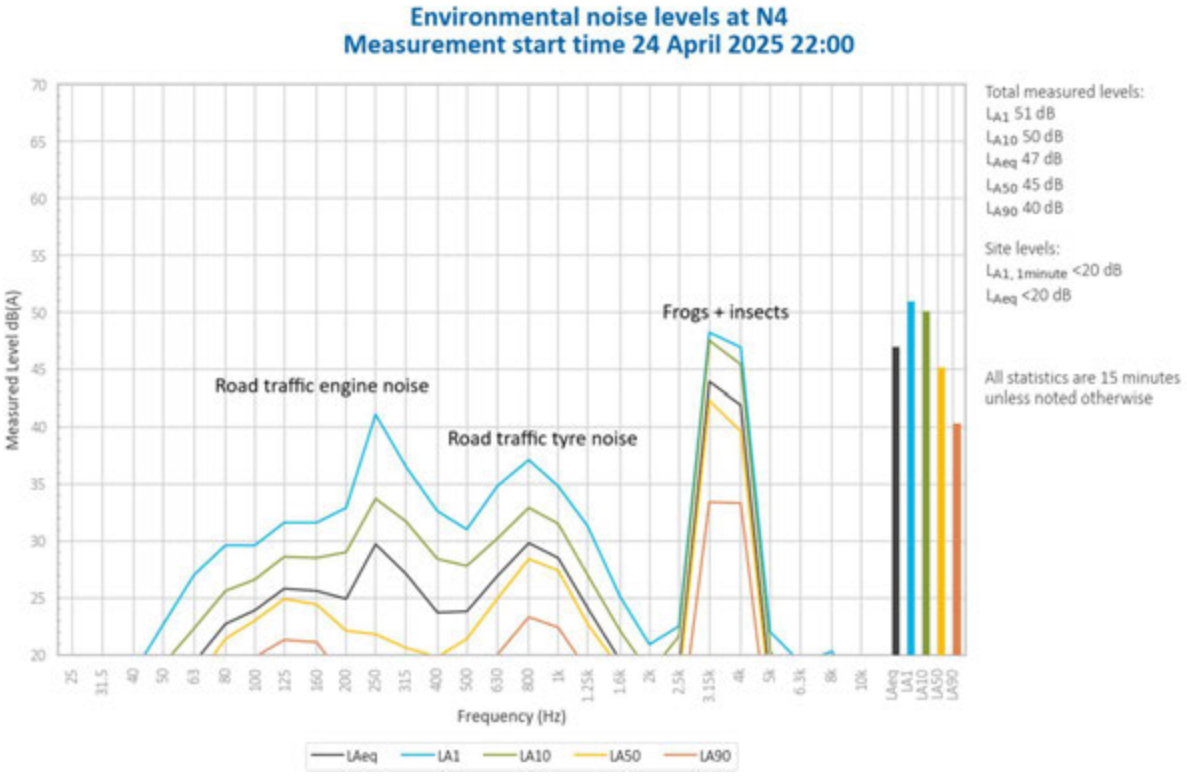


Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal continuum was audible during the measurement. This generated a site $L_{Aeq,15minute}$ and $L_{A1,1minute}$ of <20 dB.

Road traffic, trains, insects and frogs were the main contributors to measured levels.

Noise from bats was also noted.

5.4.1 Cumulative mining noise at N4

Other mining operations in the vicinity were inaudible during the operator-attended noise survey at monitoring location N4. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <20 dB, which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Ltd (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Thursday 24 April 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the April 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

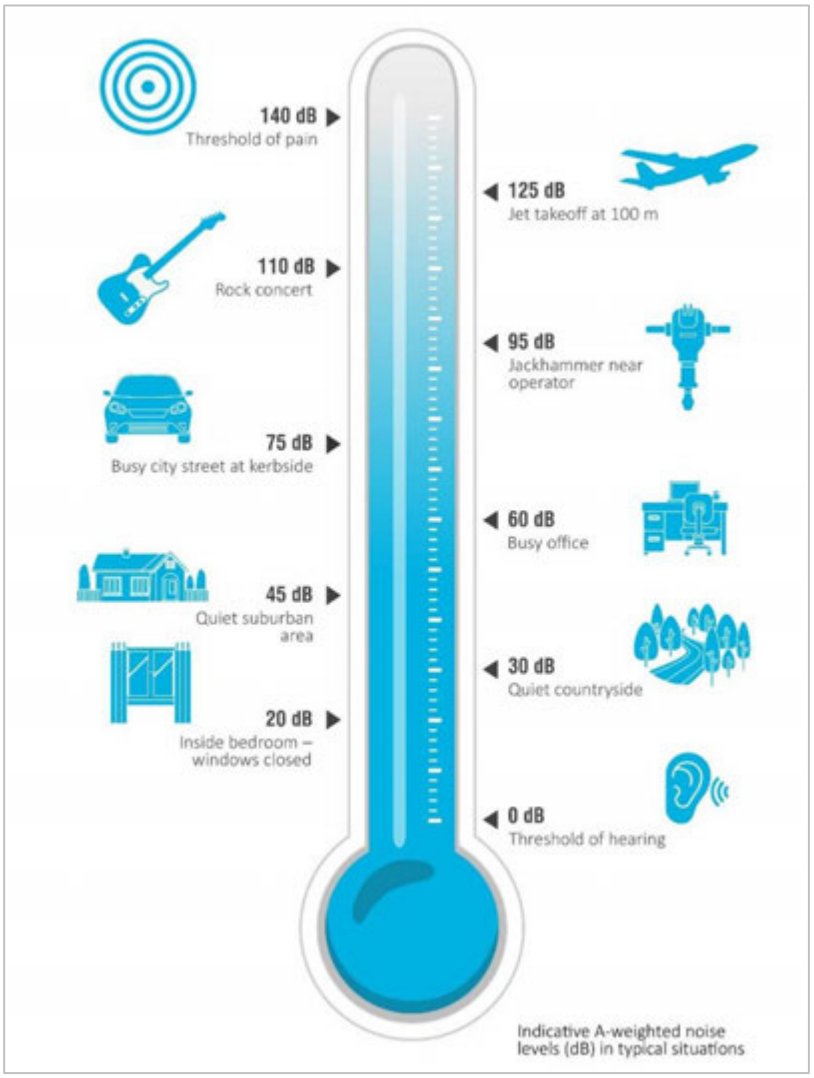

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

Environment Protection Licence

24	Groundwater monitoring	Monitoring up-gradient of Glennies Creek alluvium at coordinates 319294, 6404588 (Easting, Northing), identified as WML120B in Figure 1.
25	Groundwater monitoring	Monitoring mid-gradient of Glennies Creek alluvium at coordinates 319468, 6403528 (Easting, Northing), identified as WML129 in Figure 1.
26	Groundwater monitoring	Monitoring down-gradient of Glennies Creek alluvium at coordinates 318965, 6402842 (Easting, Northing), identified as WMLP336 in Figure 1.
27	Groundwater monitoring	Monitoring up-gradient of Barrett coal seam at coordinates 318431, 6407214 (Easting, Northing), identified as GM1 in Figure 1.
28	Groundwater monitoring	Monitoring up-gradient of Pikes Gully coal seam at coordinates 319292, 6404580 (Easting, Northing), identified as WML120A in Figure 1.
29	Groundwater monitoring	Monitoring mid-gradient of Pikes Gully coal seam at coordinates 319220, 6403928 (Easting, Northing), identified as WML262 in Figure 1.
30	Groundwater monitoring	Monitoring up-gradient of Upper Liddell coal seam at coordinates 319215, 6403958 (Easting, Northing), identified as WML181 in Figure 1.
31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam at coordinates 319188, 6404325 (Easting, Northing), identified as WML183 in Figure 1.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring at coordinates 320522, 6406815 (Easting, Northing), identified as Repeater on Figure 2.
13	Noise monitoring	Monitoring at coordinates 320554, 6405839 (Easting, Northing), identified as N3 on Figure 2 and representative of Noise Assessment Group 2.

14	Noise monitoring	Monitoring at coordinates 320297, 6405670 (Easting, Northing), identified as N2 on Figure 2 and representative of Noise Assessment Group 1.
15	Noise monitoring	Monitoring at coordinates 319776, 6404101 (Easting, Northing), identified as N4 on Figure 2 and representative of Noise Assessment Group 3.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Monitoring of temperature at 'M1' at coordinates 320259, 6405971 (Easting, Northing).

P1.5 For the purposes of Condition P1.1, P1.2 and P1.3, Figure 1 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Surface Infrastructure" dated 30/08/19 (EPA reference DOC19/761196).

P1.6 For the purpose of Condition P1.4, Figure 2 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Monitoring" dated 30/08/19 (EPA reference DOC19/761196).

P1.7 The datum for grid references in this Licence is the Geodetic Datum of Australia 1994 (GDA94), Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The Licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and summarised in the EPA

reference DOC19/761196.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of Condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at EPA Identification Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using EPA Identification Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	LAeq (15 minute)	LAeq (15 minute)	LAeq (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	LAeq (period)	LAeq (period)	LAeq (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C24405

Client Details	EMM Consulting Level 3, 175 Scott Street Newcastle NSW 2300
Equipment Tested/ Model Number :	NA-28
Instrument Serial Number :	01070590
Microphone Serial Number :	08184
Pre-amplifier Serial Number :	52329
Firmware Version :	v2.0

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	24.4 °C	**Ambient Temperature :**	23.8 °C
Relative Humidity :	45.2 %	**Relative Humidity :**	46.7 %
Barometric Pressure :	101.3 kPa	**Barometric Pressure :**	101.26 kPa

Calibration Technician :	Peter Elters	**Secondary Check:**	Rhys Gravelle
Calibration Date :	27 May 2024	**Report Issue Date :**	3 Jun 2024

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

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 testing organisation responsible for approving the results of pattern evaluation test 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 IEC 61672-1:2013.

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13 dB*	*Temperature*	*±0.1 °C*
1kHz	*±0.13 dB*	*Relative Humidity*	*±1.9 %*
8kHz	*±0.14 dB*	*Barometric Pressure*	*±0.11 kPa*
Electrical Tests	*±0.13 dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C53022

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Pulsar
Type No: 105 **Serial No:** 96080
Class: 1
Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
See Details and Class Tolerance overleaf.

Comments:

CONDITION OF TEST:

Ambient Pressure	1008	hPa ±1 hPa	**Date of Receipt :**	27/02/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	04/03/2025
Relative Humidity	52	% ±5%	**Date of Issue :**	04/03/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

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

Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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Appendix E

Monthly attended noise monitoring report – May 2025

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Ashton Coal

Monthly attended noise monitoring - May 2025

Prepared for Ashton Coal Operations Pty Ltd

May 2025

Ashton Coal

Monthly attended noise monitoring - May 2025

Ashton Coal Operations Pty Ltd

E241180 RP5

May 2025

Version	Date	Prepared by	Reviewed by	Comments
1	15 May 2025	Isaac Hepworth	Robert Kirwan	Draft
2	16 May 2025	Isaac Hepworth	Robert Kirwan	Final

Approved by

Robert Kirwan
Associate Acoustics Consultant – Team Leader
16 May 2025

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This report has been prepared in accordance with the brief provided by Ashton Coal Operations Pty Ltd and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. The contents of this report are private and confidential. This report is only for Ashton Coal Operations Pty Ltd's use in accordance with its agreement with EMM and is not to be relied on by or made available to any other party without EMM's prior written consent. Except as permitted by the Copyright Act 1968 (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Ashton Coal Operations Pty Ltd (and subject to the terms of EMM's agreement with Ashton Coal Operations Pty Ltd).

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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

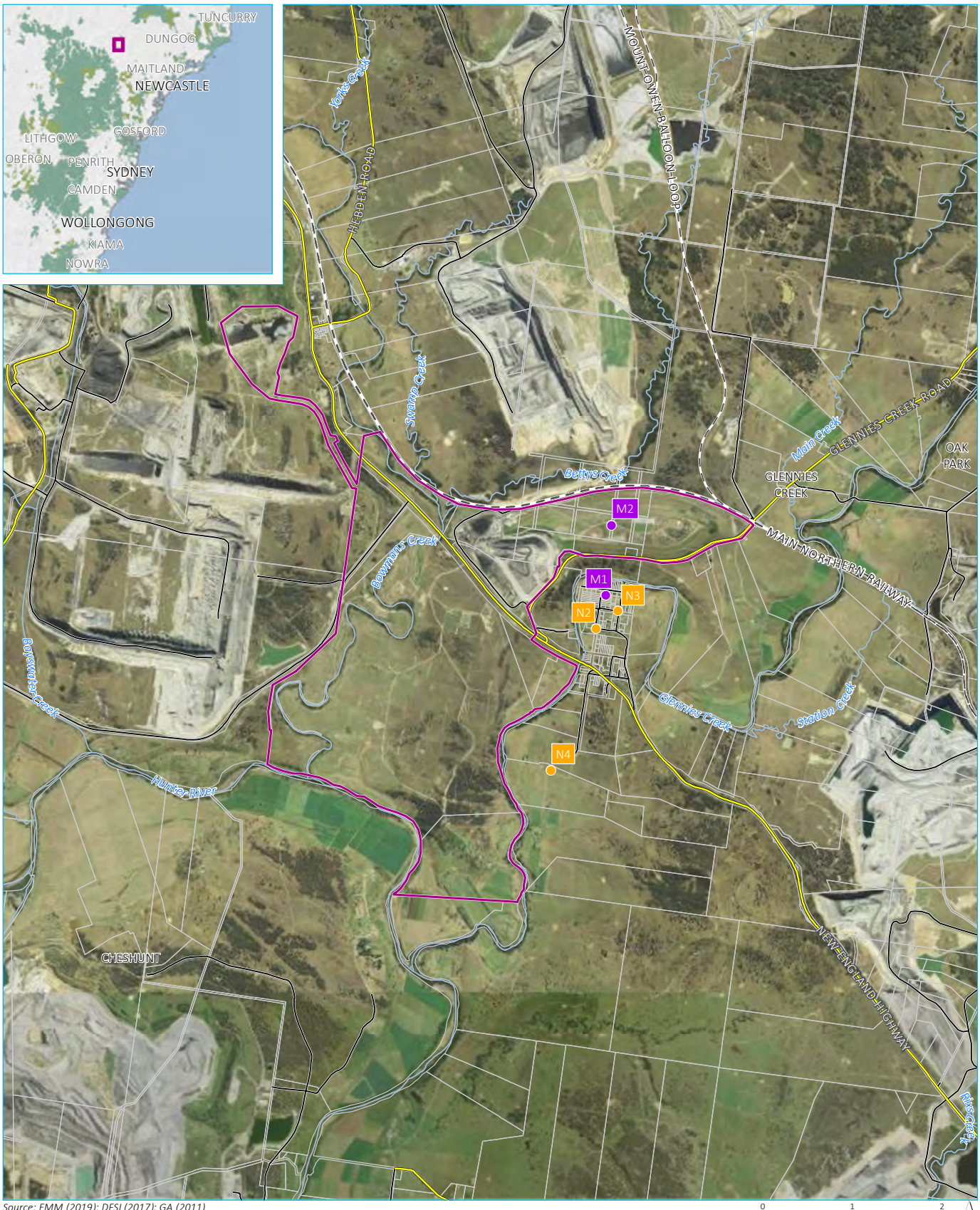
Attended environmental noise monitoring described in this report was done during the night period of Tuesday 13 May 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

EMM creating opportunities

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1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for one per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for one per cent of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 per cent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	The vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 3 November 2022. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply if:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 metres above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15-minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 metres above local ground level) minus temperature measured at M1 (at 10 metres above local ground level)
- ΔH = the vertical height difference between M2 and M1 (equal to 73 metres).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Isaac Hepworth. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA28 sound level meter	30131882	06/02/2027	IEC 61672-1:2002
SVAN SV-36 acoustic calibrator	138014	07/08/2025	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Section 5 of this report.

Table 4.1 Total measured noise levels, dB – May 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N4	13/05/2025	22:00	53	49	46	43	42	39	37
N3	13/05/2025	22:26	57	54	47	44	40	36	32
N2	13/05/2025	22:48	66	60	52	48	41	33	28

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height –May 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north	Cloud cover 1/8s
N4	13/05/2025	22:00	18.8	<0.5	-	6
N3	13/05/2025	22:26	18.5	<0.5	-	6
N2	13/05/2025	22:48	18.1	<0.5	-	5

4.2 Site only noise levels

4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – May 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N4	13/05/2025	22:00	1.1	146	F	-4.1	Yes	36	46	IA	IA	Nil	Nil
N3	13/05/2025	22:26	1.5	168	F	-5.1	Yes	36	46	IA	IA	Nil	Nil
N2	13/05/2025	22:48	1.6	137	F	-5.8	Yes	36	46	IA	IA	Nil	Nil

Notes:
1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.
2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.
3. Degrees magnetic north, "-" indicates calm conditions.
4. IA in the site level column means that the site was deemed inaudible at that location.
5. NM (not measurable) in the site level column means that the site was audible but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

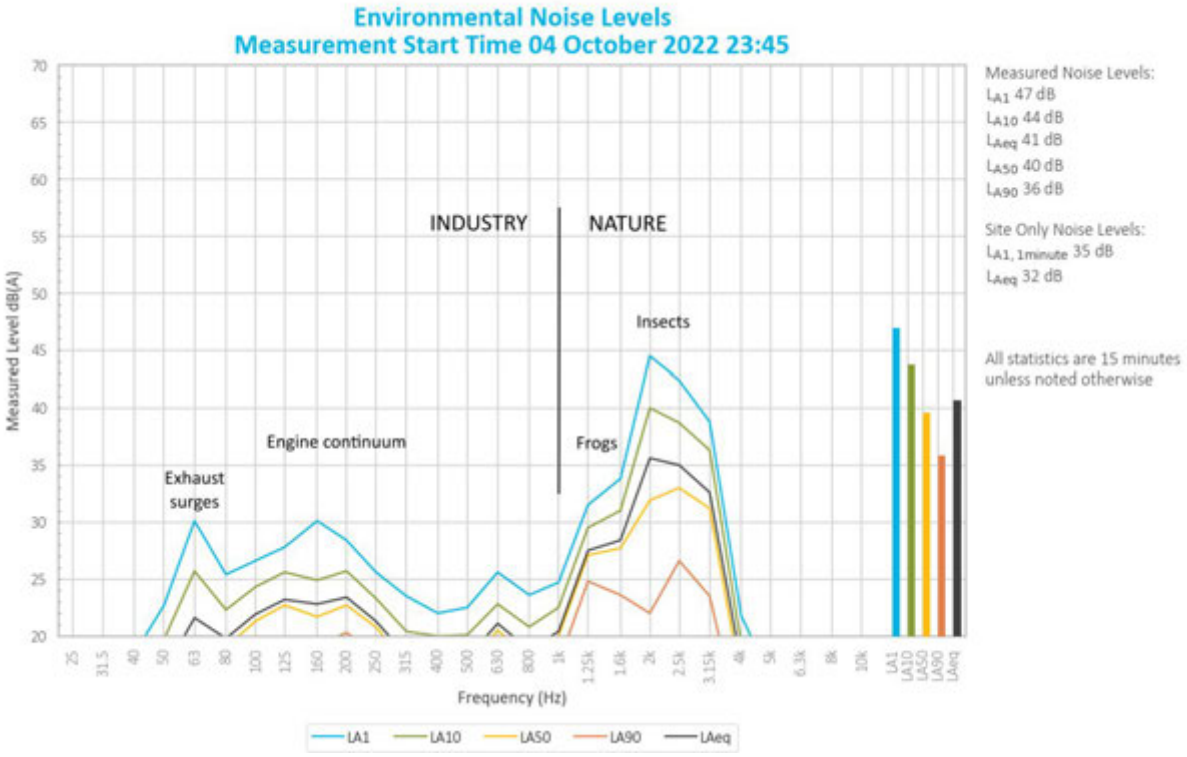

Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

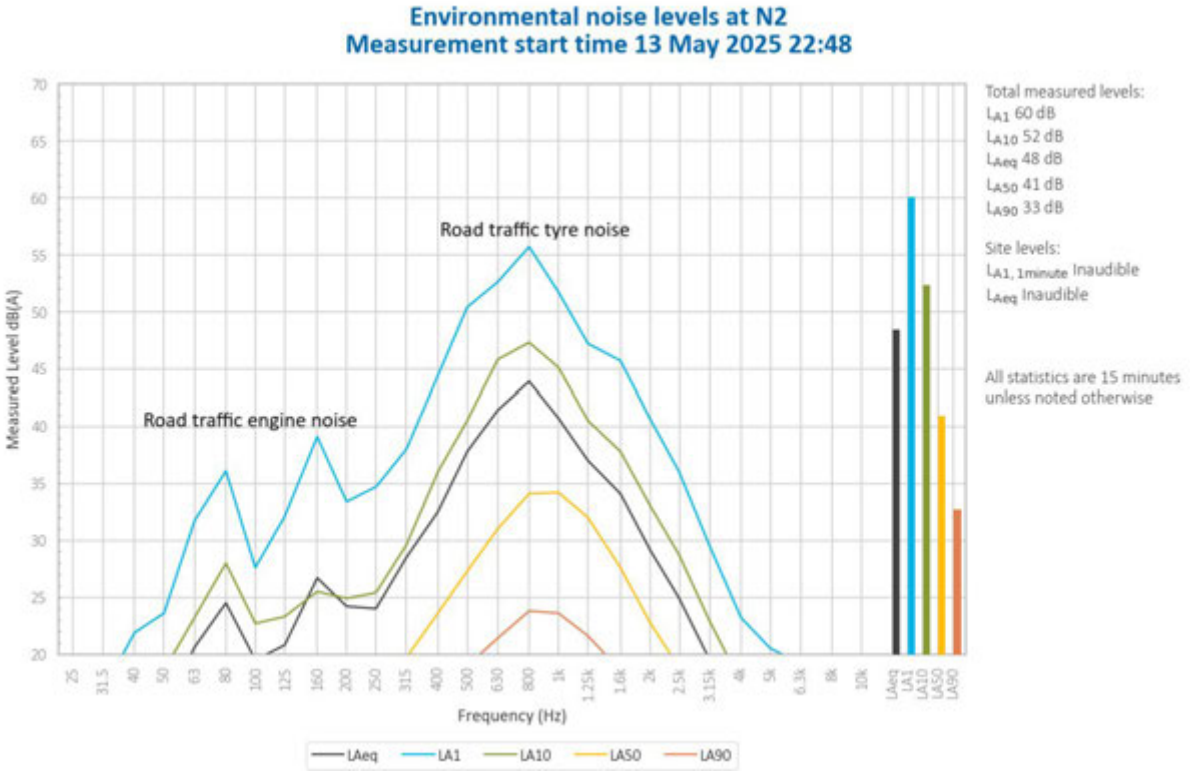

Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity, trains and dogs were the main contributors to measured levels.

Noise from frogs, insects, birds and cattle was also noted.

5.2.1 Cumulative mining noise at N2

Other mining operations in the vicinity were frequently audible during the operator-attended noise survey at monitoring location N2. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <30 dB, which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

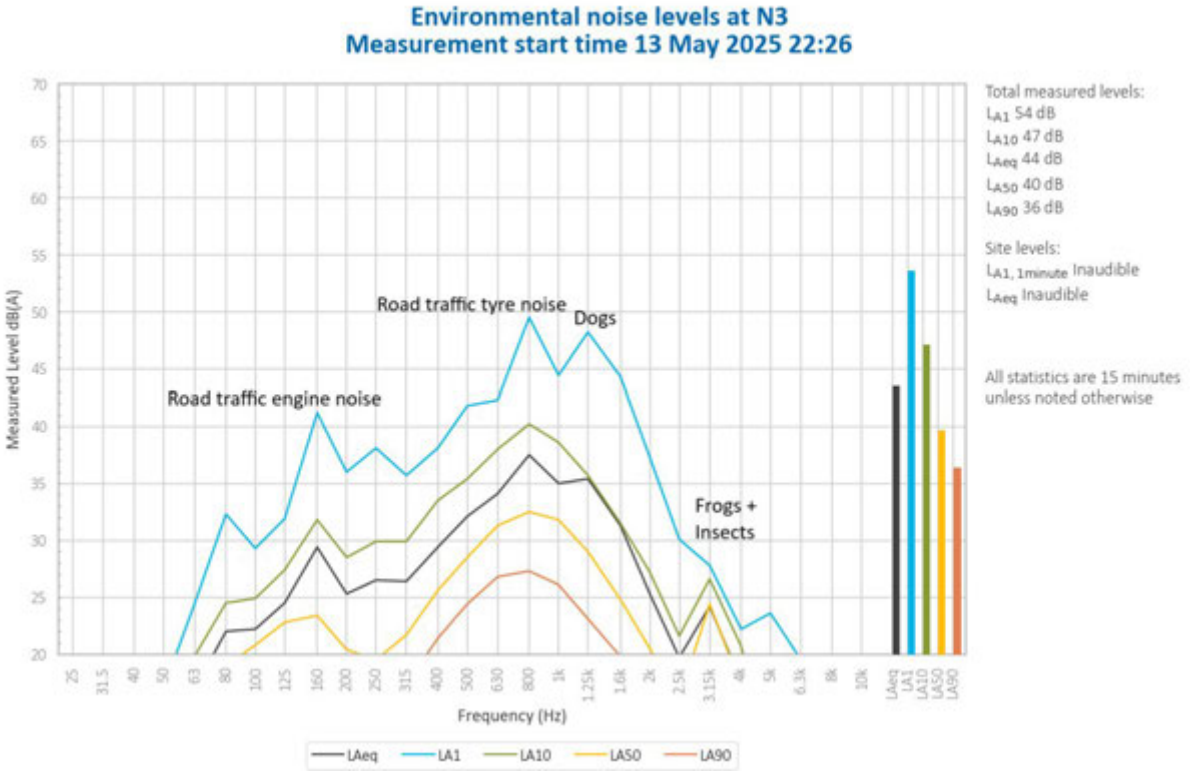

Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity and dogs were the main contributors to measured levels.

Noise from frogs, insects, trains and birds was also noted.

5.3.1 Cumulative mining noise at N3

Other mining operations in the vicinity were frequently audible during the operator-attended noise survey at monitoring location N3. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <35 dB, which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

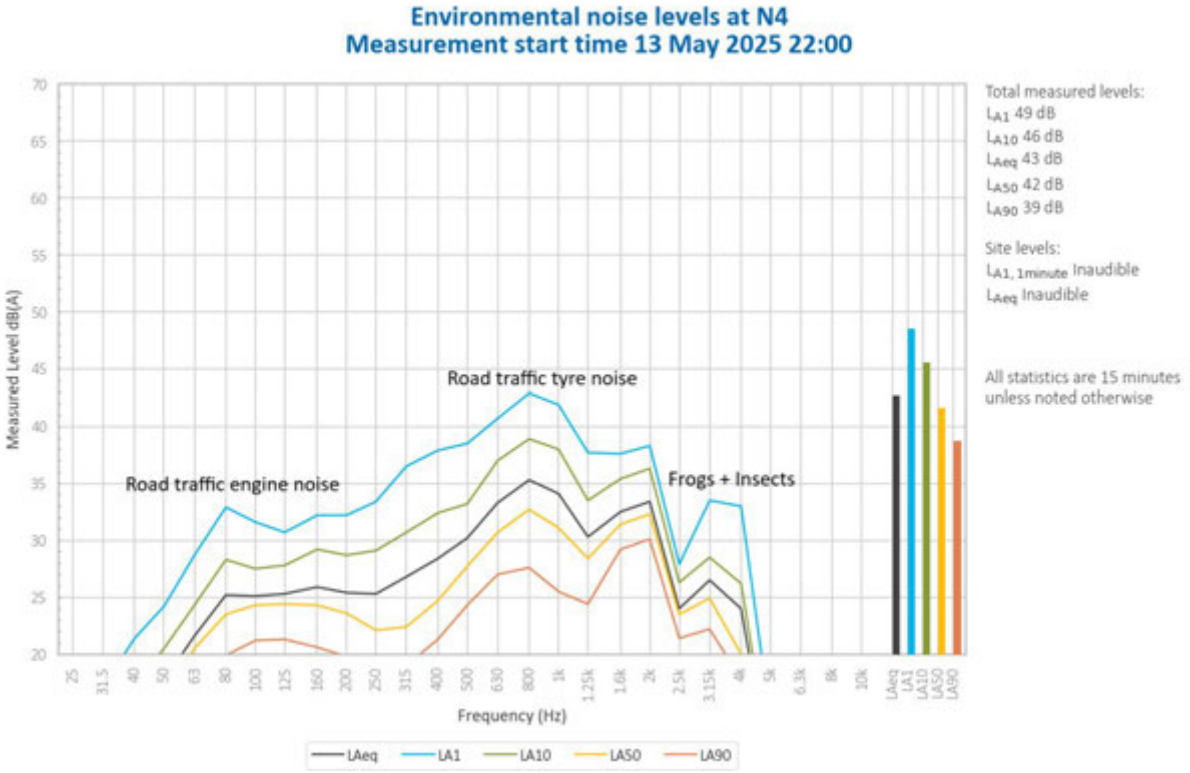

Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic, other mines in the vicinity, trains, insects and frogs were the main contributors to measured levels.

Noise from birds was also noted.

5.4.1 Cumulative mining noise at N4

Other mining operations in the vicinity were inaudible during the operator-attended noise survey at monitoring location N4. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <35 dB, which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Ltd (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Tuesday 13 May 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the May 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

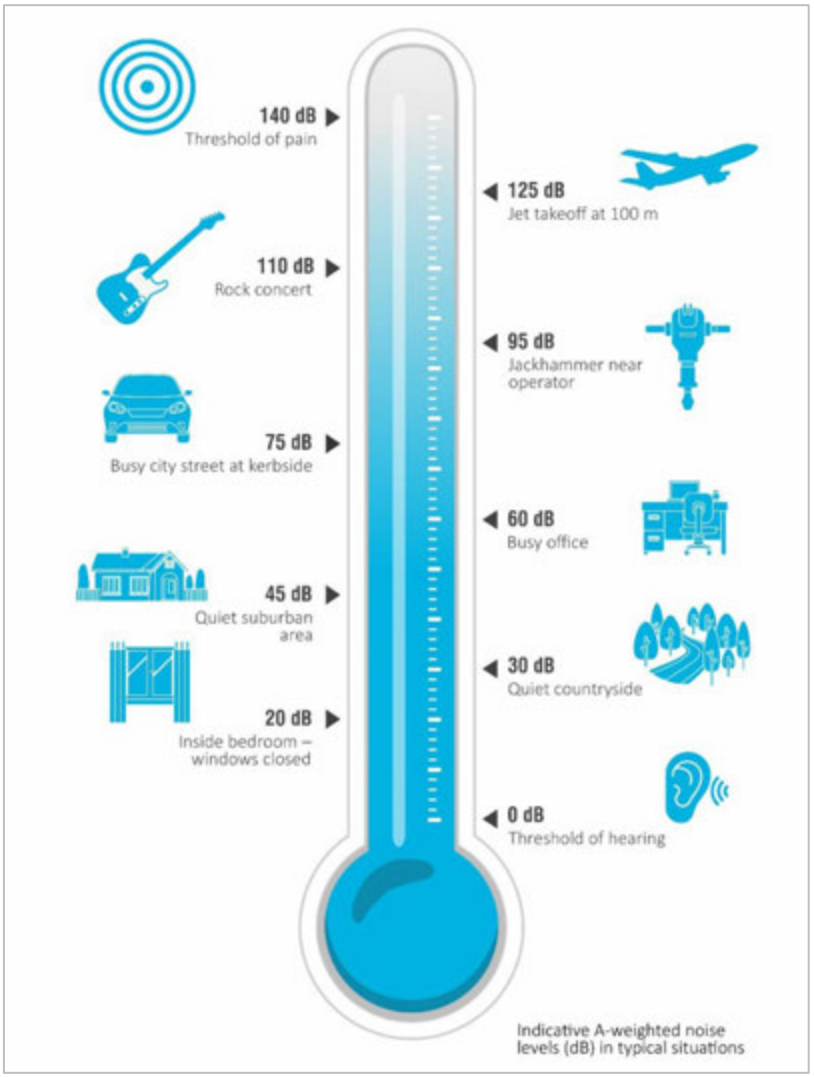

Figure A.1 Common noise levels

Appendix B
Regulator documents

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APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

Environment Protection Licence

24	Groundwater monitoring	Monitoring up-gradient of Glennies Creek alluvium at coordinates 319294, 6404588 (Easting, Northing), identified as WML120B in Figure 1.
25	Groundwater monitoring	Monitoring mid-gradient of Glennies Creek alluvium at coordinates 319468, 6403528 (Easting, Northing), identified as WML129 in Figure 1.
26	Groundwater monitoring	Monitoring down-gradient of Glennies Creek alluvium at coordinates 318965, 6402842 (Easting, Northing), identified as WMLP336 in Figure 1.
27	Groundwater monitoring	Monitoring up-gradient of Barrett coal seam at coordinates 318431, 6407214 (Easting, Northing), identified as GM1 in Figure 1.
28	Groundwater monitoring	Monitoring up-gradient of Pikes Gully coal seam at coordinates 319292, 6404580 (Easting, Northing), identified as WML120A in Figure 1.
29	Groundwater monitoring	Monitoring mid-gradient of Pikes Gully coal seam at coordinates 319220, 6403928 (Easting, Northing), identified as WML262 in Figure 1.
30	Groundwater monitoring	Monitoring up-gradient of Upper Liddell coal seam at coordinates 319215, 6403958 (Easting, Northing), identified as WML181 in Figure 1.
31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam at coordinates 319188, 6404325 (Easting, Northing), identified as WML183 in Figure 1.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring at coordinates 320522, 6406815 (Easting, Northing), identified as Repeater on Figure 2.
13	Noise monitoring	Monitoring at coordinates 320554, 6405839 (Easting, Northing), identified as N3 on Figure 2 and representative of Noise Assessment Group 2.

14	Noise monitoring	Monitoring at coordinates 320297, 6405670 (Easting, Northing), identified as N2 on Figure 2 and representative of Noise Assessment Group 1.
15	Noise monitoring	Monitoring at coordinates 319776, 6404101 (Easting, Northing), identified as N4 on Figure 2 and representative of Noise Assessment Group 3.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Monitoring of temperature at 'M1' at coordinates 320259, 6405971 (Easting, Northing).

P1.5 For the purposes of Condition P1.1, P1.2 and P1.3, Figure 1 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Surface Infrastructure" dated 30/08/19 (EPA reference DOC19/761196).

P1.6 For the purpose of Condition P1.4, Figure 2 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Monitoring" dated 30/08/19 (EPA reference DOC19/761196).

P1.7 The datum for grid references in this Licence is the Geodetic Datum of Australia 1994 (GDA94), Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The Licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and summarised in the EPA

reference DOC19/761196.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of Condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at EPA Identification Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using EPA Identification Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	L_{Aeq} (period)	L_{Aeq} (period)	L_{Aeq} (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM52717

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	Rion		
Type No:	NA-28	**Serial No:**	30131882
Mic. Type:	Rion UC-59	**Serial No:**	04739
Pre-Amp. Type:	Rion NH-23	**Serial No:**	11942
Filter Type:	1/3 Octave	**Test No:**	FILT9709

Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300

Tests Performed: IEC 61672-3:2013,
IEC 1260:1995, & AS/NZS 4476:1997

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	1000	hPa ±1 hPa	**Date of Receipt :**	31/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	06/02/2025
Relative Humidity	46	% ±5%	**Date of Issue :**	06/02/2025

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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NATA
WORLD RECOGNISED ACCREDITATION
Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

CERTIFICATE NO: SLM52717

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 successfully completed the periodic tests of IEC 61672-3:-2013, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:-2013 because evidence was not publically available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:-2013 and because the periodic tests of IEC 61672-3:-2013 cover only a limited subset of the specifications in IEC 61672-1:-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 on request.

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C50817

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 138014
Class: 1
Owner: EMM Consulting
Suite 01, 20 Chandos St
St Leonards NSW 2065
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	1013	hPa ±1 hPa	**Date of Receipt :**	05/08/2024
Temperature	22	°C ±1° C	**Date of Calibration :**	07/08/2024
Relative Humidity	41	% ±5%	**Date of Issue :**	07/08/2024

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: KB

AUTHORISED SIGNATURE: Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

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Appendix F

Monthly attended noise monitoring report – June 2025

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Ashton Coal

Monthly attended noise monitoring - June 2025

Prepared for Ashton Coal Operations Pty Ltd

June 2025

Ashton Coal

Monthly attended noise monitoring - June 2025

Ashton Coal Operations Pty Ltd

E241180 RP6

June 2025

Version	Date	Prepared by	Reviewed by	Comments
1	20 June 2025	Isaac Hepworth Lucas Adamson	Teanuanua Villierme	Draft
2	27 June 2025	Lucas Adamson	Teanuanua Villierme	Final

Approved by

Teanuanua Villierme
Associate Acoustic Consultant – Team Leader
27 June 2025

Level 3 175 Scott Street
Newcastle NSW 2300
ABN: 28 141 736 558

This report has been prepared in accordance with the brief provided by Ashton Coal Operations Pty Ltd and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. The contents of this report are private and confidential. This report is only for Ashton Coal Operations Pty Ltd's use in accordance with its agreement with EMM and is not to be relied on by or made available to any other party without EMM's prior written consent. Except as permitted by the Copyright Act 1968 (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Ashton Coal Operations Pty Ltd (and subject to the terms of EMM's agreement with Ashton Coal Operations Pty Ltd).

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ABN: 28 141 736 558

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1 Introduction

1.1 Background

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

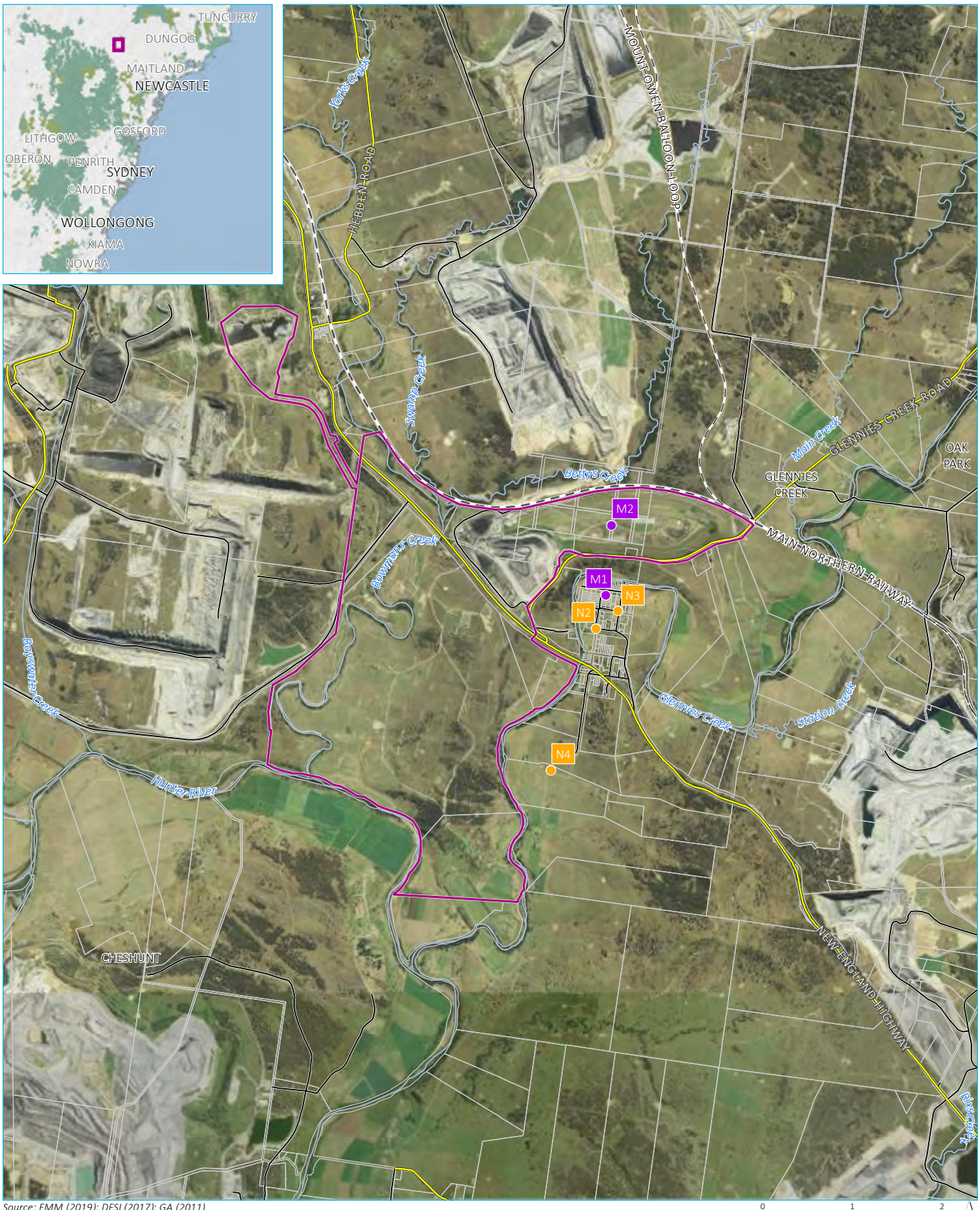
Attended environmental noise monitoring described in this report was done during the night period of Thursday 12 June 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

EMM creating opportunities

\\emmsvr1\EMM\Jobs\2019\H190081 - Ashton Coal Noise Monitoring\8 GIS\02_Maps\N001_NoiseMonitoring_20190312_02.mxd 12/03/2019

1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for one per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for one per cent of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 per cent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	The vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 3 November 2022. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 metres above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15-minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 metres above local ground level) minus temperature measured at M1 (at 10 metres above local ground level)
- ΔH = the vertical height difference between M2 and M1 (equal to 73 metres).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Isaac Hepworth. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA28 sound level meter	30131882	06/02/2027	IEC 61672-1:2002
SVAN SV-36 acoustic calibrator	138014	07/08/2025	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Section 5 of this report.

Table 4.1 Total measured noise levels, dB – June 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N4	12/06/2025	22:16	46	44	41	38	37	35	31
N3	12/06/2025	22:45	49	45	40	37	36	33	30
N2	12/06/2025	23:07	56	52	48	43	39	33	31

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height –June 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north	Cloud cover 1/8s
N4	12/06/2025	22:16	13	<0.5	-	7
N3	12/06/2025	22:45	12	<0.5	-	7
N2	12/06/2025	23:07	12	<0.5	-	8

4.2 Site only noise levels

4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – June 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N4	12/06/2025	22:16	0.7	311	F	2.2	Yes	36	46	IA	IA	Nil	Nil
N3	12/06/2025	22:45	0.7	219	F	3.0	Yes	36	46	28	36	Nil	Nil
N2	12/06/2025	23:07	1.1	315	F	1.9	Yes	36	46	<25	30	Nil	Nil

Notes: 1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.

2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.

3. Degrees magnetic north, "-" indicates calm conditions.

4. IA in the site level column means that the site was deemed inaudible at that location.

5. NM (not measurable) in the site level column means that the site noise was audible and satisfied the relevant limits but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

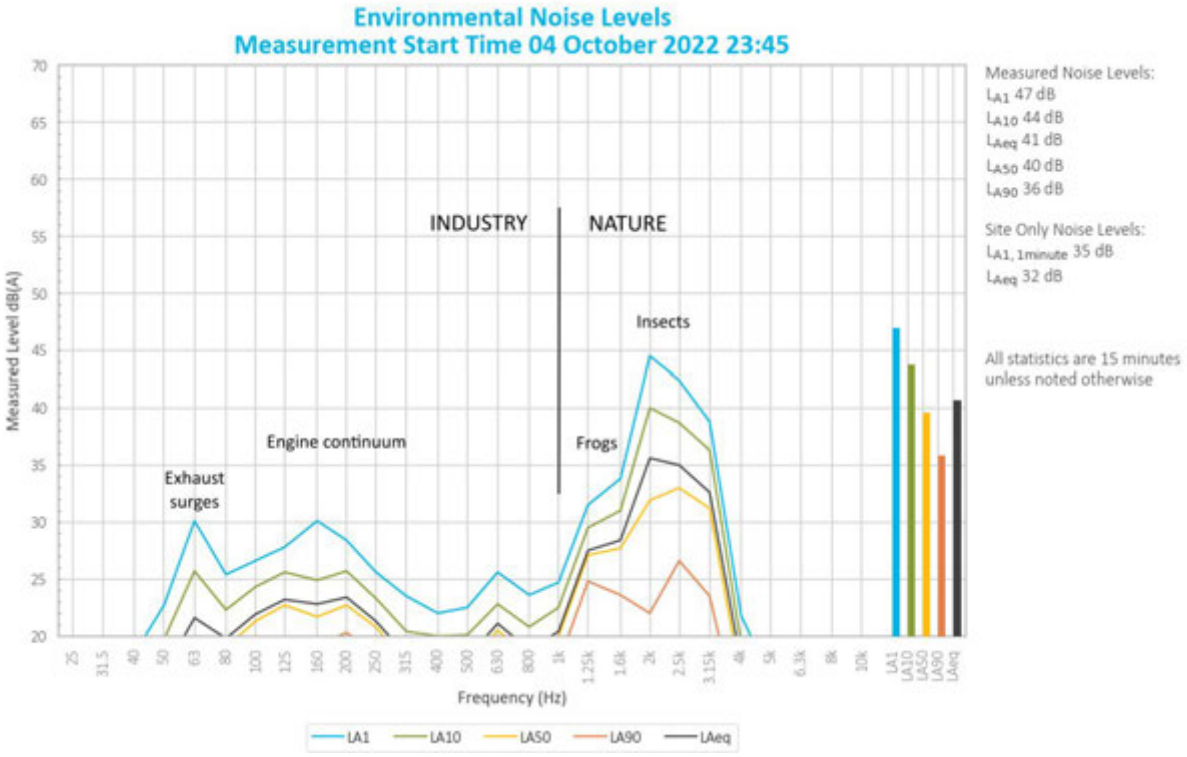


Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

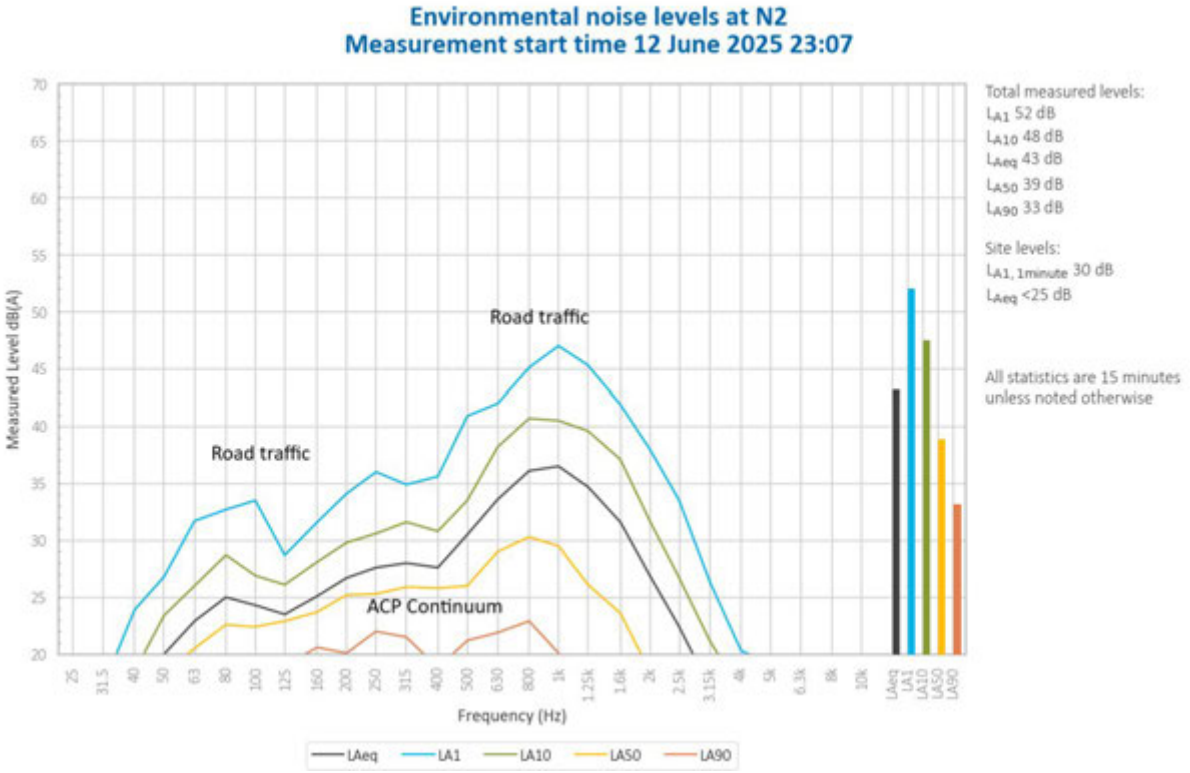


Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal continuum was audible throughout the measurement. This generated a site $L_{Aeq,15minute}$ of <25 dB. Surges in this continuum produced an L_{Amax} of 30 dB.

Road traffic was the main contributor to measured levels.

5.2.1 Cumulative mining noise at N2

Other mining operations in the vicinity were inaudible during the operator-attended noise survey at monitoring location N2. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ <22 dB, which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

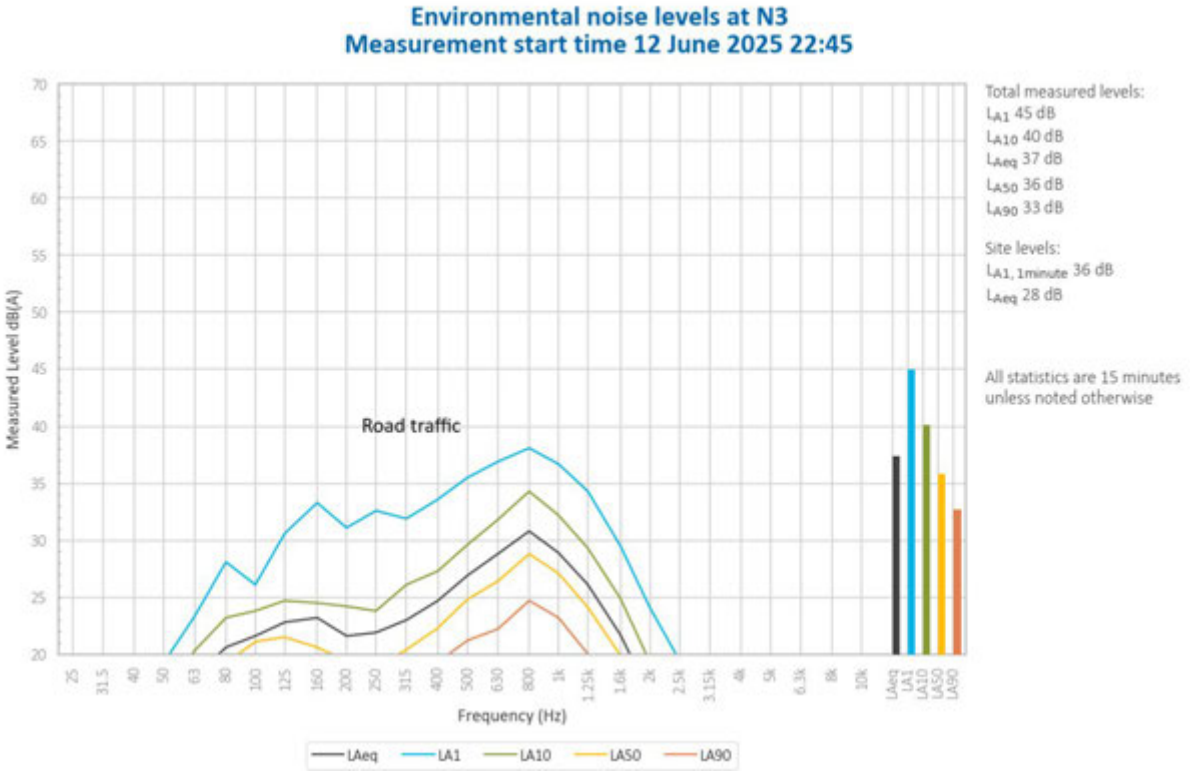


Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal continuum was audible throughout the measurement. This generated a site $L_{Aeq,15minute}$ of 28 dB. Surges in this continuum produced an L_{Amax} of 36 dB.

Road traffic was the main contributor to measured levels.

Noise from frogs and insects was also noted.

5.3.1 Cumulative mining noise at N3

Other mining operations in the vicinity were inaudible during the operator-attended noise survey at monitoring location N3. The cumulative mining noise level was estimated to be $L_{Aeq,night}$ 25 dB, which is below the relevant $L_{Aeq,night}$ 40 dB limit. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

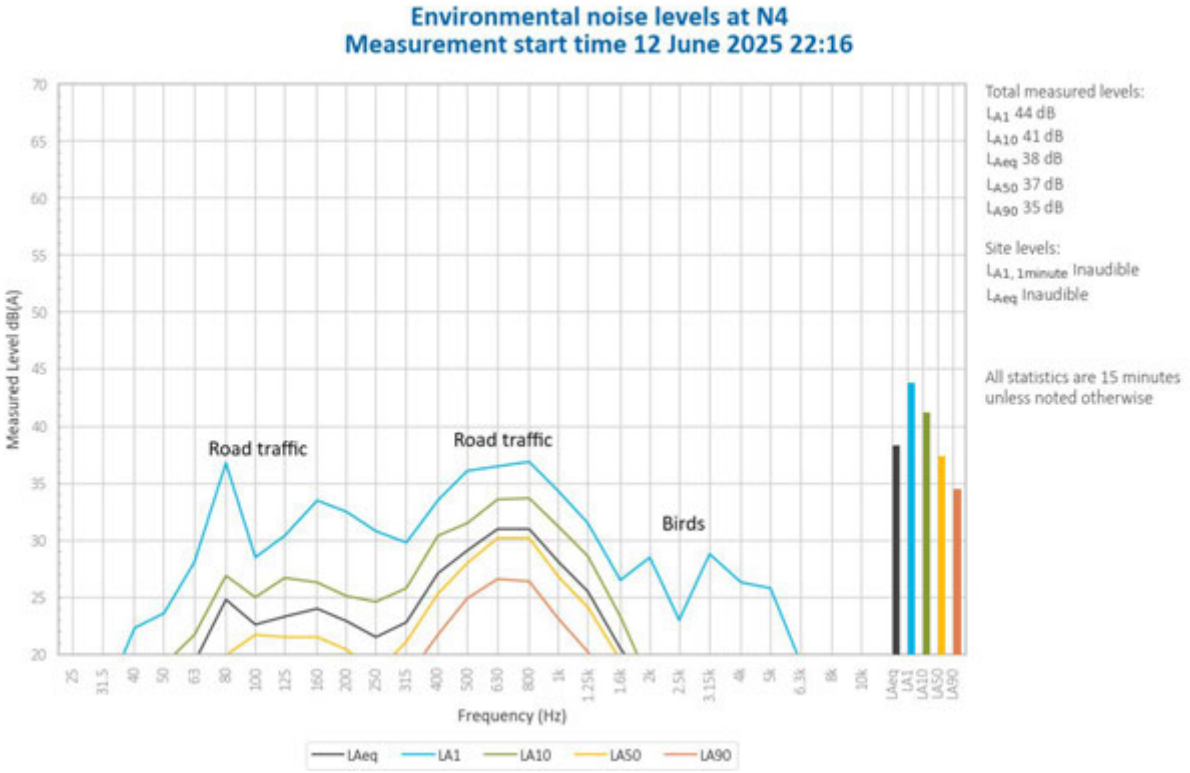


Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic, trains and birds were the main contributors to measured levels.

Noise from frogs and insects was also noted.

5.4.1 Cumulative mining noise at N4

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Thursday 12 June 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the June 2025 survey.

Appendix A
Noise perception and examples

EMM
creating opportunities

A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

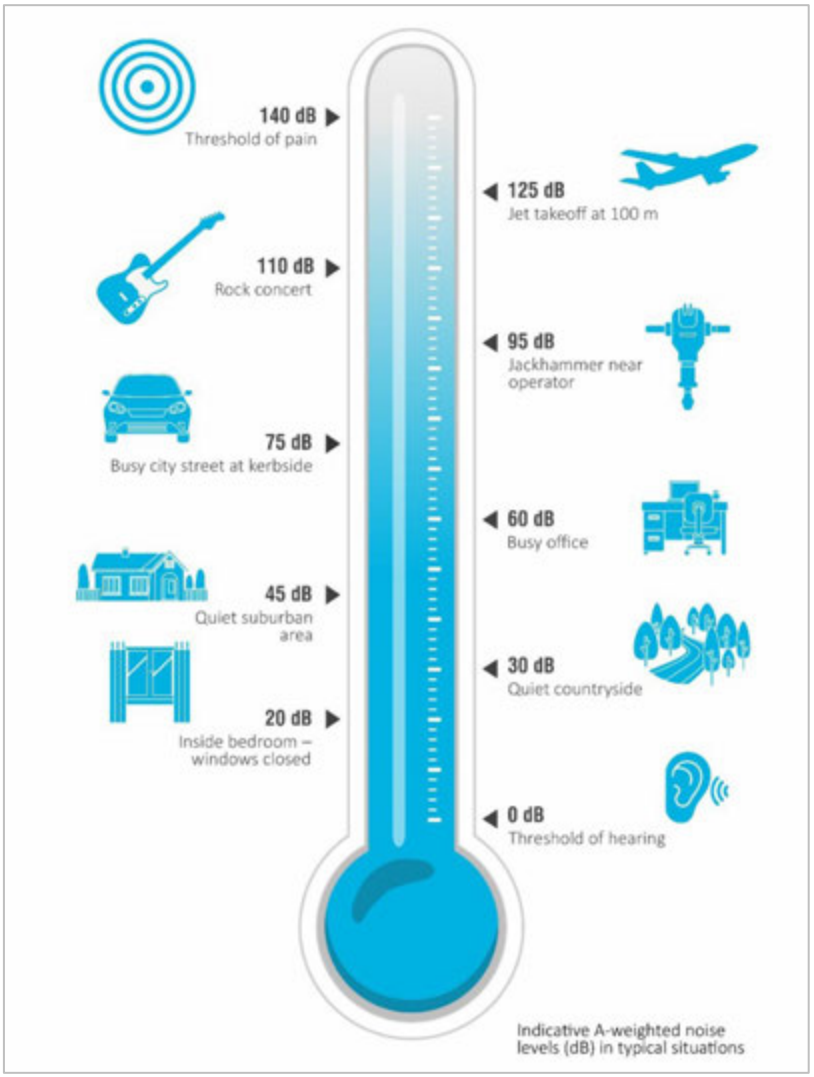


Figure A.1 Common noise levels

Appendix B
Regulator documents

EMM
creating opportunities

B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

Environment Protection Licence

24	Groundwater monitoring	Monitoring up-gradient of Glennies Creek alluvium at coordinates 319294, 6404588 (Easting, Northing), identified as WML120B in Figure 1.
25	Groundwater monitoring	Monitoring mid-gradient of Glennies Creek alluvium at coordinates 319468, 6403528 (Easting, Northing), identified as WML129 in Figure 1.
26	Groundwater monitoring	Monitoring down-gradient of Glennies Creek alluvium at coordinates 318965, 6402842 (Easting, Northing), identified as WMLP336 in Figure 1.
27	Groundwater monitoring	Monitoring up-gradient of Barrett coal seam at coordinates 318431, 6407214 (Easting, Northing), identified as GM1 in Figure 1.
28	Groundwater monitoring	Monitoring up-gradient of Pikes Gully coal seam at coordinates 319292, 6404580 (Easting, Northing), identified as WML120A in Figure 1.
29	Groundwater monitoring	Monitoring mid-gradient of Pikes Gully coal seam at coordinates 319220, 6403928 (Easting, Northing), identified as WML262 in Figure 1.
30	Groundwater monitoring	Monitoring up-gradient of Upper Liddell coal seam at coordinates 319215, 6403958 (Easting, Northing), identified as WML181 in Figure 1.
31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam at coordinates 319188, 6404325 (Easting, Northing), identified as WML183 in Figure 1.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring at coordinates 320522, 6406815 (Easting, Northing), identified as Repeater on Figure 2.
13	Noise monitoring	Monitoring at coordinates 320554, 6405839 (Easting, Northing), identified as N3 on Figure 2 and representative of Noise Assessment Group 2.

14	Noise monitoring	Monitoring at coordinates 320297, 6405670 (Easting, Northing), identified as N2 on Figure 2 and representative of Noise Assessment Group 1.
15	Noise monitoring	Monitoring at coordinates 319776, 6404101 (Easting, Northing), identified as N4 on Figure 2 and representative of Noise Assessment Group 3.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Monitoring of temperature at 'M1' at coordinates 320259, 6405971 (Easting, Northing).

P1.5 For the purposes of Condition P1.1, P1.2 and P1.3, Figure 1 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Surface Infrastructure" dated 30/08/19 (EPA reference DOC19/761196).

P1.6 For the purpose of Condition P1.4, Figure 2 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Monitoring" dated 30/08/19 (EPA reference DOC19/761196).

P1.7 The datum for grid references in this Licence is the Geodetic Datum of Australia 1994 (GDA94), Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The Licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and summarised in the EPA

reference DOC19/761196.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of Condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at EPA Identification Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using EPA Identification Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	L_{Aeq} (period)	L_{Aeq} (period)	L_{Aeq} (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM52717

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	Rion		
Type No:	NA-28	**Serial No:**	30131882
Mic. Type:	Rion UC-59	**Serial No:**	04739
Pre-Amp. Type:	Rion NH-23	**Serial No:**	11942
Filter Type:	1/3 Octave	**Test No:**	FILT9709

Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300

Tests Performed: IEC 61672-3:2013,
IEC 1260:1995, & AS/NZS 4476:1997

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	1000	hPa ±1 hPa	**Date of Receipt :**	31/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	06/02/2025
Relative Humidity	46	% ±5%	**Date of Issue :**	06/02/2025

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....
Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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No. 9262
Acoustic and Vibration
Measurements

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C50817

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 138014
Class: 1
Owner: EMM Consulting
Suite 01, 20 Chandos St
St Leonards NSW 2065
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	1013	hPa ±1 hPa	**Date of Receipt :**	05/08/2024
Temperature	22	°C ±1° C	**Date of Calibration :**	07/08/2024
Relative Humidity	41	% ±5%	**Date of Issue :**	07/08/2024

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: KB **AUTHORISED SIGNATURE:** Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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Appendix G

Monthly attended noise monitoring report – July 2025

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Ashton Coal

Monthly attended noise monitoring - July 2025

Prepared for Ashton Coal Operations Pty Ltd

August 2025

Ashton Coal

Monthly attended noise monitoring - July 2025

Ashton Coal Operations Pty Ltd

E241180 RP7

August 2025

Version	Date	Prepared by	Reviewed by	Comments
1	29 July 2025	Lucas Adamson	Robert Kirwan	Draft
2	7 August 2025	Lucas Adamson	Robert Kirwan	Final

Approved by

Robert Kirwan
Senior Associate Acoustics Consultant
7 August 2025

Level 3 175 Scott Street Newcastle
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This report has been prepared in accordance with the brief provided by Ashton Coal Operations Pty Ltd and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. The contents of this report are private and confidential. This report is only for Ashton Coal Operations Pty Ltd's use in accordance with its agreement with EMM and is not to be relied on by or made available to any other party without EMM's prior written consent. Except as permitted by the Copyright Act 1968 (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Ashton Coal Operations Pty Ltd (and subject to the terms of EMM's agreement with Ashton Coal Operations Pty Ltd).

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1 Introduction

1.1 Background

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

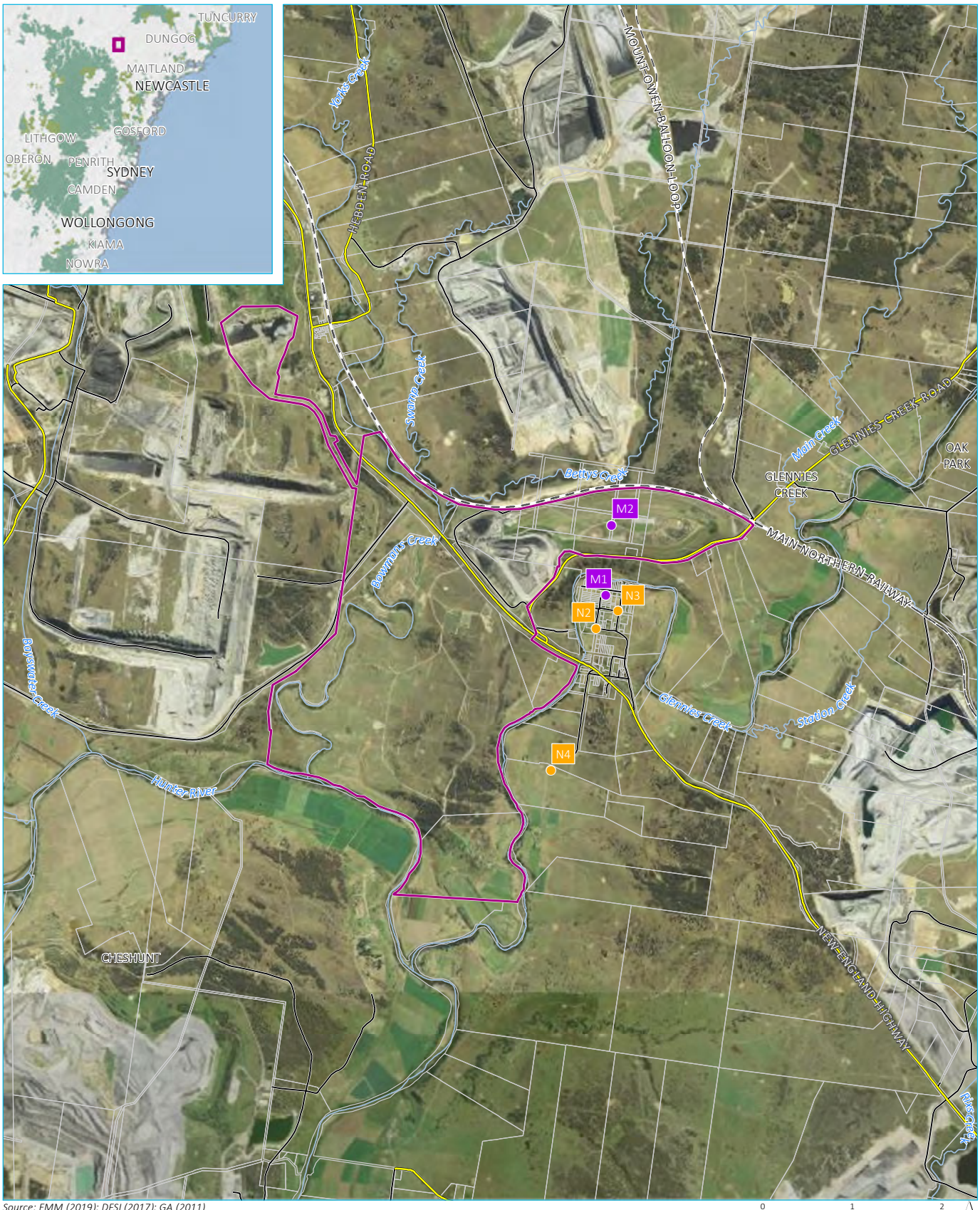
Attended environmental noise monitoring described in this report was done during the night period of Monday 21 July 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

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\\emmsvr1\EMM\Jobs\2019\H190081 - Ashton Coal Noise Monitoring\8 GIS\02_Maps\N001_NoiseMonitoring_20190312_02.mxd 12/03/2019

1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for one per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for one per cent of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 per cent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	The vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 3 November 2022. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 metres above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15-minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 metres above local ground level) minus temperature measured at M1 (at 10 metres above local ground level)
- ΔH = the vertical height difference between M2 and M1 (equal to 73 metres).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Isaac Hepworth. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA28 sound level meter	30131882	06/02/2027	IEC 61672-1:2002
SVAN SV-36 acoustic calibrator	138014	07/08/2025	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Section 5 of this report.

Table 4.1 Total measured noise levels, dB – July 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N4	21/07/2025	22:00	53	50	46	42	39	34	31
N3	21/07/2025	22:24	58	54	49	45	40	33	30
N2	21/07/2025	22:45	57	54	52	46	38	33	31

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height –July 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north	Cloud cover 1/8s
N4	21/07/2025	22:00	14.2	0.8	200	2
N3	21/07/2025	22:24	12.5	<0.5	-	2
N2	21/07/2025	22:45	14.2	<0.5	-	3

4.2 Site only noise levels

4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – July 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N4	21/07/2025	22:00	2.4	180	D	-1.2	Yes	36	46	IA	IA	Nil	Nil
N3	21/07/2025	22:24	2.2	160	D	-1.9	Yes	36	46	IA	IA	Nil	Nil
N2	21/07/2025	22:45	0.5	153	D	-1.9	Yes	36	46	IA	IA	Nil	Nil

Notes: 1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.

2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.

3. Degrees magnetic north, "-" indicates calm conditions.

4. IA in the site level column means that the site was deemed inaudible at that location.

5. NM (not measurable) in the site level column means that the site noise was audible and satisfied the relevant limits but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

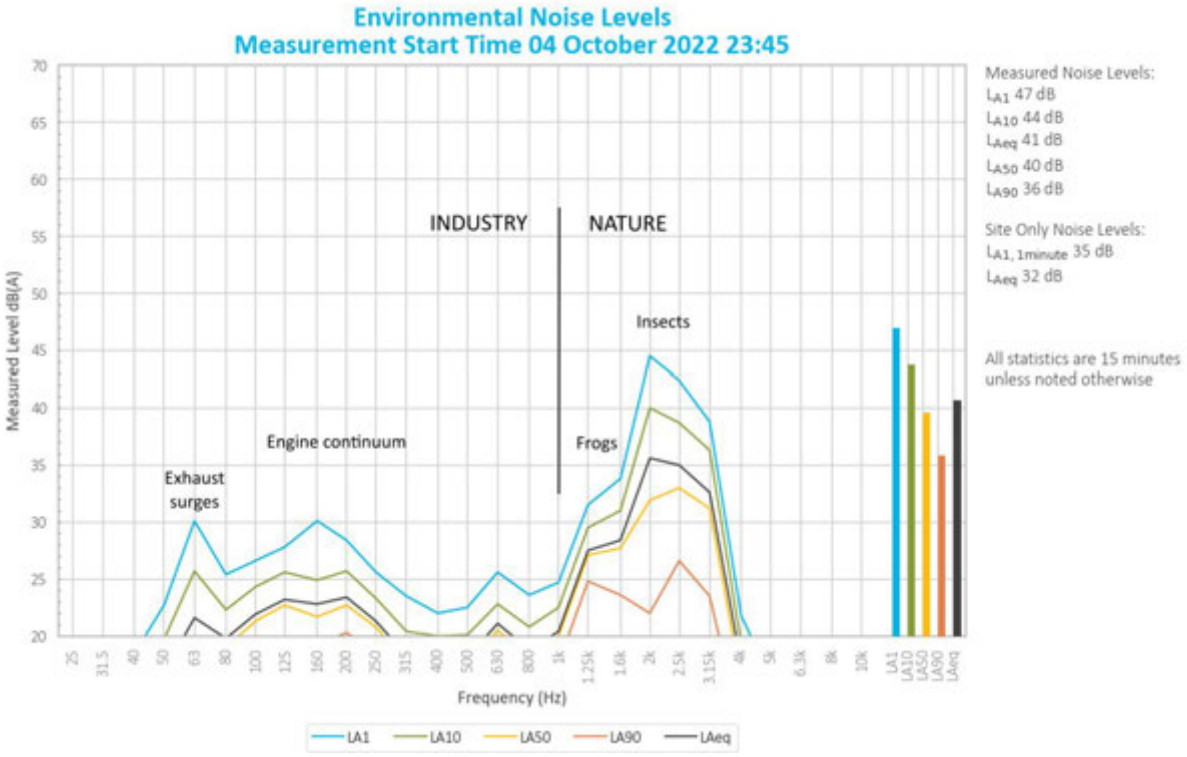

Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

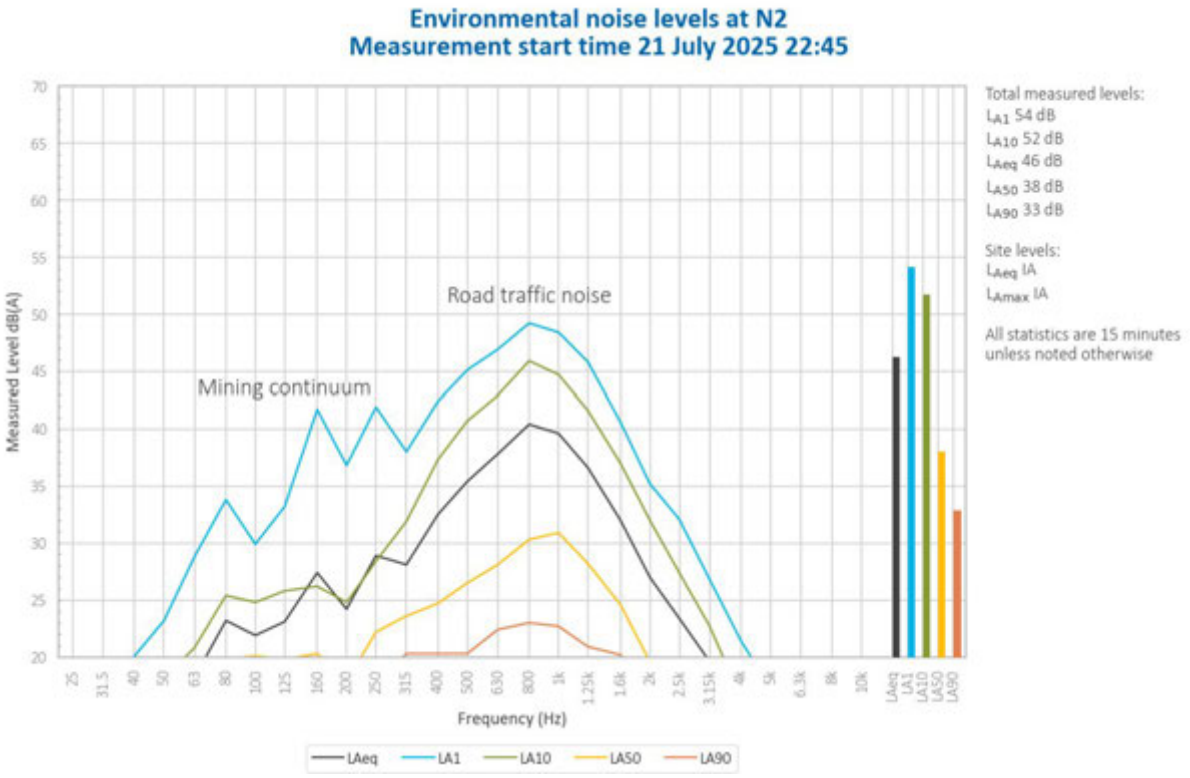

Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal was inaudible throughout the measurement.

Road traffic and other mines in the vicinity were the main contributors to measured levels.

Noise from dogs, frogs and insects was also noted.

5.2.1 Cumulative mining noise at N2

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

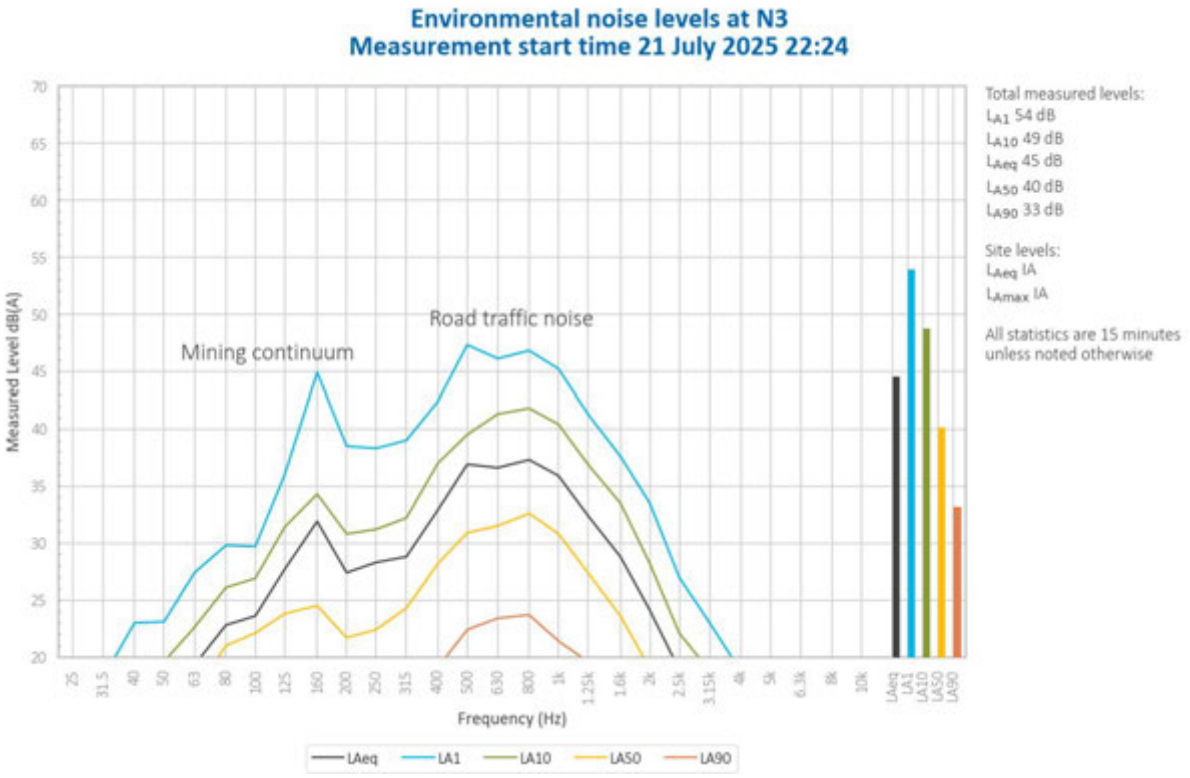

Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic and other mines in the vicinity were the main contributors to measured levels.

Noise from trains, birds, dogs, frogs and insects was also noted.

5.3.1 Cumulative mining noise at N3

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

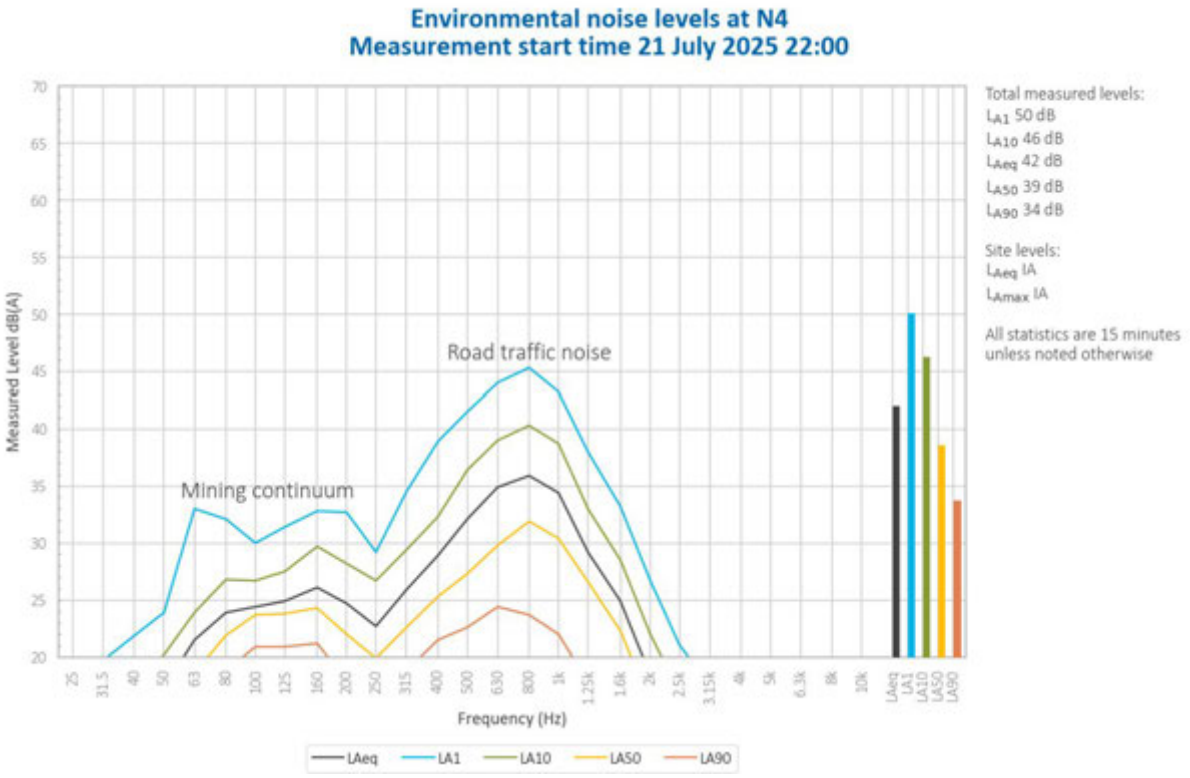

Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic and other mines in the vicinity were the main contributors to measured levels.

Noise from trains, livestock, aircraft, frogs and insects was also noted.

5.4.1 Cumulative mining noise at N4

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Monday 21 July 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the July 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

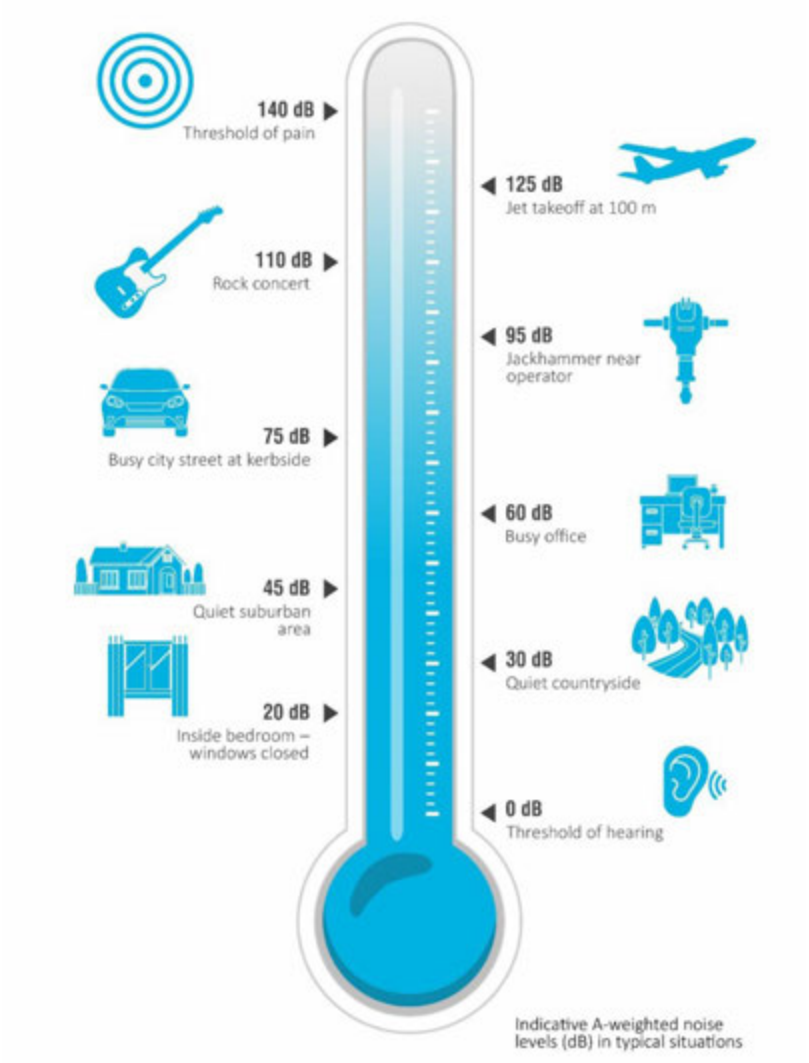

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

Environment Protection Licence

24	Groundwater monitoring	Monitoring up-gradient of Glennies Creek alluvium at coordinates 319294, 6404588 (Easting, Northing), identified as WML120B in Figure 1.
25	Groundwater monitoring	Monitoring mid-gradient of Glennies Creek alluvium at coordinates 319468, 6403528 (Easting, Northing), identified as WML129 in Figure 1.
26	Groundwater monitoring	Monitoring down-gradient of Glennies Creek alluvium at coordinates 318965, 6402842 (Easting, Northing), identified as WMLP336 in Figure 1.
27	Groundwater monitoring	Monitoring up-gradient of Barrett coal seam at coordinates 318431, 6407214 (Easting, Northing), identified as GM1 in Figure 1.
28	Groundwater monitoring	Monitoring up-gradient of Pikes Gully coal seam at coordinates 319292, 6404580 (Easting, Northing), identified as WML120A in Figure 1.
29	Groundwater monitoring	Monitoring mid-gradient of Pikes Gully coal seam at coordinates 319220, 6403928 (Easting, Northing), identified as WML262 in Figure 1.
30	Groundwater monitoring	Monitoring up-gradient of Upper Liddell coal seam at coordinates 319215, 6403958 (Easting, Northing), identified as WML181 in Figure 1.
31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam at coordinates 319188, 6404325 (Easting, Northing), identified as WML183 in Figure 1.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring at coordinates 320522, 6406815 (Easting, Northing), identified as Repeater on Figure 2.
13	Noise monitoring	Monitoring at coordinates 320554, 6405839 (Easting, Northing), identified as N3 on Figure 2 and representative of Noise Assessment Group 2.

14	Noise monitoring	Monitoring at coordinates 320297, 6405670 (Easting, Northing), identified as N2 on Figure 2 and representative of Noise Assessment Group 1.
15	Noise monitoring	Monitoring at coordinates 319776, 6404101 (Easting, Northing), identified as N4 on Figure 2 and representative of Noise Assessment Group 3.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Monitoring of temperature at 'M1' at coordinates 320259, 6405971 (Easting, Northing).

P1.5 For the purposes of Condition P1.1, P1.2 and P1.3, Figure 1 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Surface Infrastructure" dated 30/08/19 (EPA reference DOC19/761196).

P1.6 For the purpose of Condition P1.4, Figure 2 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Monitoring" dated 30/08/19 (EPA reference DOC19/761196).

P1.7 The datum for grid references in this Licence is the Geodetic Datum of Australia 1994 (GDA94), Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The Licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and summarised in the EPA

reference DOC19/761196.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of Condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at EPA Identification Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using EPA Identification Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	L_{Aeq} (period)	L_{Aeq} (period)	L_{Aeq} (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM52717

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	Rion		
Type No:	NA-28	**Serial No:**	30131882
Mic. Type:	Rion UC-59	**Serial No:**	04739
Pre-Amp. Type:	Rion NH-23	**Serial No:**	11942
Filter Type:	1/3 Octave	**Test No:**	FILT9709

Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300

Tests Performed: IEC 61672-3:2013,
IEC 1260:1995, & AS/NZS 4476:1997

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	1000	hPa ±1 hPa	**Date of Receipt :**	31/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	06/02/2025
Relative Humidity	46	% ±5%	**Date of Issue :**	06/02/2025

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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NATA
WORLD RECOGNISED ACCREDITATION
Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

CERTIFICATE NO: SLM52717

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 successfully completed the periodic tests of IEC 61672-3:-2013, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:-2013 because evidence was not publically available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:-2013 and because the periodic tests of IEC 61672-3:-2013 cover only a limited subset of the specifications in IEC 61672-1:-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 on request.

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C50817

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 138014
Class: 1
Owner: EMM Consulting
Suite 01, 20 Chandos St
St Leonards NSW 2065
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	1013	hPa ±1 hPa	**Date of Receipt :**	05/08/2024
Temperature	22	°C ±1° C	**Date of Calibration :**	07/08/2024
Relative Humidity	41	% ±5%	**Date of Issue :**	07/08/2024

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: KB

AUTHORISED SIGNATURE: Hein Soe

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

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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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Appendix H

Monthly attended noise monitoring report – August 2025

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Ashton Coal

Monthly attended noise monitoring - August 2025

Prepared for Ashton Coal Operations Pty Ltd

August 2025

Ashton Coal

Monthly attended noise monitoring - August 2025

Ashton Coal Operations Pty Ltd

E241180 RP8

August 2025

Version	Date	Prepared by	Reviewed by	Comments
1	13 August 2025	Isaac Hepworth	Robert Kirwan	Draft
2	20 August 2025	Isaac Hepworth	Robert Kirwan	Final

Approved by

Robert Kirwan
Senior Associate Acoustics Consultant– Team Leader
20 August 2025

Level 3 175 Scott Street
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This report has been prepared in accordance with the brief provided by Ashton Coal Operations Pty Ltd and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. The contents of this report are private and confidential. This report is only for Ashton Coal Operations Pty Ltd's use in accordance with its agreement with EMM and is not to be relied on by or made available to any other party without EMM's prior written consent. Except as permitted by the Copyright Act 1968 (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Ashton Coal Operations Pty Ltd (and subject to the terms of EMM's agreement with Ashton Coal Operations Pty Ltd).

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ABN: 28 141 736 558

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1 Introduction

1.1 Background

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

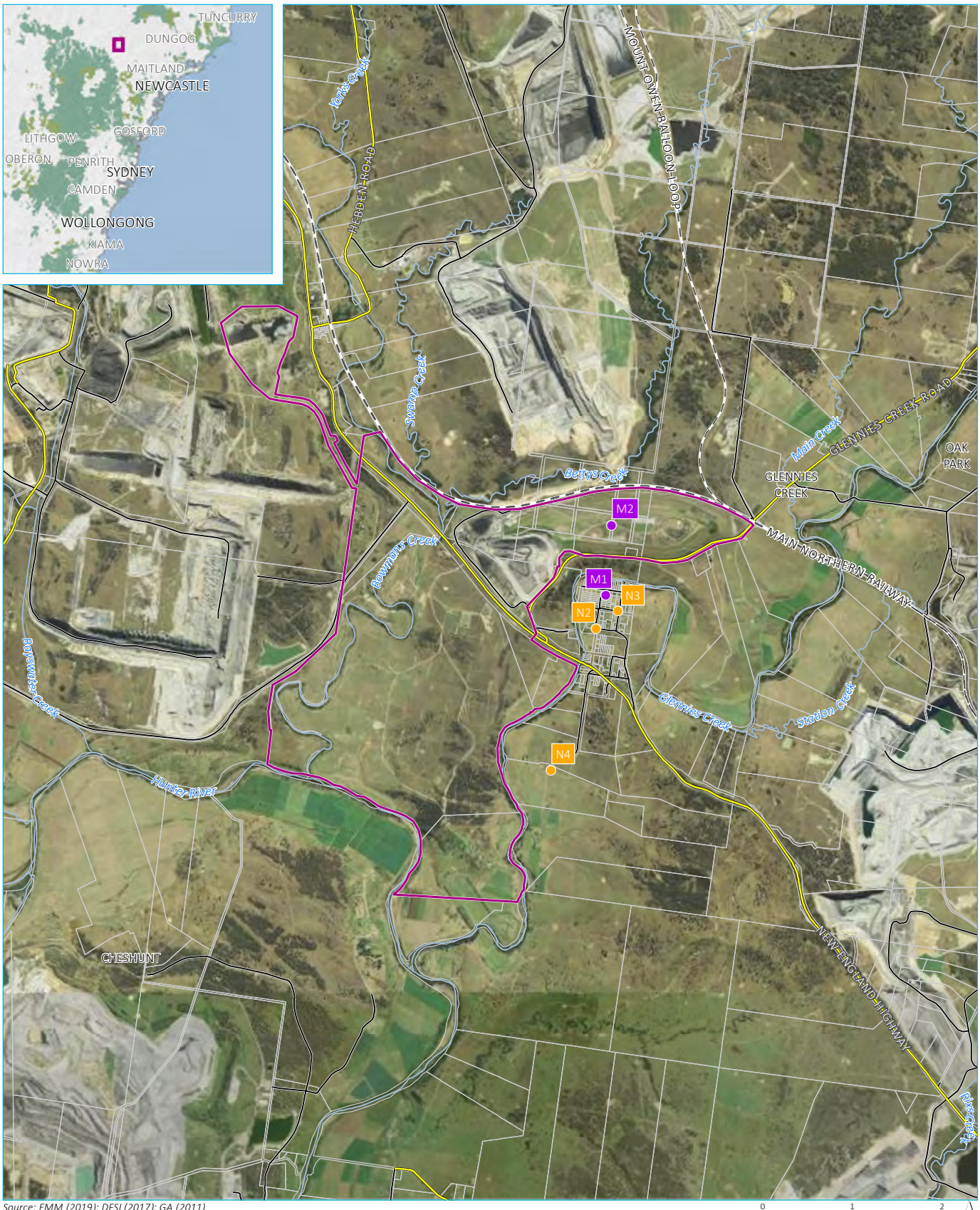
Attended environmental noise monitoring described in this report was done during the night period of Monday 11 August 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

EMM creating opportunities

\\emmsvr1\EMM\Jobs\2019\H190081 - Ashton Coal Noise Monitoring\8 GIS\02_Maps\N001_NoiseMonitoring_20190312_02.mxd 12/03/2019

1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for one per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for one per cent of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 per cent of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	The vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 3 November 2022. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply during:

- periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 metres above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15-minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 metres above local ground level) minus temperature measured at M1 (at 10 metres above local ground level)
- ΔH = the vertical height difference between M2 and M1 (equal to 73 metres).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Isaac Hepworth. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA28 sound level meter	30131882	06/02/2027	IEC 61672-1:2002
Pulsar 105 acoustic calibrator	96080	04/03/2026	IEC 60942:2003

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Section 5 of this report.

Table 4.1 Total measured noise levels, dB – August 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N4	11/08/2025	22:00	54	51	48	44	42	39	37
N3	11/08/2025	22:25	58	55	52	48	44	36	32
N2	11/08/2025	22:47	60	57	54	49	46	35	32

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height –August 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north	Cloud cover 1/8s
N4	11/08/2025	22:00	11	<0.5	-	4
N3	11/08/2025	22:25	10	<0.5	-	3
N2	11/08/2025	22:47	13	<0.5	-	4

4.2 Site only noise levels

4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – August 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N4	11/08/2025	22:00	1.1	112	F	1.8	Yes	36	46	IA	IA	Nil	Nil
N3	11/08/2025	22:25	1.3	184	F	1.5	Yes	36	46	IA	IA	Nil	Nil
N2	11/08/2025	22:47	1.7	165	E	1.2	Yes	36	46	IA	IA	Nil	Nil

Notes:
1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.
2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.
3. Degrees magnetic north, "-" indicates calm conditions.
4. IA in the site level column means that the site was deemed inaudible at that location.
5. NM (not measurable) in the site level column means that the site noise was audible and satisfied the relevant limits but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

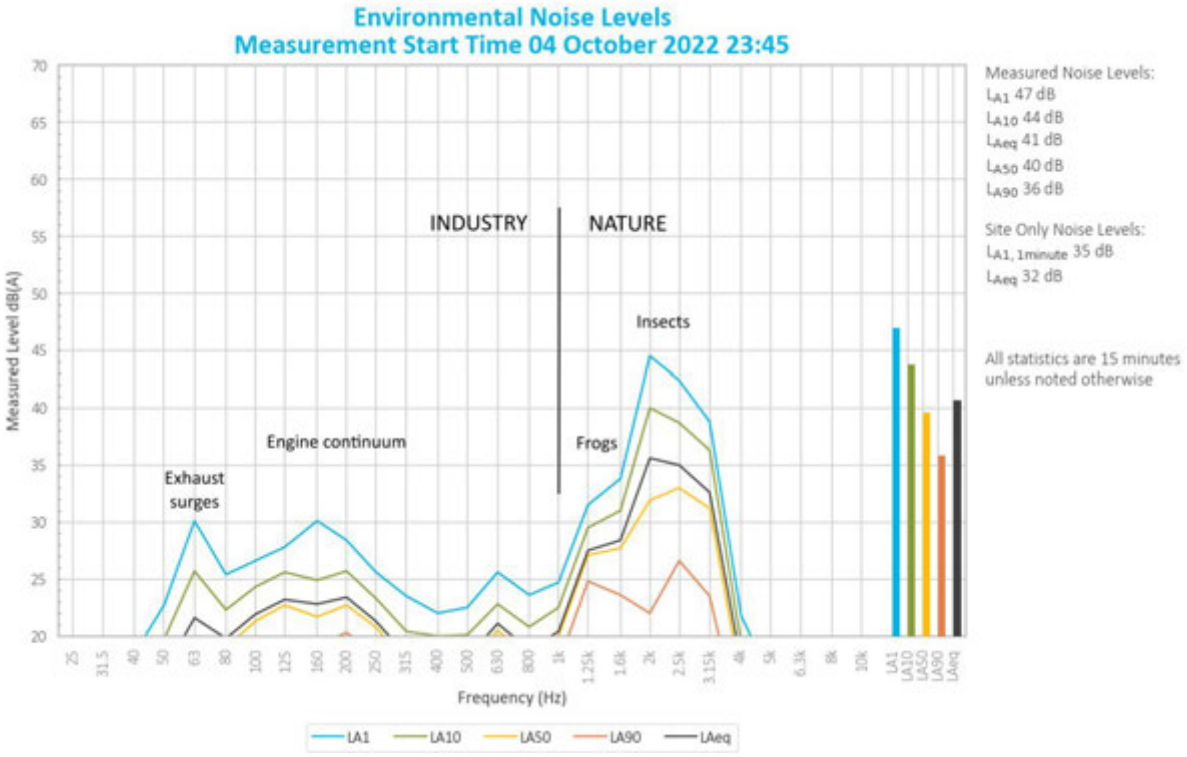


Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

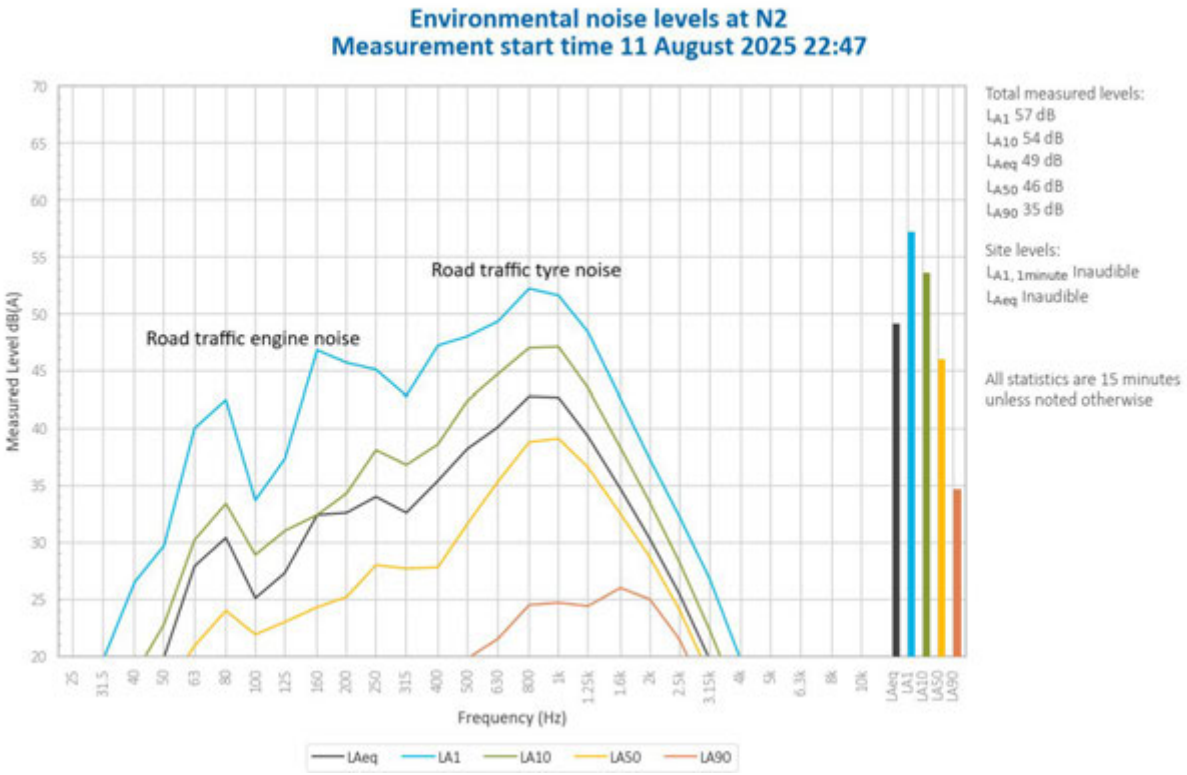


Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal was inaudible throughout the measurement.

Road traffic was responsible for total measured levels.

Noise from trains, dogs, frogs and insects was also noted.

5.2.1 Cumulative mining noise at N2

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

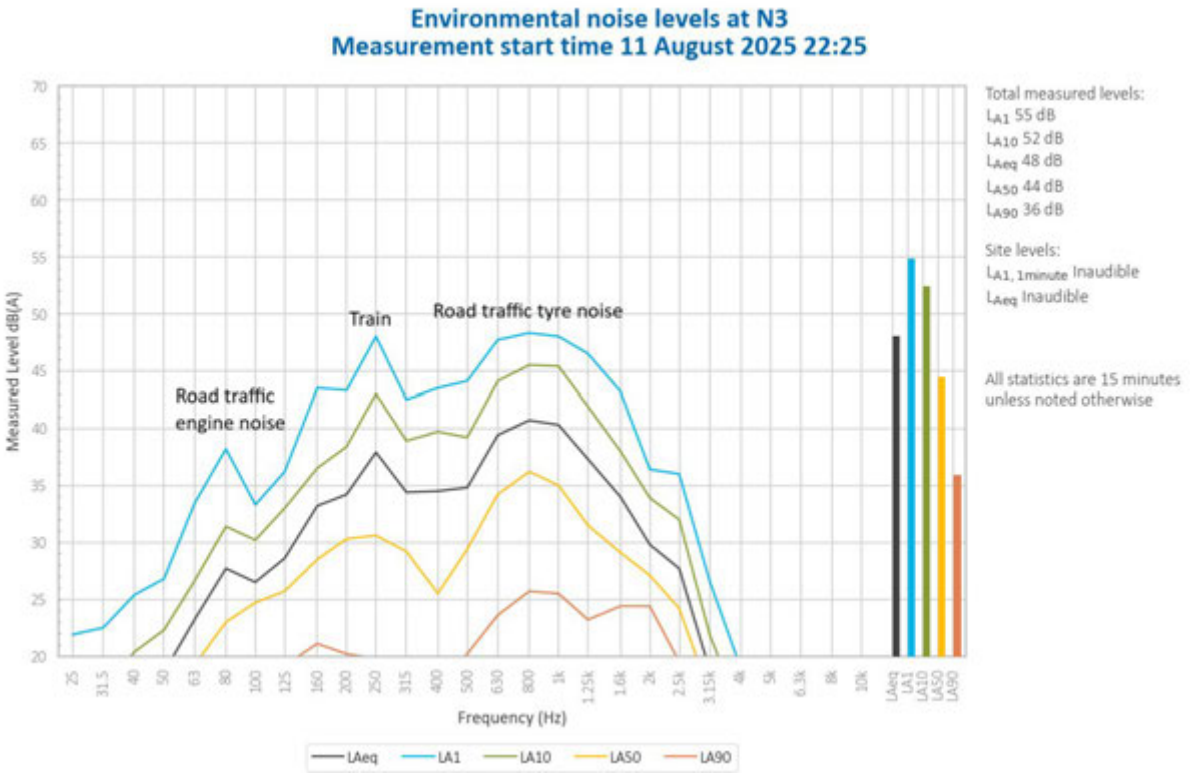


Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic and trains were the main contributors to measured levels.

Noise from other mining continuum, birds, dogs, frogs and insects was also noted.

5.3.1 Cumulative mining noise at N3

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

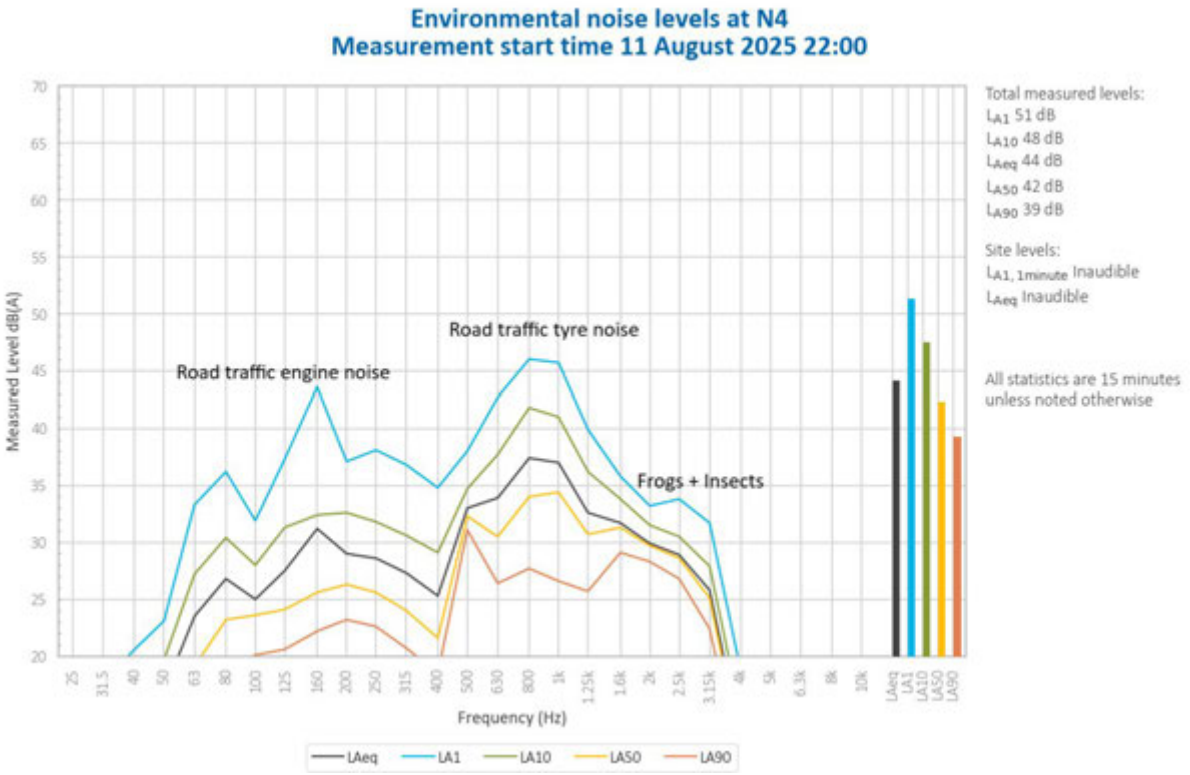


Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic primarily generated total measured levels.

Noise from other mining continuum, trains, livestock, birds, frogs and insects was also noted.

5.4.1 Cumulative mining noise at N4

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Monday 11 August 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the August 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

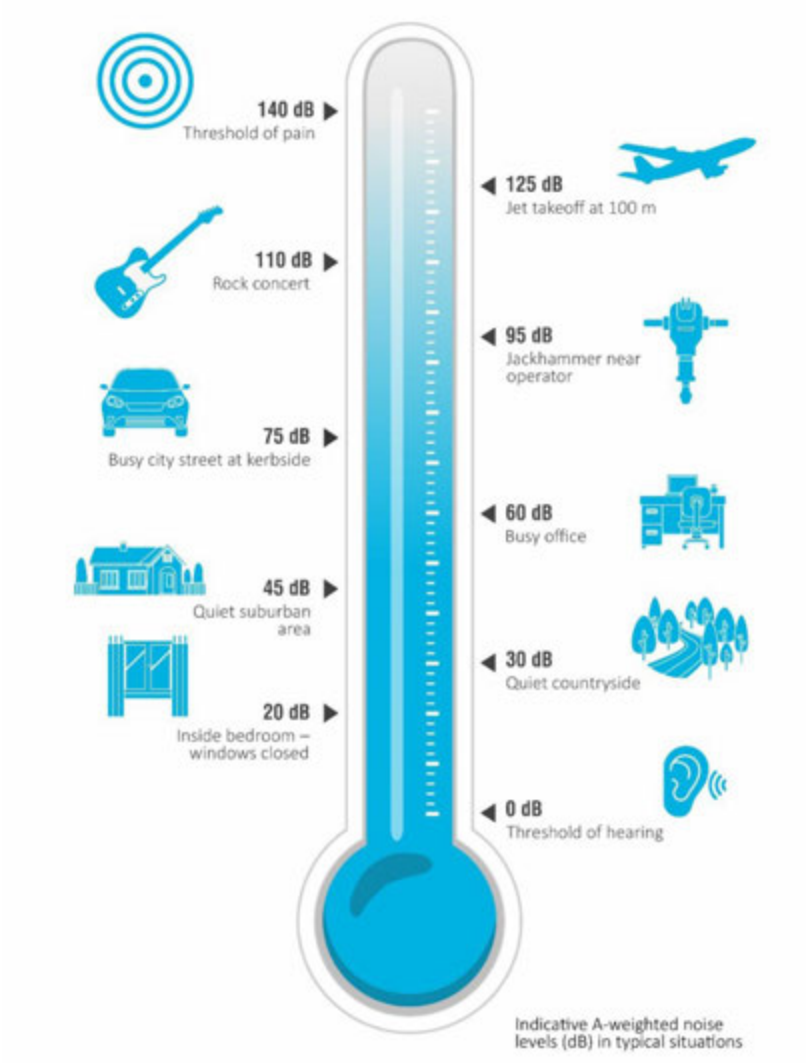

Figure A.1 Common noise levels

Appendix B
Regulator documents

EMM
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B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

Environment Protection Licence

24	Groundwater monitoring	Monitoring up-gradient of Glennies Creek alluvium at coordinates 319294, 6404588 (Easting, Northing), identified as WML120B in Figure 1.
25	Groundwater monitoring	Monitoring mid-gradient of Glennies Creek alluvium at coordinates 319468, 6403528 (Easting, Northing), identified as WML129 in Figure 1.
26	Groundwater monitoring	Monitoring down-gradient of Glennies Creek alluvium at coordinates 318965, 6402842 (Easting, Northing), identified as WMLP336 in Figure 1.
27	Groundwater monitoring	Monitoring up-gradient of Barrett coal seam at coordinates 318431, 6407214 (Easting, Northing), identified as GM1 in Figure 1.
28	Groundwater monitoring	Monitoring up-gradient of Pikes Gully coal seam at coordinates 319292, 6404580 (Easting, Northing), identified as WML120A in Figure 1.
29	Groundwater monitoring	Monitoring mid-gradient of Pikes Gully coal seam at coordinates 319220, 6403928 (Easting, Northing), identified as WML262 in Figure 1.
30	Groundwater monitoring	Monitoring up-gradient of Upper Liddell coal seam at coordinates 319215, 6403958 (Easting, Northing), identified as WML181 in Figure 1.
31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam at coordinates 319188, 6404325 (Easting, Northing), identified as WML183 in Figure 1.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring at coordinates 320522, 6406815 (Easting, Northing), identified as Repeater on Figure 2.
13	Noise monitoring	Monitoring at coordinates 320554, 6405839 (Easting, Northing), identified as N3 on Figure 2 and representative of Noise Assessment Group 2.

14	Noise monitoring	Monitoring at coordinates 320297, 6405670 (Easting, Northing), identified as N2 on Figure 2 and representative of Noise Assessment Group 1.
15	Noise monitoring	Monitoring at coordinates 319776, 6404101 (Easting, Northing), identified as N4 on Figure 2 and representative of Noise Assessment Group 3.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Monitoring of temperature at 'M1' at coordinates 320259, 6405971 (Easting, Northing).

P1.5 For the purposes of Condition P1.1, P1.2 and P1.3, Figure 1 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Surface Infrastructure" dated 30/08/19 (EPA reference DOC19/761196).

P1.6 For the purpose of Condition P1.4, Figure 2 refers to the plan titled "Ashton Underground Mine Environment Protection licence 11879 Premises Boundary, Monitoring" dated 30/08/19 (EPA reference DOC19/761196).

P1.7 The datum for grid references in this Licence is the Geodetic Datum of Australia 1994 (GDA94), Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The Licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and summarised in the EPA

reference DOC19/761196.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of Condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at EPA Identification Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using EPA Identification Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	L_{Aeq} (period)	L_{Aeq} (period)	L_{Aeq} (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C53022

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Pulsar
Type No: 105 **Serial No:** 96080
Class: 1
Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
See Details and Class Tolerance overleaf.

Comments:

CONDITION OF TEST:

Ambient Pressure	1008	hPa ±1 hPa	**Date of Receipt :**	27/02/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	04/03/2025
Relative Humidity	52	% ±5%	**Date of Issue :**	04/03/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

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

Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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NATA
WORLD RECOGNISED
ACCREDITATION
Accredited Laboratory
No. 9262
Acoustic and Vibration
Measurements

CERTIFICATE NO: C53022

The Calibrator described in this report has been tested to the requirements of the standard IEC 60942-[Ed 4]:2017-11.
The tests described in Annex B of the standard (Periodic tests) were carried out under the environmental conditions listed above to the following clauses:

Clause	Test description
B4.6	Sound Pressure Level (By comparison with a reference calibrator).
B4.7	Frequency (By measurement with a calibrated frequency meter).
B4.8	Total distortion and noise. (By measurement with a calibrated Noise and Distortion meter).

Notes:

1. The calibrator was calibrated with the main axis vertical and facing down.
2. No corrections have been made for atmospheric pressure, temperature, or humidity.

Parameter	Pre-Adj	Adj Y/N	Output: (dB re 20 µPa)	Frequency (Hz)	THD&N (%)
Level:	NA	N	94.05 dB	1000.36 Hz	0.63 %
Uncertainty			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

Parameter	Class 1		Class 2	
Nominal Frequency	250 Hz	1 kHz	250 Hz	1 kHz
Output dB SPL	0.25 dB	0.25 dB	0.40 dB	0.40 dB
Frequency Hz	0.7 % (1.75 Hz)	0.7 % (7 Hz)	1.7 % (4.25 Hz)	1.7 % (17 Hz)
THD&N	2.5 %	2.5 %	3.0 %	3.0 %

Tolerance limits from AS/IEC60942 (edition 4)

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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%.

----ooooOoooo----

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM52717

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	Rion		
Type No:	NA-28	**Serial No:**	30131882
Mic. Type:	Rion UC-59	**Serial No:**	04739
Pre-Amp. Type:	Rion NH-23	**Serial No:**	11942
Filter Type:	1/3 Octave	**Test No:**	FILT9709

Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300

Tests Performed: IEC 61672-3:2013,
IEC 1260:1995, & AS/NZS 4476:1997

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	1000	hPa ±1 hPa	**Date of Receipt :**	31/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	06/02/2025
Relative Humidity	46	% ±5%	**Date of Issue :**	06/02/2025

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Hein Soe

Accredited for compliance with ISO/IEC 17025 - Calibration

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Acoustic and Vibration Measurements

CERTIFICATE NO: SLM52717

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 successfully completed the periodic tests of IEC 61672-3:-2013, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:-2013 because evidence was not publically available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:-2013 and because the periodic tests of IEC 61672-3:-2013 cover only a limited subset of the specifications in IEC 61672-1:-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 on request.

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Appendix I

Monthly attended noise monitoring report – September 2025

EMM
creating opportunities

Ashton Coal

Monthly attended noise monitoring - September 2025

Prepared for Ashton Coal Operations Pty Ltd

September 2025

Ashton Coal

Monthly attended noise monitoring - September 2025

Ashton Coal Operations Pty Ltd

E241180 RP9

September 2025

Version	Date	Prepared by	Reviewed by	Comments
1	5 September 2025	Lucas Adamson	Robert Kirwan	Draft
2	5 September 2025	Lucas Adamson	Robert Kirwan	Final

Approved by

Signature:

Email: rkirwan@emmconsulting.com.au

Robert Kirwan
Senior Associate Acoustics Consultant – Team Leader
5 September 2025

Level 3 175 Scott Street
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This report has been prepared in accordance with the brief provided by Ashton Coal Operations Pty Ltd and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. The contents of this report are private and confidential. This report is only for Ashton Coal Operations Pty Ltd's use in accordance with its agreement with EMM and is not to be relied on by or made available to any other party without EMM's prior written consent. Except as permitted by the *Copyright Act 1968* (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Ashton Coal Operations Pty Ltd (and subject to the terms of EMM's agreement with Ashton Coal Operations Pty Ltd).

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1 Introduction

1.1 Background

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

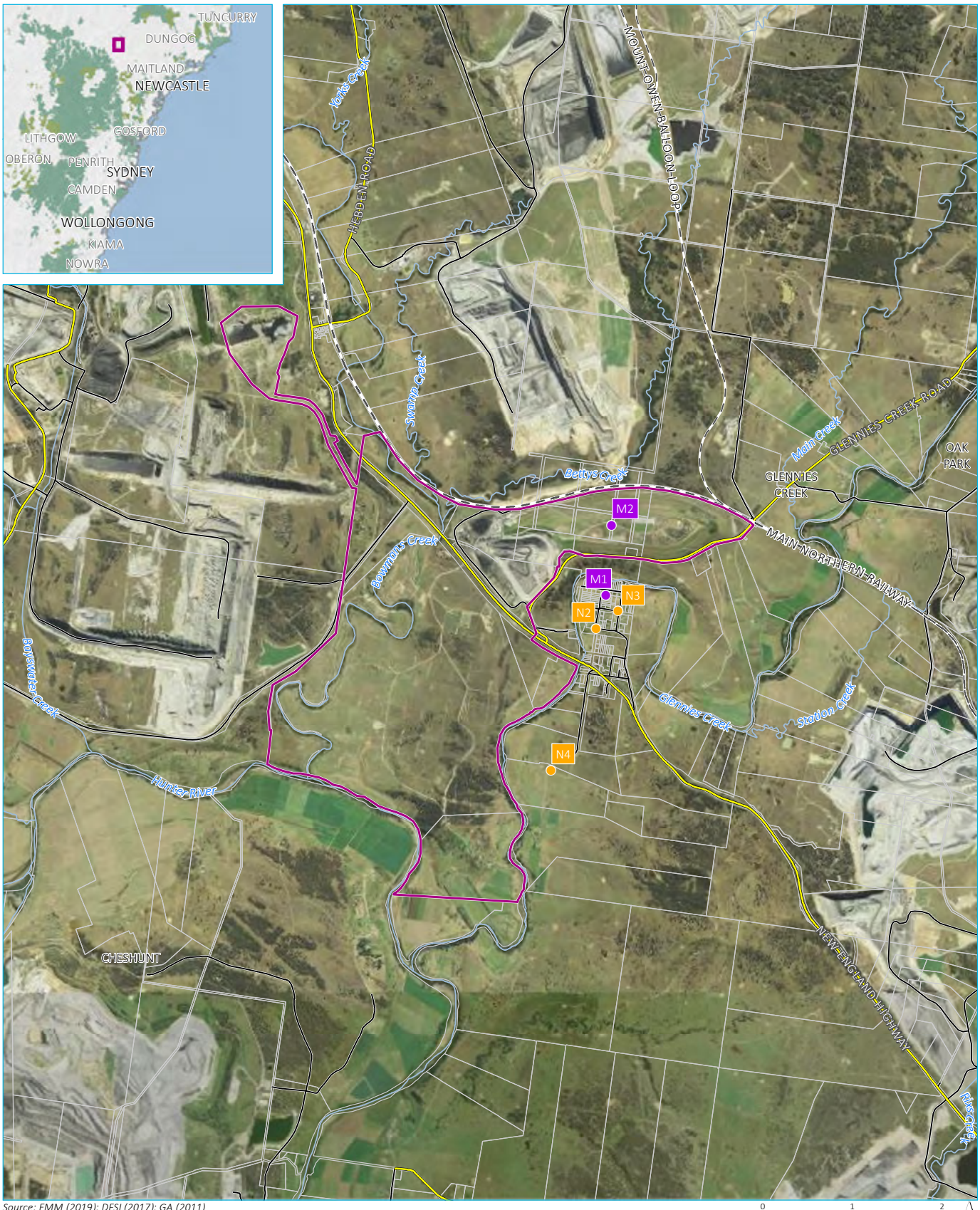
Attended environmental noise monitoring described in this report was done during the night period of Monday 1 September 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

EMM creating opportunities

\\emmsvr1\EMM\Jobs\2019\H190081 - Ashton Coal Noise Monitoring\8 GIS\02_Maps\N001_NoiseMonitoring_20190312_02.mxd 12/03/2019

1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1% of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1% of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10% of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50% of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90% of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres (m).
VTG	The vertical temperature gradient in degrees Celsius per 100 m altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday–Saturday: 7:00 am to 6:00 pm, on Sundays and public holidays: 8:00 am to 6:00 pm.
Evening	Monday–Saturday: 6:00 pm to 10:00 pm, on Sundays and public holidays: 6:00 pm to 10:00 pm.
Night	Monday–Saturday: 10:00 pm to 7:00 am, on Sundays and public holidays: 10:00 pm to 8:00 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 20 August 2025. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply during:

- periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 m above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15 minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 m above local ground level) minus temperature measured at M1 (at 10 m above local ground level).
- ΔH = the vertical height difference between M2 and M1 (equal to 73 m).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Isaac Hepworth. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA28 sound level meter	30131882	06/02/2027	IEC 61672-1:2002
Pulsar 105 acoustic calibrator	96080	04/03/2026	IEC 60942:2003

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Chapter 5 of this report.

Table 4.1 Total measured noise levels, dB – September 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N4	1/09/2025	22:00	54	50	44	41	38	35	31
N3	1/09/2025	22:24	52	49	44	40	36	31	28
N2	1/09/2025	22:45	60	55	47	44	37	33	30

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 m above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height – September 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north	Cloud cover 1/8s
N4	1/09/2025	22:00	14.2	<0.5	-	1
N3	1/09/2025	22:24	10.6	<0.5	-	0
N2	1/09/2025	22:45	11.6	<0.5	-	0

4.2 Site only noise levels

4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – September 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N4	1/09/2025	22:00	1.0	135	E	1.1	Yes	36	46	IA	IA	Nil	Nil
N3	1/09/2025	22:24	1.2	117	F	1.8	Yes	36	46	IA	IA	Nil	Nil
N2	1/09/2025	22:45	1.2	109	F	3.2	No	36	46	IA	IA	Nil	Nil

Notes: 1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.

2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.

3. Degrees magnetic north, "-" indicates calm conditions.

4. IA in the site level column means that the site was deemed inaudible at that location.

5. NM (not measurable) in the site level column means that the site noise was audible and satisfied the relevant limits but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

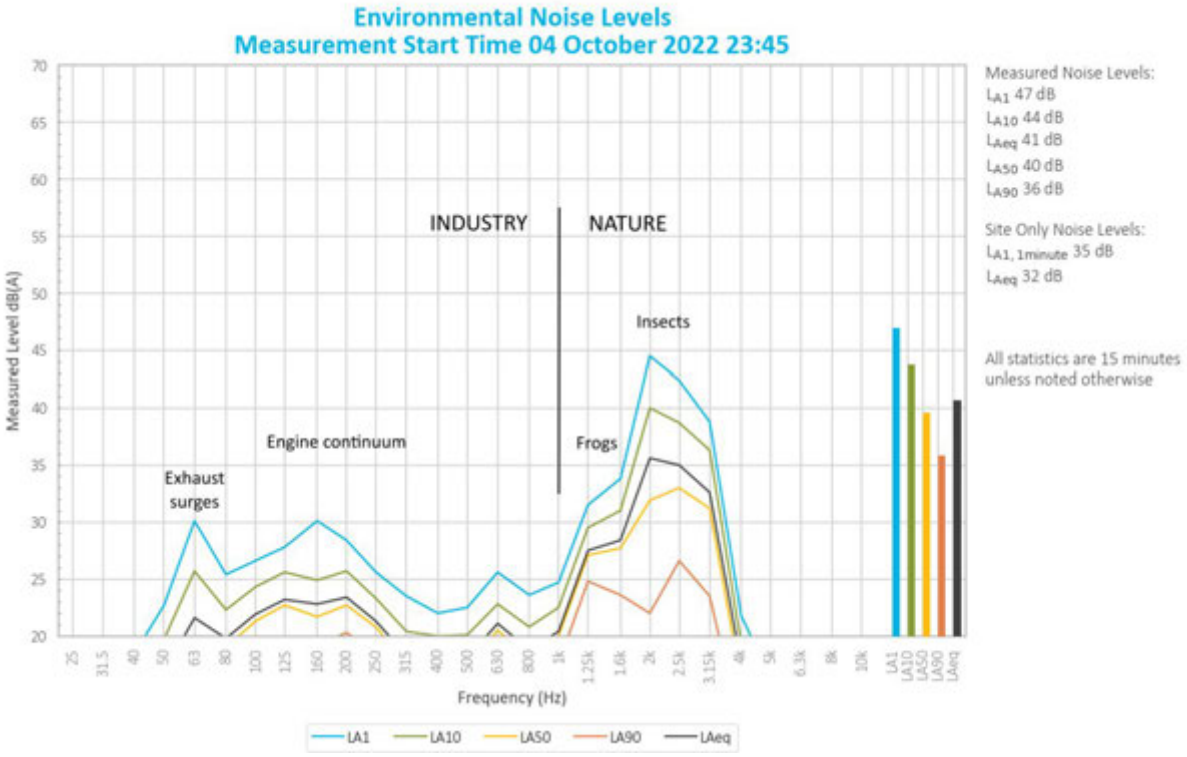


Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

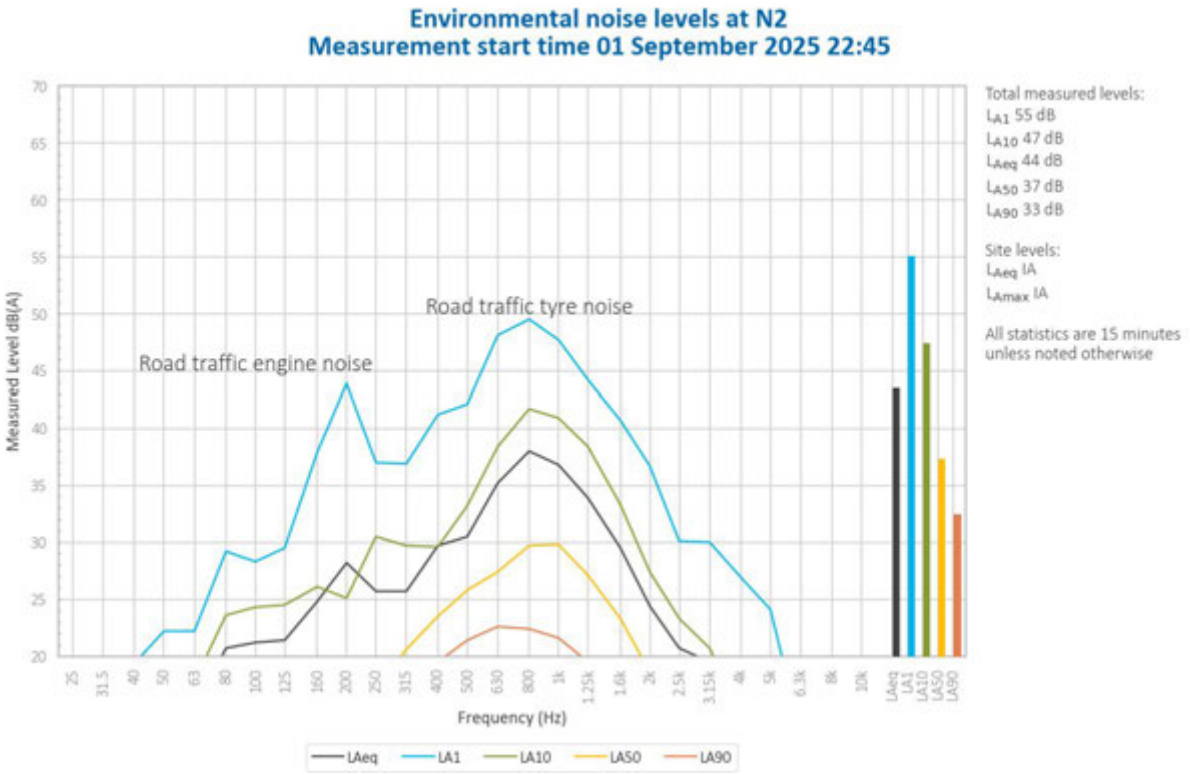


Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal was inaudible throughout the measurement.

Road traffic was responsible for total measured levels.

Noise from another mine in the vicinity, frogs, insects, birds, dogs and trains was also noted.

5.2.1 Cumulative mining noise at N2

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

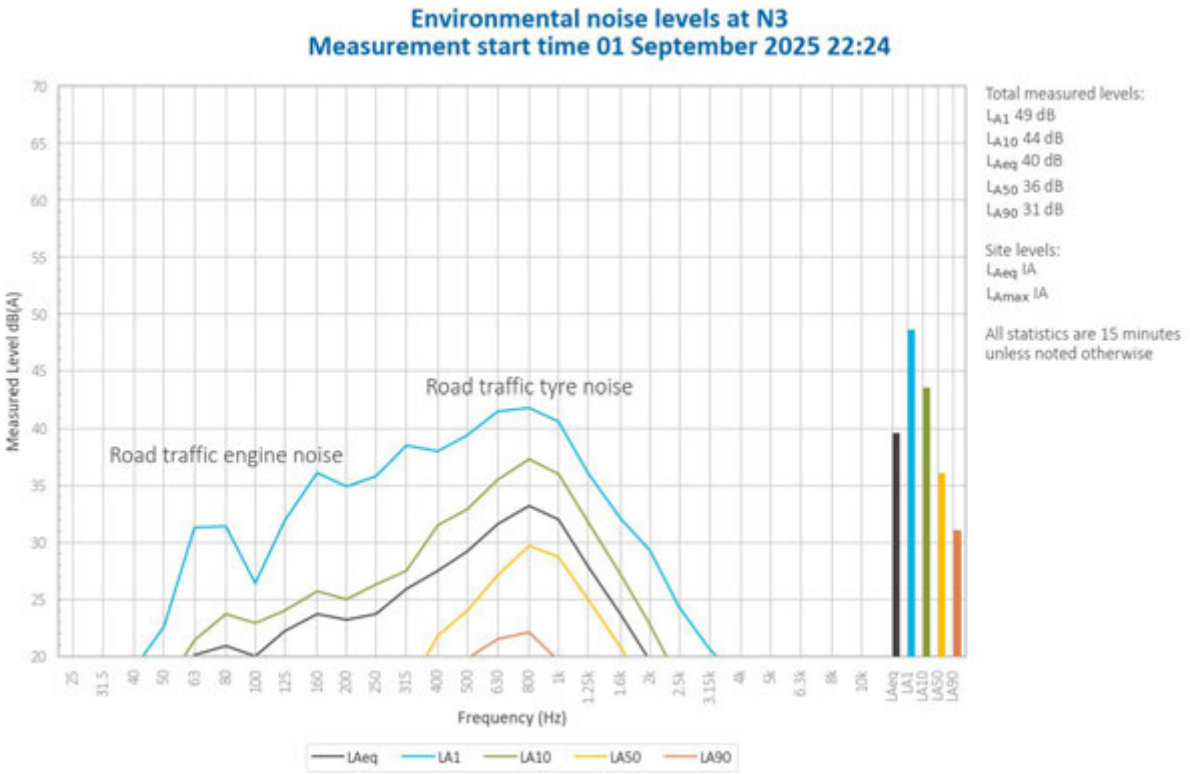


Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic was responsible for total measured levels.

Noise from another mine in the vicinity, frogs, insects, birds, dogs and trains was also noted.

5.3.1 Cumulative mining noise at N3

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

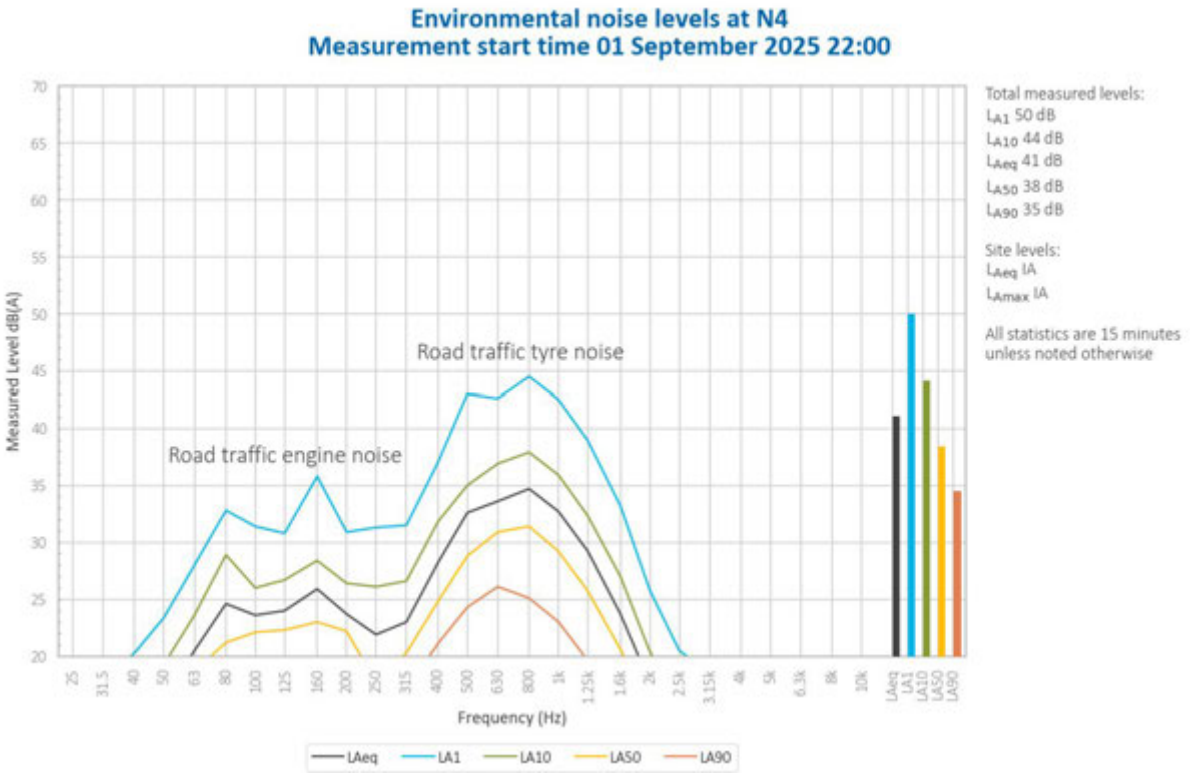


Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic was responsible for total measured levels.

Noise from another mine in the vicinity, frogs, insects, trains and livestock was also noted.

5.4.1 Cumulative mining noise at N4

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Monday 1 September 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the September 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

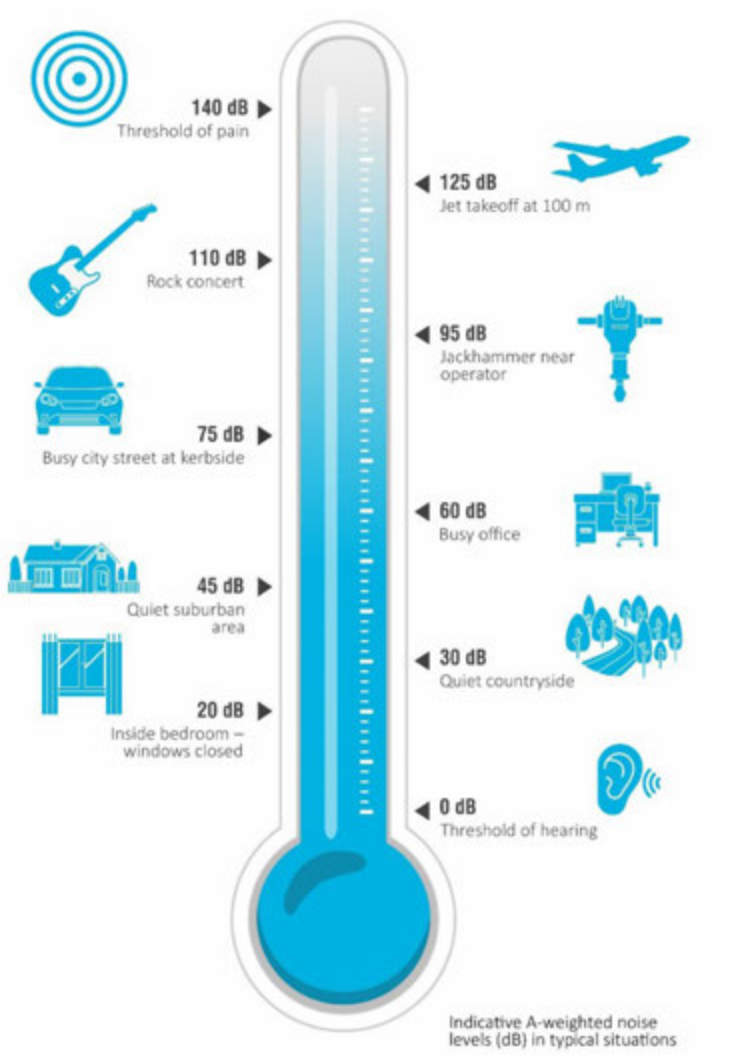

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam, marked and shown as "WML183" on the Plan.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring, marked and shown "Repeater - Meteorological Station" on the Plan.
13	Noise monitoring	Noise monitor, marked and shown "N3" on the Plan.
14	Noise monitoring	Noise monitor, marked and shown "N2" on the Plan.
15	Noise monitoring	Noise monitor, marked and shown "N4" on the Plan.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological Station, marked and shown as "M1" on the Plan.

P1.5 For the purposes of conditions P1.1 to P1.4 and L4.1; the "Plan" refers to the Plan titled "Ashton Underground Mine Environment Protection Licence 11879 Premises Boundary", Drawing No. A-1005_Mon, Revision No. 2025, dated 29 May 2025 (EPA ref. DOC25/503163).

The datum for grid references in the Plan is the Geodetic Datum of Australia 1994 (GDA94), MGA Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and the Plan.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	L_{Aeq} (period)	L_{Aeq} (period)	L_{Aeq} (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C53022

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Pulsar
Type No: 105 **Serial No:** 96080
Class: 1
Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
See Details and Class Tolerance overleaf.

Comments:

CONDITION OF TEST:

Ambient Pressure	1008	hPa ±1 hPa	**Date of Receipt :**	27/02/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	04/03/2025
Relative Humidity	52	% ±5%	**Date of Issue :**	04/03/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

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

Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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NATA
WORLD RECOGNISED
ACCREDITATION
Accredited Laboratory
No. 9262
Acoustic and Vibration
Measurements

CERTIFICATE NO: C53022

The Calibrator described in this report has been tested to the requirements of the standard IEC 60942-[Ed 4]:2017-11.
The tests described in Annex B of the standard (Periodic tests) were carried out under the environmental conditions listed above to the following clauses:

Clause	Test description
B4.6	Sound Pressure Level (By comparison with a reference calibrator).
B4.7	Frequency (By measurement with a calibrated frequency meter).
B4.8	Total distortion and noise. (By measurement with a calibrated Noise and Distortion meter).

Notes:

1. The calibrator was calibrated with the main axis vertical and facing down.
2. No corrections have been made for atmospheric pressure, temperature, or humidity.

Parameter	Pre-Adj	Adj Y/N	Output: (dB re 20 µPa)	Frequency (Hz)	THD&N (%)
Level:	NA	N	94.05 dB	1000.36 Hz	0.63 %
Uncertainty			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

Parameter	Class 1		Class 2	
Nominal Frequency	250 Hz	1 kHz	250 Hz	1 kHz
Output dB SPL	0.25 dB	0.25 dB	0.40 dB	0.40 dB
Frequency Hz	0.7 % (1.75 Hz)	0.7 % (7 Hz)	1.7 % (4.25 Hz)	1.7 % (17 Hz)
THD&N	2.5 %	2.5 %	3.0 %	3.0 %

Tolerance limits from AS/IEC60942 (edition 4)

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

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%.

----ooooOoooo----

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM52717

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	Rion		
Type No:	NA-28	**Serial No:**	30131882
Mic. Type:	Rion UC-59	**Serial No:**	04739
Pre-Amp. Type:	Rion NH-23	**Serial No:**	11942
Filter Type:	1/3 Octave	**Test No:**	FILT9709

Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300

Tests Performed: IEC 61672-3:2013,
IEC 1260:1995, & AS/NZS 4476:1997

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	1000	hPa ±1 hPa	**Date of Receipt :**	31/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	06/02/2025
Relative Humidity	46	% ±5%	**Date of Issue :**	06/02/2025

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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NATA
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Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

CERTIFICATE NO: SLM52717

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 successfully completed the periodic tests of IEC 61672-3:-2013, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:-2013 because evidence was not publically available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:-2013 and because the periodic tests of IEC 61672-3:-2013 cover only a limited subset of the specifications in IEC 61672-1:-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 on request.

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Appendix J

Monthly attended noise monitoring report – October 2025

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Ashton Coal

Monthly attended noise monitoring - October 2025

Prepared for Ashton Coal Operations Pty Ltd

October 2025

Ashton Coal

Monthly attended noise monitoring - October 2025

Ashton Coal Operations Pty Ltd

E241180 RP10

October 2025

Version	Date	Prepared by	Reviewed by	Comments
1	15 October 2025	Lucas Adamson	Robert Kirwan	Draft
2	23 October 2025	Lucas Adamson	Robert Kirwan	Final

Approved by

Robert Kirwan
Senior Associate Acoustics Consultant – Team Leader
23 October 2025

Level 3 175 Scott Street
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This report has been prepared in accordance with the brief provided by Ashton Coal Operations Pty Ltd and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. The contents of this report are private and confidential. This report is only for Ashton Coal Operations Pty Ltd's use in accordance with its agreement with EMM and is not to be relied on by or made available to any other party without EMM's prior written consent. Except as permitted by the *Copyright Act 1968* (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Ashton Coal Operations Pty Ltd (and subject to the terms of EMM's agreement with Ashton Coal Operations Pty Ltd).

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ABN: 28 141 736 558

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1 Introduction

1.1 Background

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

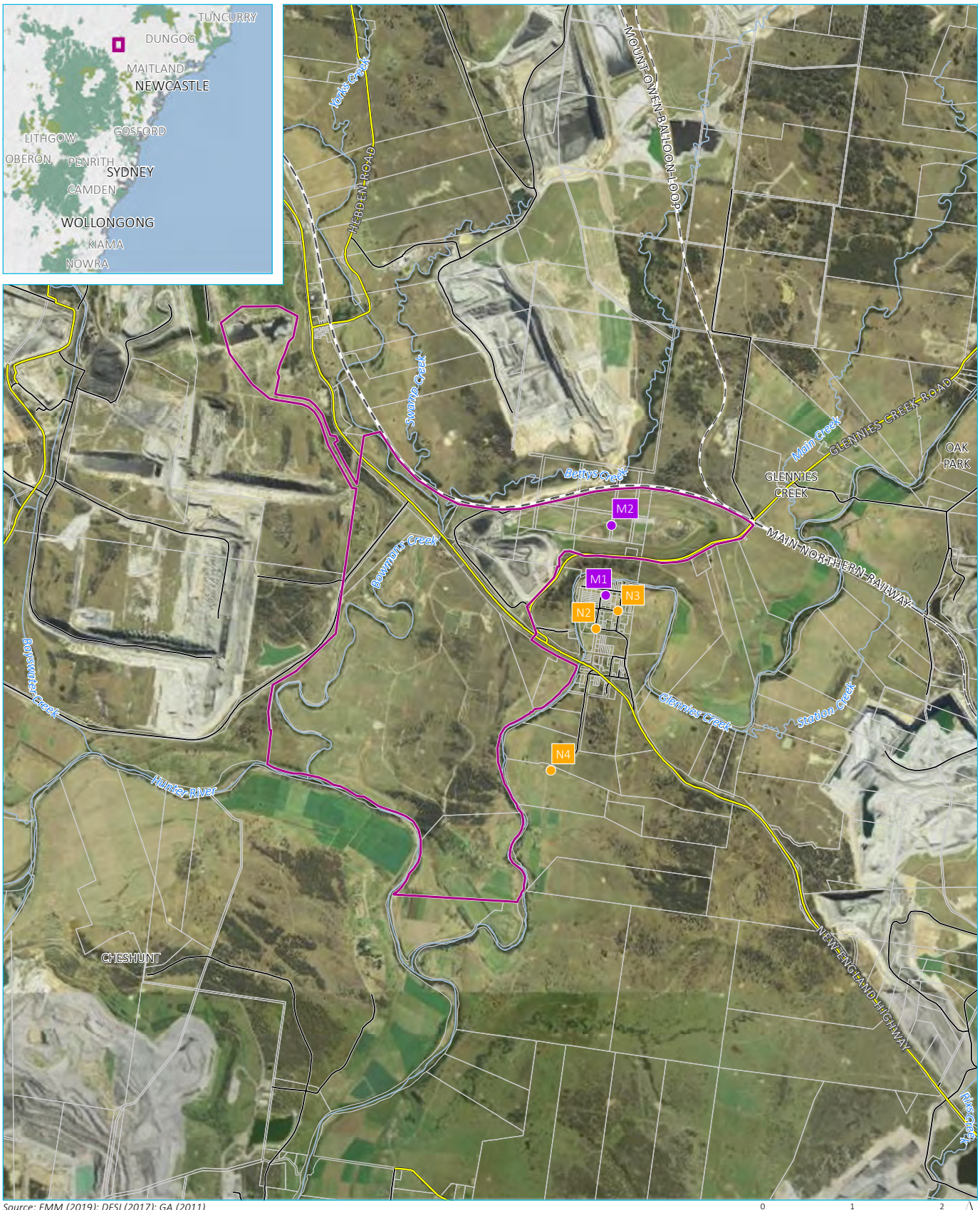
Attended environmental noise monitoring described in this report was done during the night period of Monday 13 October 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

EMM creating opportunities

\\emmsvr1\EMM\Jobs\2019\H190081 - Ashton Coal Noise Monitoring\8 GIS\02_Maps\N001_NoiseMonitoring_20190312_02.mxd 12/03/2019

1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1% of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1% of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10% of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50% of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90% of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres (m).
VTG	The vertical temperature gradient in degrees Celsius per 100 m altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday–Saturday: 7:00 am to 6:00 pm, on Sundays and public holidays: 8:00 am to 6:00 pm.
Evening	Monday–Saturday: 6:00 pm to 10:00 pm, on Sundays and public holidays: 6:00 pm to 10:00 pm.
Night	Monday–Saturday: 10:00 pm to 7:00 am, on Sundays and public holidays: 10:00 pm to 8:00 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 20 August 2025. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply during:

- periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 m above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15 minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 m above local ground level) minus temperature measured at M1 (at 10 m above local ground level).
- ΔH = the vertical height difference between M2 and M1 (equal to 73 m).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Lucas Adamson. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Brüel & Kjær 2250 sound level meter	2759405	20/12/2025	IEC 61672-1:2013
Svantek SV36 calibrator	162796	28/1/2027	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Chapter 5 of this report.

Table 4.1 Total measured noise levels, dB – October 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N2	13/10/2025	22:00	61	54	47	44	39	34	30
N3	13/10/2025	22:17	51	46	42	38	36	31	28
N4	13/10/2025	22:37	62	42	37	35	32	28	25

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 m above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height – October 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north	Cloud cover 1/8s
N2	13/10/2025	22:00	14.2	1.6	140	8
N3	13/10/2025	22:17	14.3	1.4	140	8
N4	13/10/2025	22:37	13.9	1.7	135	8

4.2 Site only noise levels

4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – October 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N2	13/10/2025	22:00	2.2	111	D	-1.4	Yes	36	46	IA	IA	Nil	Nil
N3	13/10/2025	22:17	2.0	114	D	-1.4	Yes	36	46	IA	IA	Nil	Nil
N4	13/10/2025	22:37	2.1	111	D	-1.4	Yes	36	46	IA	IA	Nil	Nil

Notes:
1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.
2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.
3. Degrees magnetic north, "-" indicates calm conditions.
4. IA in the site level column means that the site was deemed inaudible at that location.
5. NM (not measurable) in the site level column means that the site noise was audible and satisfied the relevant limits but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1,000 Hz.

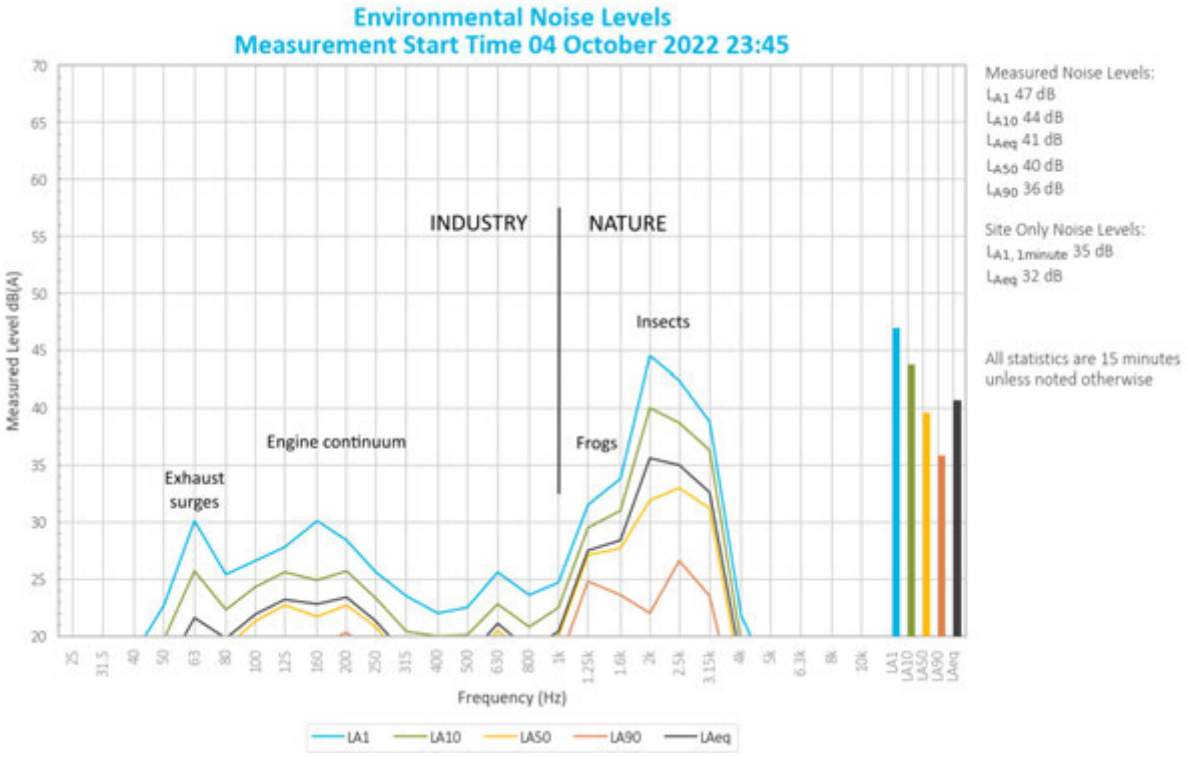


Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

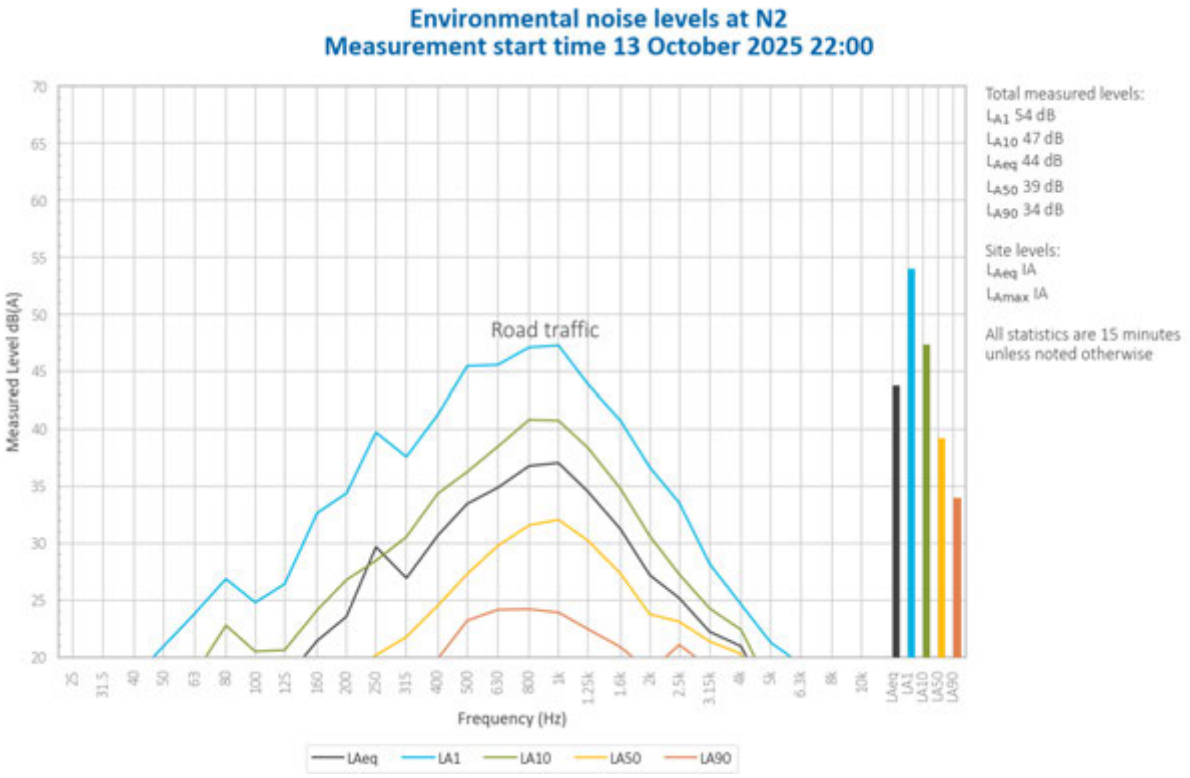


Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal was inaudible throughout the measurement.

Road traffic was responsible for total measured levels.

Noise from insects, frogs, birds, bats, dogs and wind in foliage was also noted.

5.2.1 Cumulative mining noise at N2

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

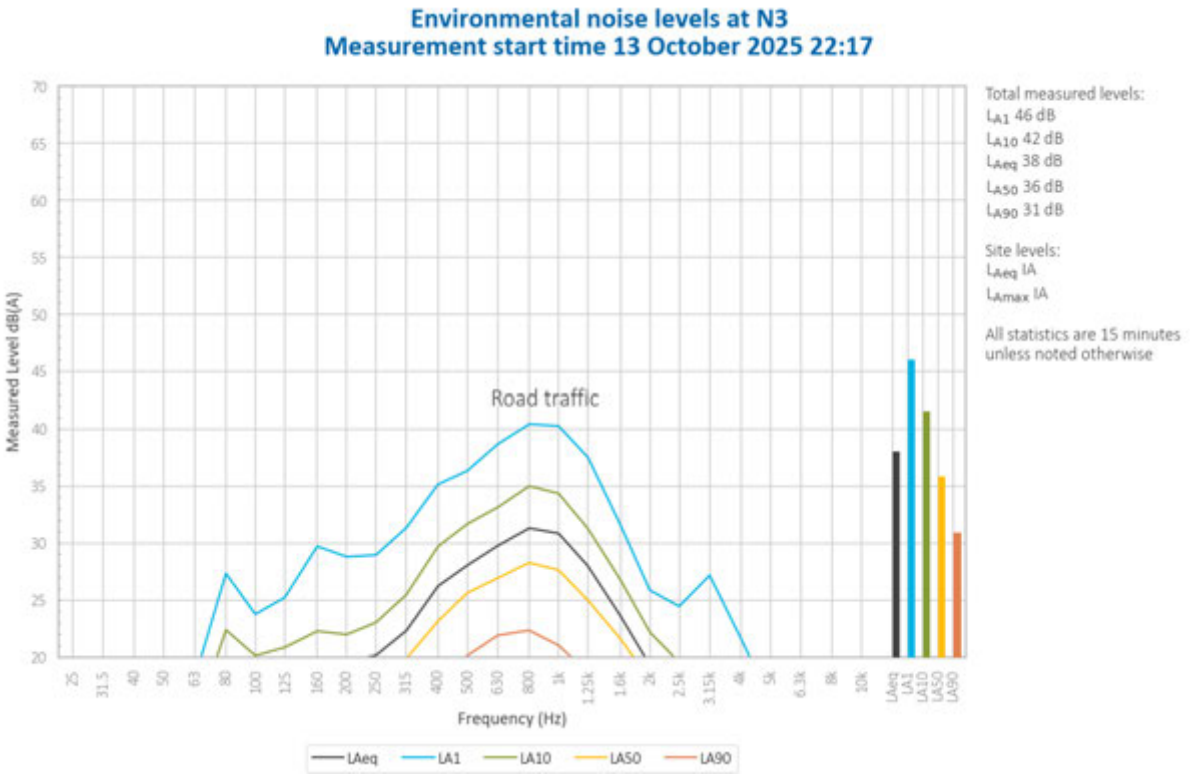


Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic was responsible for total measured levels.

Noise from insects, frogs, birds, bats, dogs and wind in foliage was also noted.

5.3.1 Cumulative mining noise at N3

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

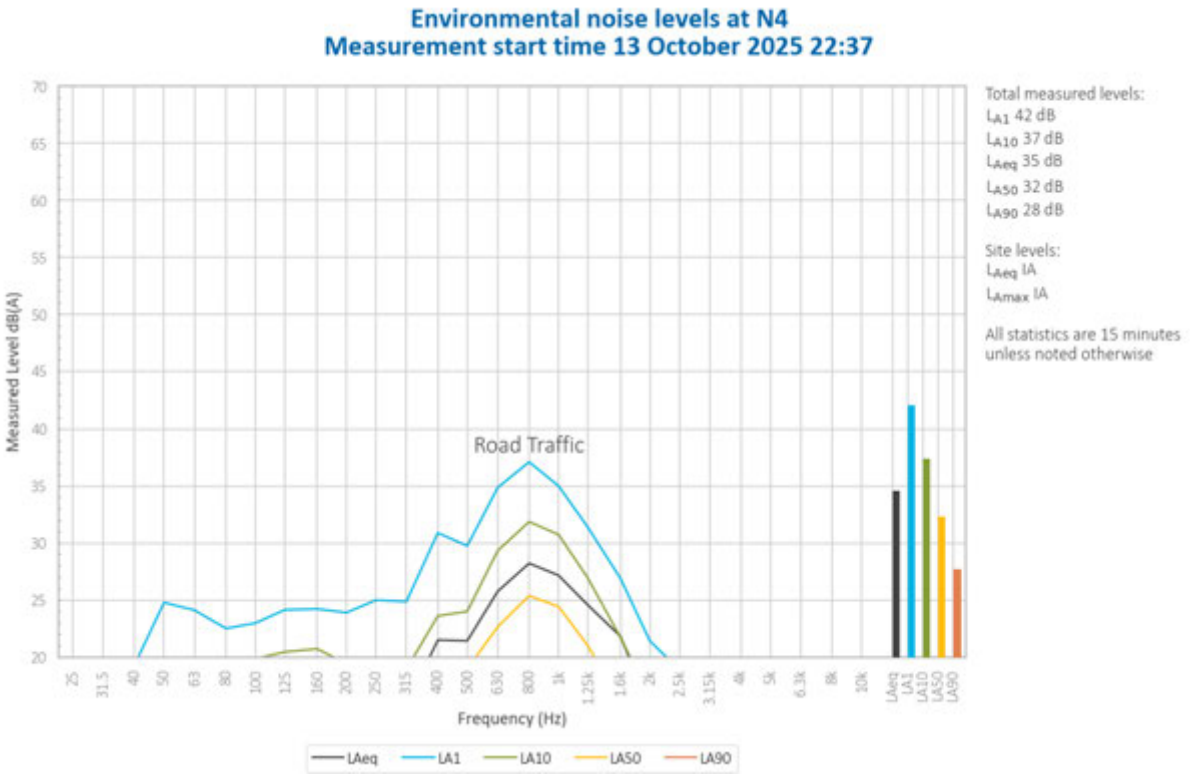


Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic was responsible for total measured levels.

Noise from insects, frogs, birds, bats and nearby powerline was also noted.

5.4.1 Cumulative mining noise at N4

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Monday 13 October 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the October 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

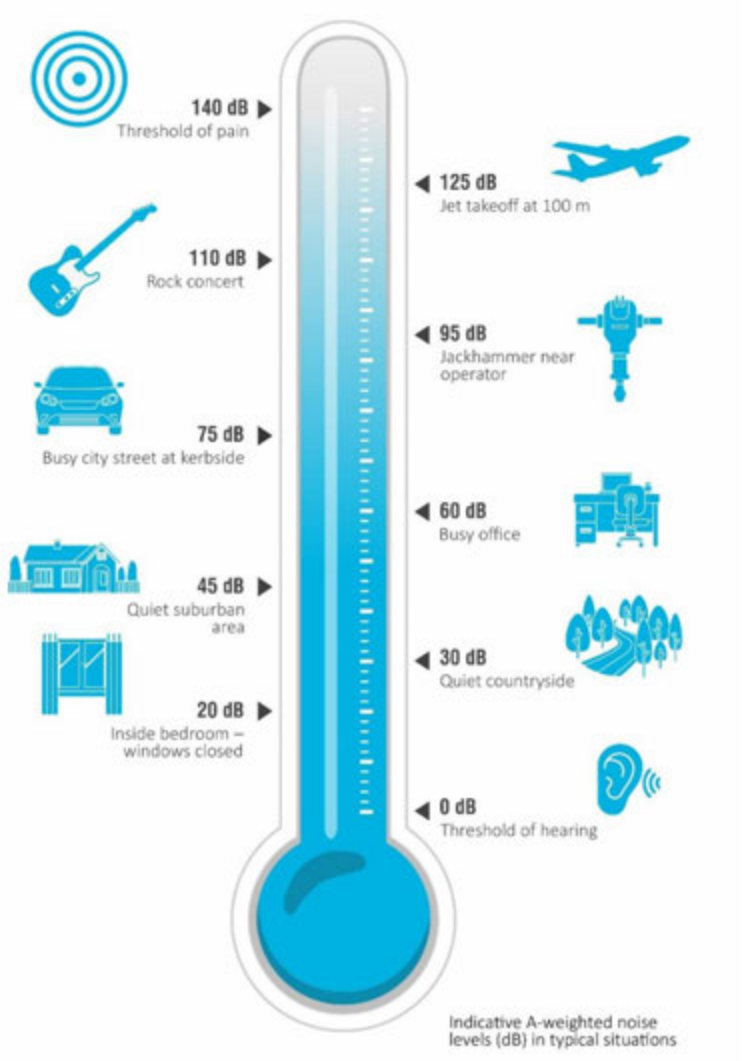

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam, marked and shown as "WML183" on the Plan.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring, marked and shown "Repeater - Meteorological Station" on the Plan.
13	Noise monitoring	Noise monitor, marked and shown "N3" on the Plan.
14	Noise monitoring	Noise monitor, marked and shown "N2" on the Plan.
15	Noise monitoring	Noise monitor, marked and shown "N4" on the Plan.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological Station, marked and shown as "M1" on the Plan.

P1.5 For the purposes of conditions P1.1 to P1.4 and L4.1; the "Plan" refers to the Plan titled "Ashton Underground Mine Environment Protection Licence 11879 Premises Boundary", Drawing No. A-1005_Mon, Revision No. 2025, dated 29 May 2025 (EPA ref. DOC25/503163).

The datum for grid references in the Plan is the Geodetic Datum of Australia 1994 (GDA94), MGA Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and the Plan.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	L_{Aeq} (period)	L_{Aeq} (period)	L_{Aeq} (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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Sydney Calibration Laboratory
Suite 4.03, Level 4, 3 Thomas Holt Drive, Macquarie Park NSW 2113, Australia
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

CERTIFICATE OF CALIBRATION

Certificate No: CAU2300941

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2250	No: 2759405
Microphone:	Brüel & Kjær	4189	No: 2983733
Preamplifier:	Brüel & Kjær	ZC-0032	No: 22666
Supplied Calibrator:	None		
Software version:	BZ7224 Version 4.7.4	Pattern Approval:	-
Instruction manual:	BE1712-22	Identification:	N/A

CUSTOMER:

EMM Consulting Pty Limited
20 Chandos Street
St Leonards NSW 2065

CALIBRATION CONDITIONS:

Preconditioning:	4 hours at 23 °C
Environment conditions:	*see actual values in **Environmental conditions** sections*

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1.
Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
The measurements included in this document are traceable to Australian/National standards.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.6 - DB: 8.60) and test procedure 2250-4189.

RESULTS:

	Initial calibration		Calibration prior to repair/adjustment
X	Calibration without repair/adjustment		Calibration after repair/adjustment

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration:20/12/2023

Certificate issued:21/12/2023

Calibration Technician: Sajeeb Tharayil

Approved signatory: Sajeeb Tharayil

Reproduction of the complete certificate is allowed. Part of the certificate may only be reproduced after written permission.

Summary

Preliminary inspection	**Passed**
Environmental conditions, Prior to calibration	**Passed**
Reference information	**Passed**
Indication at the calibration check frequency	**Passed**
Acoustical signal tests of a frequency weighting, C weighting	**Passed**
Self-generated noise, Microphone installed	**Passed**
Self-generated noise, Electrical	**Passed**
Electrical signal tests of frequency weightings, A weighting	**Passed**
Electrical signal tests of frequency weightings, C weighting	**Passed**
Electrical signal tests of frequency weightings, Z weighting	**Passed**
Frequency and time weightings at 1 kHz	**Passed**
Long-term stability, Reference	**Passed**
Level linearity on the reference level range, Upper	**Passed**
Level linearity on the reference level range, Lower	**Passed**
Toneburst response, Time-weighting Fast	**Passed**
Toneburst response, Time-weighting Slow	**Passed**
Toneburst response, LAE	**Passed**
C-weighted peak sound level, 8 kHz	**Passed**
C-weighted peak sound level, 500 Hz	**Passed**
Overload indication	**Passed**
Long-term stability, 1. relative	**Passed**
High-level stability	**Passed**
Long-term stability, 2. relative	**Passed**
Environmental conditions, Following calibration	**Passed**

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.
However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Conformance to a performance specification is demonstrated when the following criteria are both satisfied: (a) a measured deviation from a design goal does not exceed the applicable acceptance limit and (b) the corresponding uncertainty of measurement does not exceed the corresponding maximum-permitted uncertainty of measurement given in IEC 61672-1:2013 for the same coverage probability of 95 %.

Instruments

Category:	Type:	Manufacturer:	Serial No.:
Voltmeter	DMM34461A	Keysight / Agilent	MY60055667
Generator	Pulse Generator	Bruel & Kjaer	BK3161-105338
Calibrator	4226	Bruel & Kjaer	3222931
AmplifierDivider	WB-3630 Output Module	Bruel & Kjaer	3330940
Adaptor	WA0302B, 15 pF	Bruel & Kjaer	2747050

Preliminary inspection

Visually inspect instrument, and operate all relevant controls. (clause 5)

	Result
Visual inspection	OK

Environmental conditions, Prior to calibration

Actual environmental conditions prior to calibration. (clause 7)

	Expected	Accept - Limit	Accept + Limit	Measured [Deg / kPa / %RH]
Air temperature	23.00	-3.00	3.00	22.20
Air pressure	101.30	-21.30	3.70	100.40
Relative humidity	50.00	-25.00	20.00	51.20

Reference information

Information about reference range, level and channel. (clause 22.h + 22.m)

	Value [dB SPL]
Reference sound pressure level	94
Reference level range	140
Channel number	1

Indication at the calibration check frequency

Measure and adjust sound level meter using the supplied calibrator. (clause 10 + 22.m)

	Expected [dB SPL / Hz]	Measured [dB SPL / Hz]	Uncertainty [dB]
Calibration check frequency (in-house calibrator)	1000.00	1000.00	1.00
Initial indication (in-house calibrator)	93.93	93.83	0.20
Adjusted indication (in-house calibrator)	93.93	93.86	0.20

Acoustical signal tests of a frequency weighting, C weighting

Frequency weightings measured acoustically with a calibrated multi-frequency sound calibrator. Averaging time is 10 seconds, and the result is the average of 2 measurements. (clause 12)

	Coupler Pressure Lc	Mic. Correction C4226	Body Influence	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref. (1st)	93.96	0.10	-0.07	93.93	93.86	-0.7	0.7	-0.07	0.25
1000Hz, Ref. (2nd)	93.96	0.10	-0.07	93.93	93.86	-0.7	0.7	-0.07	0.25
1000Hz, Ref. (Average)	93.96	0.10	-0.07	93.93	93.86	-0.7	0.7	-0.07	0.25
125.89Hz (1st)	94.04	0.00	0.00	93.84	93.92	-1.0	1.0	0.08	0.25
125.89Hz (2nd)	94.04	0.00	0.00	93.84	93.92	-1.0	1.0	0.08	0.25
125.89Hz (Average)	94.04	0.00	0.00	93.84	93.92	-1.0	1.0	0.08	0.25
7943.3Hz (1st)	93.69	2.80	-0.08	87.97	87.74	-2.5	1.5	-0.23	0.52
7943.3Hz (2nd)	93.69	2.80	-0.08	87.97	87.73	-2.5	1.5	-0.24	0.52
7943.3Hz (Average)	93.69	2.80	-0.08	87.97	87.73	-2.5	1.5	-0.24	0.52

Self-generated noise, Microphone installed

Self-generated noise measured with microphone submitted for periodic testing. Averaging time is 30 seconds. An anechoic chamber is used to isolate environmental noise.
The level of self-generated noise is reported for information only and is not used to assess conformance to a requirement. (clause 11.1)

	Max	Measured	Uncertainty
	[dB SPL]	[dB SPL]	[dB]
A weighted	17.70	17.09	0.50

Self-generated noise, Electrical

Self-generated noise measured in most sensitive range, with electrical substitution for microphone, according to manufactures specifications.
The level of self-generated noise is reported for information only and is not used to assess conformance to a requirement. (clause 11.2)

	Max	Measured	Uncertainty
	[dB SPL]	[dB SPL]	[dB]
A weighted	13.60	12.67	0.30
C weighted	14.30	12.97	0.30
Z weighted	19.40	18.08	0.30

Electrical signal tests of frequency weightings, A weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (clause 13)
Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with clause 13.6

	Input Level	Expected	Measured	Response Corr.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-24.64	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	1.56	95.00	95.06	0.00	0.07	95.13	-1.0	1.0	0.13	0.12
125.89Hz	-8.54	95.00	95.02	0.00	0.07	95.09	-1.0	1.0	0.09	0.12
251.19Hz	-16.04	95.00	94.97	0.00	0.14	95.11	-1.0	1.0	0.11	0.12
501.19Hz	-21.44	95.00	94.97	0.00	0.29	95.26	-1.0	1.0	0.26	0.12
1995.3Hz	-25.84	95.00	95.01	-0.01	-0.02	94.98	-1.0	1.0	-0.02	0.12
3981.1Hz	-25.64	95.00	94.99	-0.02	-0.02	94.95	-1.0	1.0	-0.05	0.12
7943.3Hz	-23.54	95.00	95.00	0.00	-0.01	94.99	-2.5	1.5	-0.01	0.12
15849Hz	-18.04	95.00	94.11	0.87	0.18	95.16	-16.0	2.5	0.16	0.12

Electrical signal tests of frequency weightings, C weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (clause 13)
Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with clause 13.6

	Input Level	Expected	Measured	Response Corr.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-24.64	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	-23.84	95.00	95.02	0.00	0.07	95.09	-1.0	1.0	0.09	0.12
125.89Hz	-24.44	95.00	95.04	0.00	0.07	95.11	-1.0	1.0	0.11	0.12
251.19Hz	-24.64	95.00	95.00	0.00	0.14	95.14	-1.0	1.0	0.14	0.12
501.19Hz	-24.64	95.00	95.03	0.00	0.29	95.32	-1.0	1.0	0.32	0.12
1995.3Hz	-24.44	95.00	95.04	-0.01	-0.02	95.01	-1.0	1.0	0.01	0.12
3981.1Hz	-23.84	95.00	95.00	-0.02	-0.02	94.96	-1.0	1.0	-0.04	0.12
7943.3Hz	-21.64	95.00	95.00	0.00	-0.01	94.99	-2.5	1.5	-0.01	0.12
15849Hz	-16.14	95.00	94.08	0.87	0.18	95.13	-16.0	2.5	0.13	0.12

Electrical signal tests of frequency weightings, Z weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (clause 13)
Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with clause 13.6

	Input Level	Expected	Measured	Response Corr.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-24.64	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	-24.64	95.00	95.03	0.00	0.07	95.10	-1.0	1.0	0.10	0.12
125.89Hz	-24.64	95.00	95.01	0.00	0.07	95.08	-1.0	1.0	0.08	0.12
251.19Hz	-24.64	95.00	95.00	0.00	0.14	95.14	-1.0	1.0	0.14	0.12
501.19Hz	-24.64	95.00	95.00	0.00	0.29	95.29	-1.0	1.0	0.29	0.12
1995.3Hz	-24.64	95.00	95.01	-0.01	-0.02	94.98	-1.0	1.0	-0.02	0.12
3981.1Hz	-24.64	95.00	95.02	-0.02	-0.02	94.98	-1.0	1.0	-0.02	0.12
7943.3Hz	-24.64	95.00	95.00	0.00	-0.01	94.99	-2.5	1.5	-0.01	0.12
15849Hz	-24.64	95.00	94.14	0.87	0.18	95.19	-16.0	2.5	0.19	0.12

Frequency and time weightings at 1 kHz

Frequency and time weighting measured at 1 kHz with electrical signal in reference range. Measured relative to A-weighted and Fast response. (clause 14)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
LAF, Ref.	94.00	94.00	-0.5	0.5	0.00	0.12
LCF	94.00	94.00	-0.2	0.2	0.00	0.12
LZF	94.00	94.00	-0.2	0.2	0.00	0.12
LAS	94.00	93.96	-0.1	0.1	-0.04	0.12
LAeq	94.00	93.99	-0.1	0.1	-0.01	0.12

Long-term stability, Reference

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (clause 15)
Adjusting to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]		[dB]
Reference	94.00	-0.5	0.5	0.00	2023-12-20 13:24:32	0.10

Level linearity on the reference level range, Upper

Level linearity in reference range, measured at 8 kHz until overload. (clause 16)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
94 dB	94.00	94.00	-0.5	0.5	0.00	0.13
99 dB	99.00	99.00	-0.8	0.8	0.00	0.13
104 dB	104.00	104.00	-0.8	0.8	0.00	0.13
109 dB	109.00	109.00	-0.8	0.8	0.00	0.13
114 dB	114.00	114.02	-0.8	0.8	0.02	0.13
119 dB	119.00	119.02	-0.8	0.8	0.02	0.13
124 dB	124.00	124.02	-0.8	0.8	0.02	0.13
129 dB	129.00	129.02	-0.8	0.8	0.02	0.13
134 dB	134.00	134.02	-0.8	0.8	0.02	0.13
135 dB	135.00	135.02	-0.8	0.8	0.02	0.13
136 dB	136.00	136.02	-0.8	0.8	0.02	0.13
137 dB	137.00	137.02	-0.8	0.8	0.02	0.13
138 dB	138.00	138.02	-0.8	0.8	0.02	0.13
139 dB	139.00	139.02	-0.8	0.8	0.02	0.13
140 dB	140.00	140.01	-0.8	0.8	0.01	0.13

Level linearity on the reference level range, Lower

Level linearity in reference range, measured at 8 kHz down to lower limit, or until underrange. (clause 16)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
94 dB	94.00	94.00	-0.5	0.5	0.00	0.13
89 dB	89.00	89.00	-0.8	0.8	0.00	0.13
84 dB	84.00	84.00	-0.8	0.8	0.00	0.13
79 dB	79.00	78.99	-0.8	0.8	-0.01	0.13
74 dB	74.00	73.99	-0.8	0.8	-0.01	0.13
69 dB	69.00	69.00	-0.8	0.8	0.00	0.13
64 dB	64.00	63.99	-0.8	0.8	-0.01	0.13
59 dB	59.00	58.99	-0.8	0.8	-0.01	0.13
54 dB	54.00	54.00	-0.8	0.8	0.00	0.13
49 dB	49.00	49.00	-0.8	0.8	0.00	0.13
44 dB	44.00	44.01	-0.8	0.8	0.01	0.13
39 dB	39.00	39.02	-0.8	0.8	0.02	0.24
34 dB	34.00	34.06	-0.8	0.8	0.06	0.24
30 dB	30.00	30.14	-0.8	0.8	0.14	0.24
29 dB	29.00	29.16	-0.8	0.8	0.16	0.24
28 dB	28.00	28.19	-0.8	0.8	0.19	0.24
27 dB	27.00	27.26	-0.8	0.8	0.26	0.24
26 dB	26.00	26.29	-0.8	0.8	0.29	0.24
25 dB	25.00	25.39	-0.8	0.8	0.39	0.24
24 dB	24.00	24.46	-0.8	0.8	0.46	0.24

Toneburst response, Time-weighting Fast

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (clause 18)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	136.00	135.99	-0.5	0.5	-0.01	0.12
2 ms Burst	119.00	118.93	-1.5	1.0	-0.07	0.12
0.25 ms Burst	110.00	109.82	-3.0	1.0	-0.18	0.12

Toneburst response, Time-weighting Slow

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (clause 18)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	129.60	129.63	-0.5	0.5	0.03	0.12
2 ms Burst	110.00	110.02	-3.0	1.0	0.02	0.12

Toneburst response, LAE

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (clause 18)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	130.00	129.99	-0.5	0.5	-0.01	0.12
2 ms Burst	110.00	109.96	-1.5	1.0	-0.04	0.12
0.25 ms Burst	101.00	100.85	-3.0	1.0	-0.15	0.12

C-weighted peak sound level, 8 kHz

Peak-response to a 8 kHz single-cycle sine measured in least-sensitive range, relative to continuous signal. (clause 19)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	132.00	132.00	-0.5	0.5	0.00	0.09
Single Sine	135.40	135.30	-2.0	2.0	-0.10	0.20

C-weighted peak sound level, 500 Hz

Peak-response to a 500 Hz half-cycle sine measured in least-sensitive range, relative to continuous signal. (clause 19)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	135.00	135.00	-0.5	0.5	0.00	0.09
Half-sine, Positive	137.40	137.12	-1.0	1.0	-0.28	0.12
Half-sine, Negative	137.40	137.12	-1.0	1.0	-0.28	0.12

Overload indication

Overload indication in the least sensitive range determined with a 4 kHz positive/negative half-cycle signal. (clause 20)

	Measured / Input Level	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous	140.00	-0.5	0.5	0.00	0.20
Half-sine, Positive	141.30	-10.0	10.0	1.30	0.20
Half-sine, Negative	141.60	-10.0	10.0	1.60	0.20
Difference	141.60	-1.5	1.5	0.30	0.24

Long-term stability, 1. relative

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (clause 15)
Relative to prior adjustment to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[dB SPL / Min]	[dB / Min]	[dB / Min]	[dB / Min]		[dB]
Measurement	94.00	-0.1	0.1	0.00	2023-12-20 13:49:50	0.10
Time passed	25.18	0.0	35.0	25.18		0.00

High-level stability

High-level stability over 5 minutes, with steady 1kHz signal, 1dB below upper boundary. (clause 21)

	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]	[dB]
High-level, Ref.	139.00	-0.5	0.5	0.00	0.10
High-level, after 5min	139.00	-0.1	0.1	0.00	0.10

Long-term stability, 2. relative

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (clause 15)
Relative to prior adjustment to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[Min / dB SPL]	[Min / dB]	[Min / dB]	[Min / dB]		[dB]
Wait	31.31	25.0	120.0	31.31		0.00
Measurement	94.00	-0.1	0.1	0.00	2023-12-20 13:56:36	0.10

Environmental conditions, Following calibration

Actual environmental conditions following calibration. (clause 7)

	Expected	Accept - Limit	Accept + Limit	Measured
				[Deg / kPa / %RH]
Air temperature	23.00	-3.00	3.00	23.30
Air pressure	101.30	-21.30	3.70	100.50
Relative humidity	50.00	-25.00	20.00	59.40

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C52587

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 162796
Class: 1
Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	995	hPa ±1 hPa	**Date of Receipt :**	28/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	28/01/2025
Relative Humidity	45	% ±5%	**Date of Issue :**	29/01/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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NATA
WORLD RECOGNISED
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Accredited Laboratory
No. 9262
Acoustic and Vibration
Measurements

CERTIFICATE NO: C52587

The Calibrator described in this report has been tested to the requirements of the standard IEC 60942-[Ed 4]:2017-11.
The tests described in Annex B of the standard (Periodic tests) were carried out under the environmental conditions listed above to the following clauses:

Clause	Test description
B4.6	Sound Pressure Level (By comparison with a reference calibrator).
B4.7	Frequency (By measurement with a calibrated frequency meter).
B4.8	Total distortion and noise. (By measurement with a calibrated Noise and Distortion meter).

Notes:

1. The calibrator was calibrated with the main axis vertical and facing down.
2. No corrections have been made for atmospheric pressure, temperature, or humidity.

Parameter	Pre-Adj	Adj Y/N	Output: **(dB re 20 µPa)**	Frequency **(Hz)**	THD&N **(%)**
Level1:	NA	N	93.96 dB	999.97 Hz	0.45 %
Level2:	NA	N	113.97 dB	999.98 Hz	0.28 %
Uncertainty			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

Parameter	Class 1		Class 2	
Nominal Frequency	250 Hz	1 kHz	250 Hz	1 kHz
Output dB SPL	0.25 dB	0.25 dB	0.40 dB	0.40 dB
Frequency Hz	0.7 % (1.75 Hz)	0.7 % (7 Hz)	1.7 % (4.25 Hz)	1.7 % (17 Hz)
THD&N	2.5 %	2.5 %	3.0 %	3.0 %

Tolerance limits from AS/IEC60942 (edition 4)

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

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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Appendix K

Monthly attended noise monitoring report – November 2025

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Ashton Coal

Monthly attended noise monitoring - November 2025

Prepared for Ashton Coal Operations Pty Ltd

November 2025

Ashton Coal

Monthly attended noise monitoring - November 2025

Ashton Coal Operations Pty Ltd

E241180 RP11

November 2025

Version	Date	Prepared by	Reviewed by	Comments
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24 November 2025

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1 Introduction

1.1 Background

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

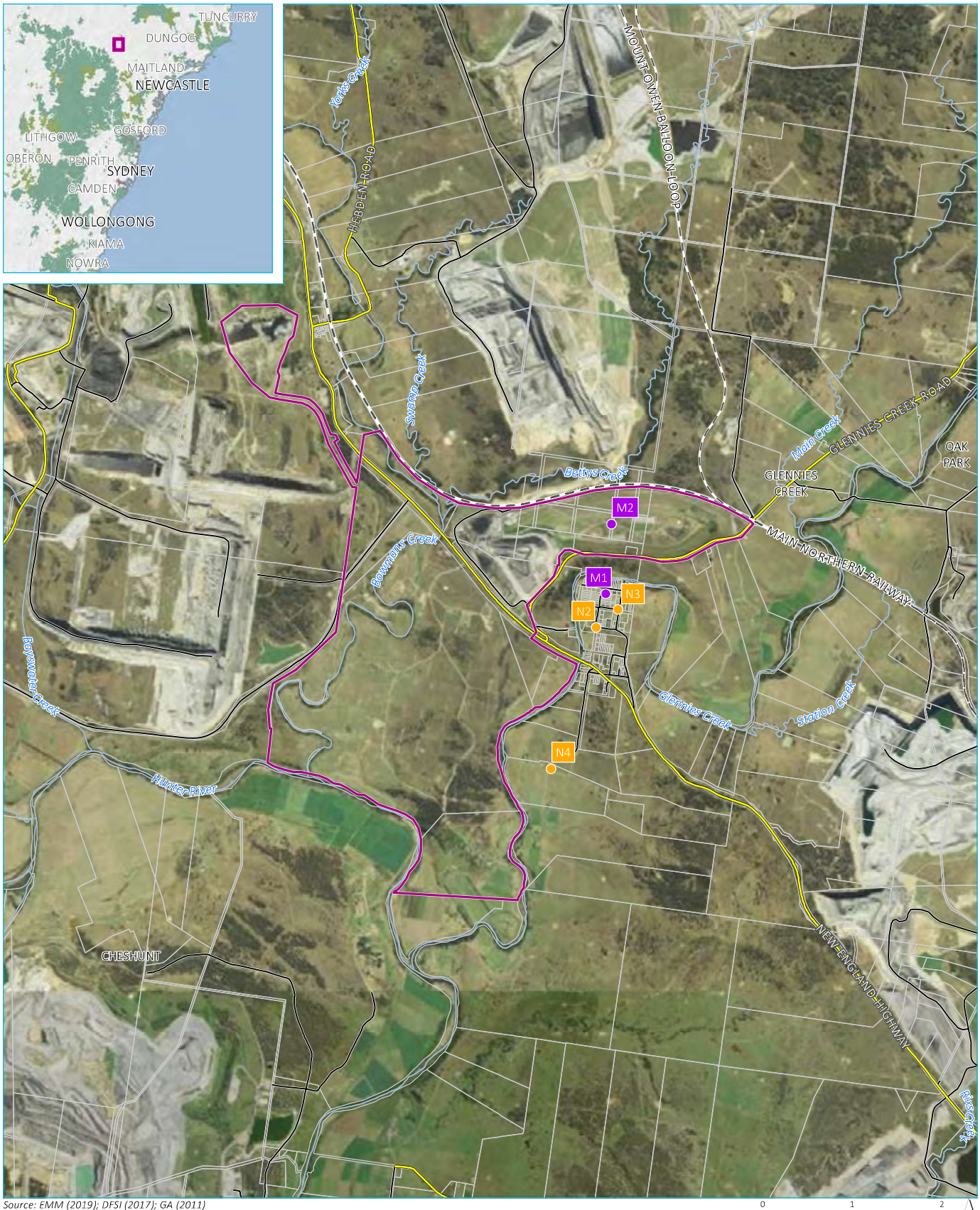
Attended environmental noise monitoring described in this report was done during the night period of Wednesday 12 November 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

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KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

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1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1% of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1% of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10% of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50% of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90% of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres (m).
VTG	The vertical temperature gradient in degrees Celsius per 100 m altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday–Saturday: 7:00 am to 6:00 pm, on Sundays and public holidays: 8:00 am to 6:00 pm.
Evening	Monday–Saturday: 6:00 pm to 10:00 pm, on Sundays and public holidays: 6:00 pm to 10:00 pm.
Night	Monday–Saturday: 10:00 pm to 7:00 am, on Sundays and public holidays: 10:00 pm to 8:00 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 20 August 2025. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply during:

- periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 m above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15 minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 m above local ground level) minus temperature measured at M1 (at 10 m above local ground level).
- ΔH = the vertical height difference between M2 and M1 (equal to 73 m).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Isaac Hepworth. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA-28 sound level meter	30131882	06/02/2027	IEC 61672-1:2002
Svantek SV36 calibrator	138014	12/08/2026	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Chapter 5 of this report.

Table 4.1 Total measured noise levels, dB – November 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N2	12/11/2025	22:47	60	53	49	45	40	34	31
N3	12/11/2025	22:26	54	49	45	42	40	36	32
N4	12/11/2025	22:02	55	48	43	39	36	33	31

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 m above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height – November 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
N2	12/11/2025	22:47	13	<0.5	-	0
N3	12/11/2025	22:26	15	0.6	160	0
N4	12/11/2025	22:02	14	2.5	170	0

Note: 1. Degrees magnetic north, "-" indicates calm conditions.

4.1.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.1.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – November 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N2	12/11/2025	22:47	1.8	150	E	0.8	Yes	36	46	IA	IA	Nil	Nil
N3	12/11/2025	22:26	1.4	173	E	-0.1	Yes	36	46	IA	IA	Nil	Nil
N4	12/11/2025	22:02	1.9	169	E	0.8	Yes	36	46	IA	IA	Nil	Nil

Notes:
1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.
2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.
3. Degrees magnetic north, "-" indicates calm conditions.
4. IA in the site level column means that the site was deemed inaudible at that location.
5. NM (not measurable) in the site level column means that the site noise was audible and satisfied the relevant limits but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1,000 Hz.

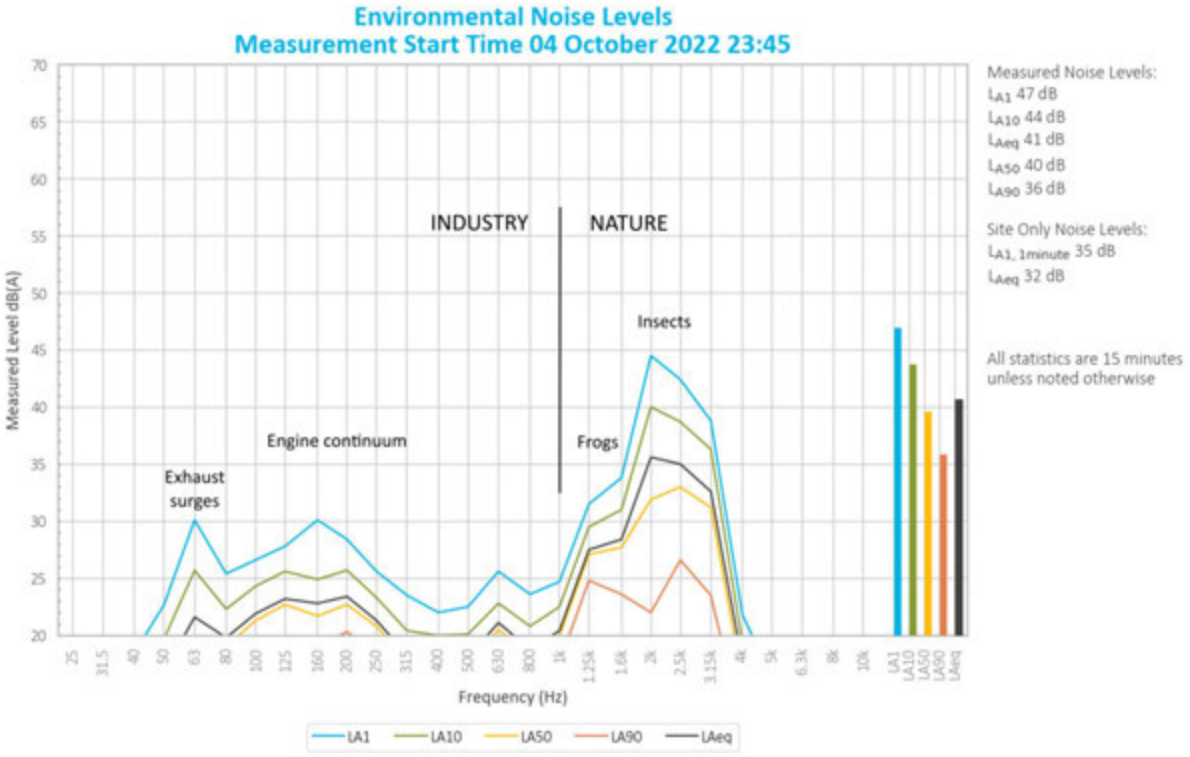

Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

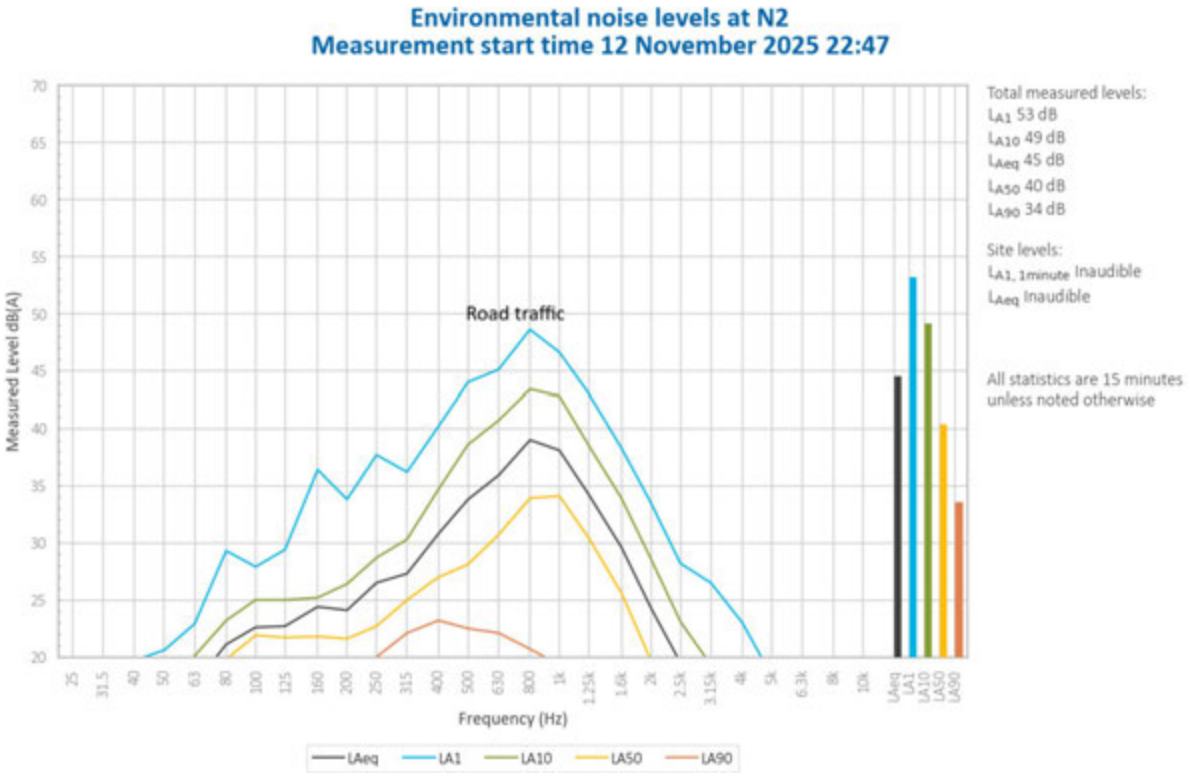

Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal was inaudible throughout the measurement.

Road traffic was responsible for total measured levels.

Noise from insects, frogs, birds, dogs, trains and other mining continuum was also noted.

5.2.1 Cumulative mining noise at N2

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

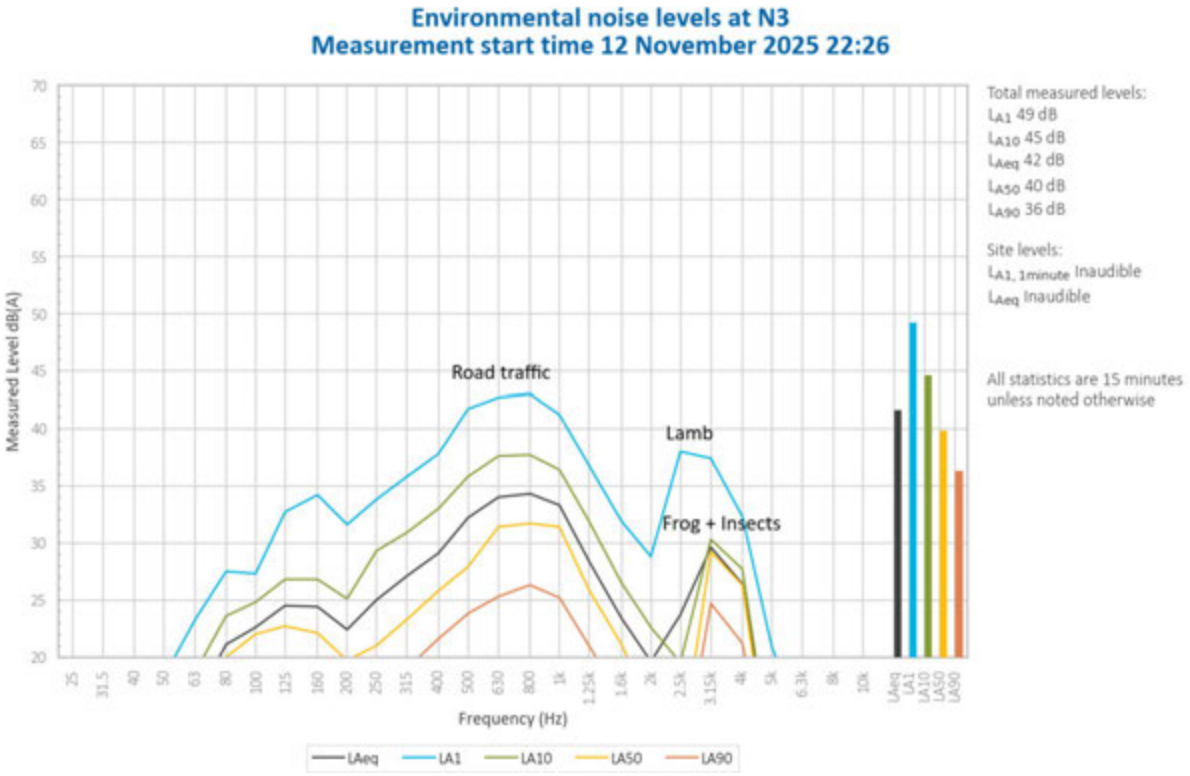

Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic was primarily responsible for total measured levels. Noise from lamb contributed to the measured L_{A1}. Frogs and insects contributed to the measured L_{A1}, L_{A10}, L_{A50}, L_{A90} and L_{Aeq}.

Noise from dogs, trains and other mining continuum was also noted.

5.3.1 Cumulative mining noise at N3

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

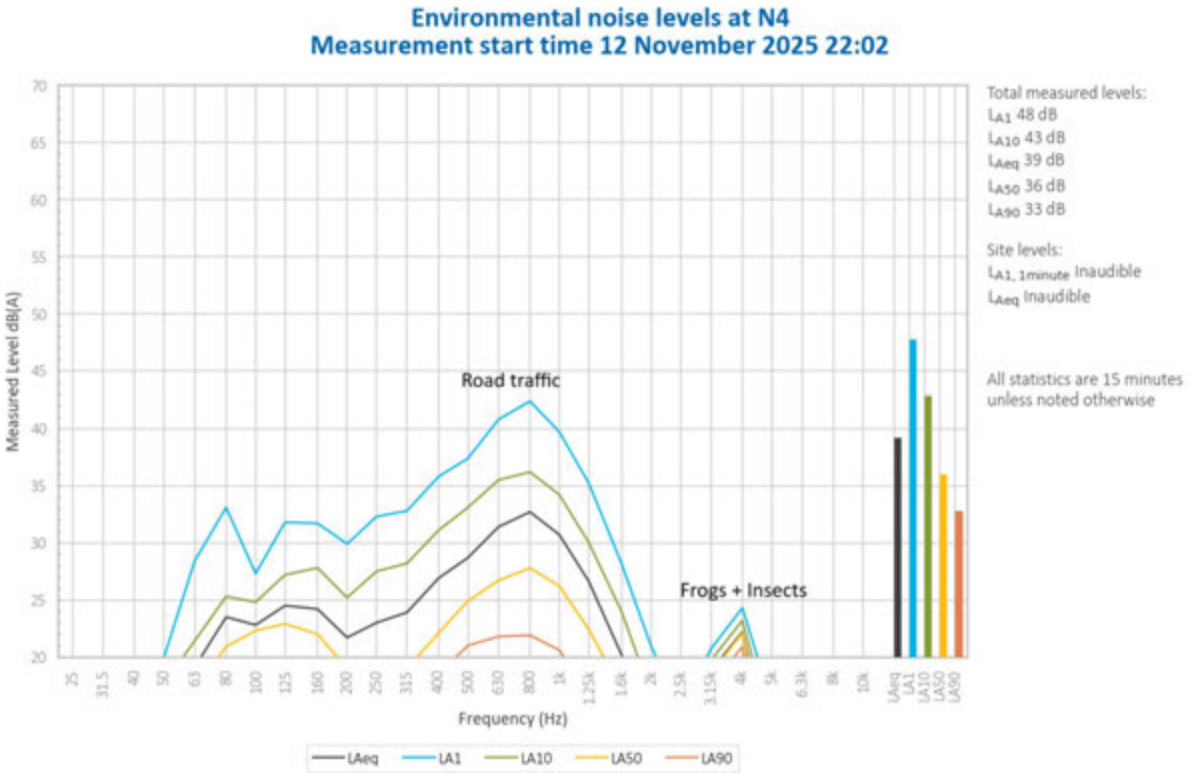

Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic was primarily responsible for total measured levels. Frogs and insects contributed to the measured L_{A50} and L_{A90}

Noise cattle, trains and other mining continuum was also noted.

5.4.1 Cumulative mining noise at N4

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Wednesday 12 November 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the November 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

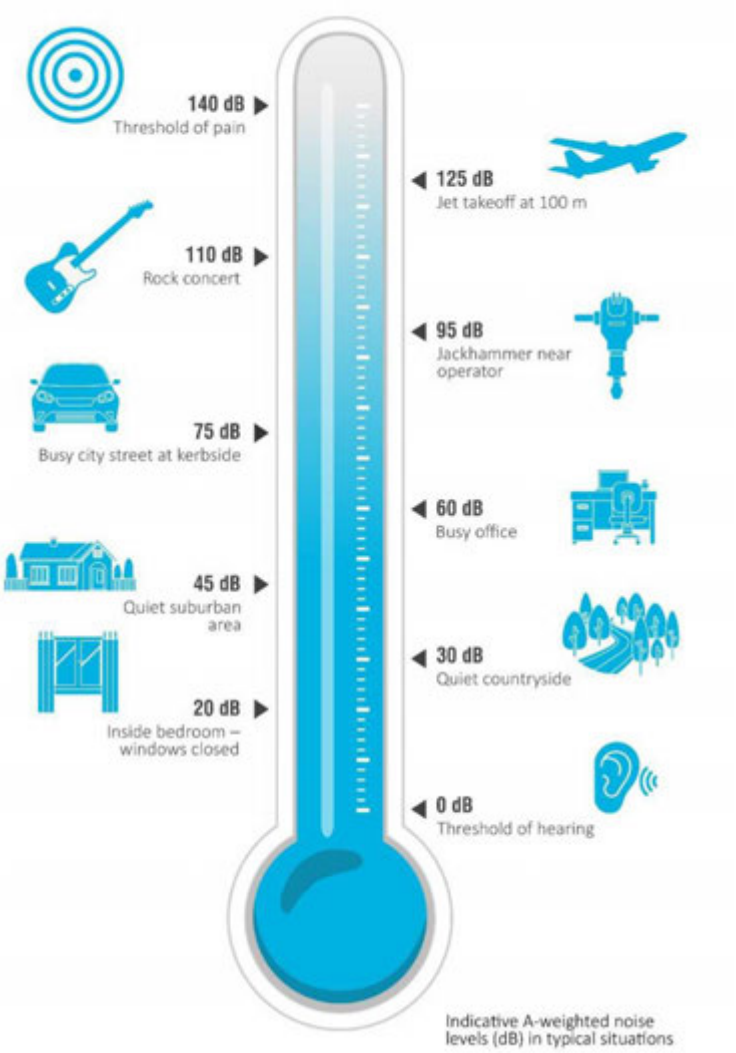

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	Receiver	Day ($L_{Aeq\ (15min)}$)	Evening ($L_{Aeq\ (15min)}$)	Night ($L_{Aeq\ (15min)}$)	Night ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	Receiver	Day ($L_{Aeq\ (15min)}$)	Evening ($L_{Aeq\ (15min)}$)	Night ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam, marked and shown as "WML183" on the Plan.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring, marked and shown "Repeater - Meteorological Station" on the Plan.
13	Noise monitoring	Noise monitor, marked and shown "N3" on the Plan.
14	Noise monitoring	Noise monitor, marked and shown "N2" on the Plan.
15	Noise monitoring	Noise monitor, marked and shown "N4" on the Plan.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological Station, marked and shown as "M1" on the Plan.

P1.5 For the purposes of conditions P1.1 to P1.4 and L4.1; the "Plan" refers to the Plan titled "Ashton Underground Mine Environment Protection Licence 11879 Premises Boundary", Drawing No. A-1005_Mon, Revision No. 2025, dated 29 May 2025 (EPA ref. DOC25/503163).

The datum for grid references in the Plan is the Geodetic Datum of Australia 1994 (GDA94), MGA Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and the Plan.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	L_{Aeq} (period)	L_{Aeq} (period)	L_{Aeq} (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM52717

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	Rion		
Type No:	NA-28	**Serial No:**	30131882
Mic. Type:	Rion UC-59	**Serial No:**	04739
Pre-Amp. Type:	Rion NH-23	**Serial No:**	11942
Filter Type:	1/3 Octave	**Test No:**	FILT9709

Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300

Tests Performed: IEC 61672-3:2013,
IEC 1260:1995, & AS/NZS 4476:1997

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	1000	hPa ±1 hPa	**Date of Receipt :**	31/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	06/02/2025
Relative Humidity	46	% ±5%	**Date of Issue :**	06/02/2025

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....
Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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NATA
WORLD RECOGNISED ACCREDITATION
Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

CERTIFICATE NO: SLM52717

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 successfully completed the periodic tests of IEC 61672-3:-2013, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:-2013 because evidence was not publically available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:-2013 and because the periodic tests of IEC 61672-3:-2013 cover only a limited subset of the specifications in IEC 61672-1:-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 on request.

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C54969

EQUIPMENT TESTED : Acoustic Calibrator

Make & Model:	Svantek SV 36	**Serial No:**	138014
Class:	1		
Owner:	EMM Consulting Suite 01, 20 Chandos St St Leonards NSW 2065		
Tests Performed:	Measured Output Pressure level, Frequency & Distortion		
Comments:	See Details and Class Tolerance overleaf.		

CONDITION OF TEST:

Ambient Pressure	1012	hPa ±1 hPa	**Date of Receipt :**	06/08/2025
Temperature	20	°C ±1° C	**Date of Calibration :**	12/08/2025
Relative Humidity	44	% ±5%	**Date of Issue :**	12/08/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: A. Nowosadzka **AUTHORISED SIGNATURE:** .....

H. Soe
Lab Manager

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

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ACCREDITATION
Accredited Laboratory
No. 9262
Acoustic and Vibration
Measurements

CERTIFICATE NO: C54969

The Calibrator described in this report has been tested to the requirements of the standard IEC 60942-[Ed 4]:2017-11.
The tests described in Annex B of the standard (Periodic tests) were carried out under the environmental conditions listed above to the following clauses:

Clause	Test description
B4.6	Sound Pressure Level (By comparison with a reference calibrator).
B4.7	Frequency (By measurement with a calibrated frequency meter).
B4.8	Total distortion and noise. (By measurement with a calibrated Noise and Distortion meter).

Notes:

1. The calibrator was calibrated with the main axis vertical and facing down.
2. No corrections have been made for atmospheric pressure, temperature, or humidity.

Parameter	Pre-Adj	Adj Y/N	Output: (dB re 20 µPa)	Frequency (Hz)	THD&N (%)
Level1:	NA	N	93.99 dB	1000.02 Hz	0.32 %
Level2:	NA	N	113.95 dB	1000.01 Hz	0.63 %
Uncertainty			±0.11 dB	±0.05%	±0.40 %
Uncertainty (at 95% c.l.) k=2					

Parameter	Class 1		Class 2	
Nominal Frequency	250 Hz	1 kHz	250 Hz	1 kHz
Output dB SPL	0.25 dB	0.25 dB	0.40 dB	0.40 dB
Frequency Hz	0.7 % (1.75 Hz)	0.7 % (7 Hz)	1.7 % (4.25 Hz)	1.7 % (17 Hz)
THD&N	2.5 %	2.5 %	3.0 %	3.0 %

Tolerance limits from AS/IEC60942 (edition 4)

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

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%.

----oooo0oooo----

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Appendix L

Monthly attended noise monitoring report – December 2025

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Ashton Coal

Monthly attended noise monitoring - December 2025

Prepared for Ashton Coal Operations Pty Ltd

January 2026

Ashton Coal

Monthly attended noise monitoring - December 2025

Ashton Coal Operations Pty Ltd

E241180 RP12

January 2026

Version	Date	Prepared by	Reviewed by	Comments
1	19 December 2025	Lucas Adamson	Robert Kirwan	Draft
2	9 January 2026	Lucas Adamson	Robert Kirwan	Final

Approved by

Robert Kirwan
Senior Associate – Team Leader
9 January 2026

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This report has been prepared in accordance with the brief provided by Ashton Coal Operations Pty Ltd and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. The contents of this report are private and confidential. This report is only for Ashton Coal Operations Pty Ltd's use in accordance with its agreement with EMM and is not to be relied on by or made available to any other party without EMM's prior written consent. Except as permitted by the *Copyright Act 1968* (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Ashton Coal Operations Pty Ltd (and subject to the terms of EMM's agreement with Ashton Coal Operations Pty Ltd).

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1 Introduction

1.1 Background

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal Operations (Ashton Coal, the site) located at Glennies Creek Road, Camberwell NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

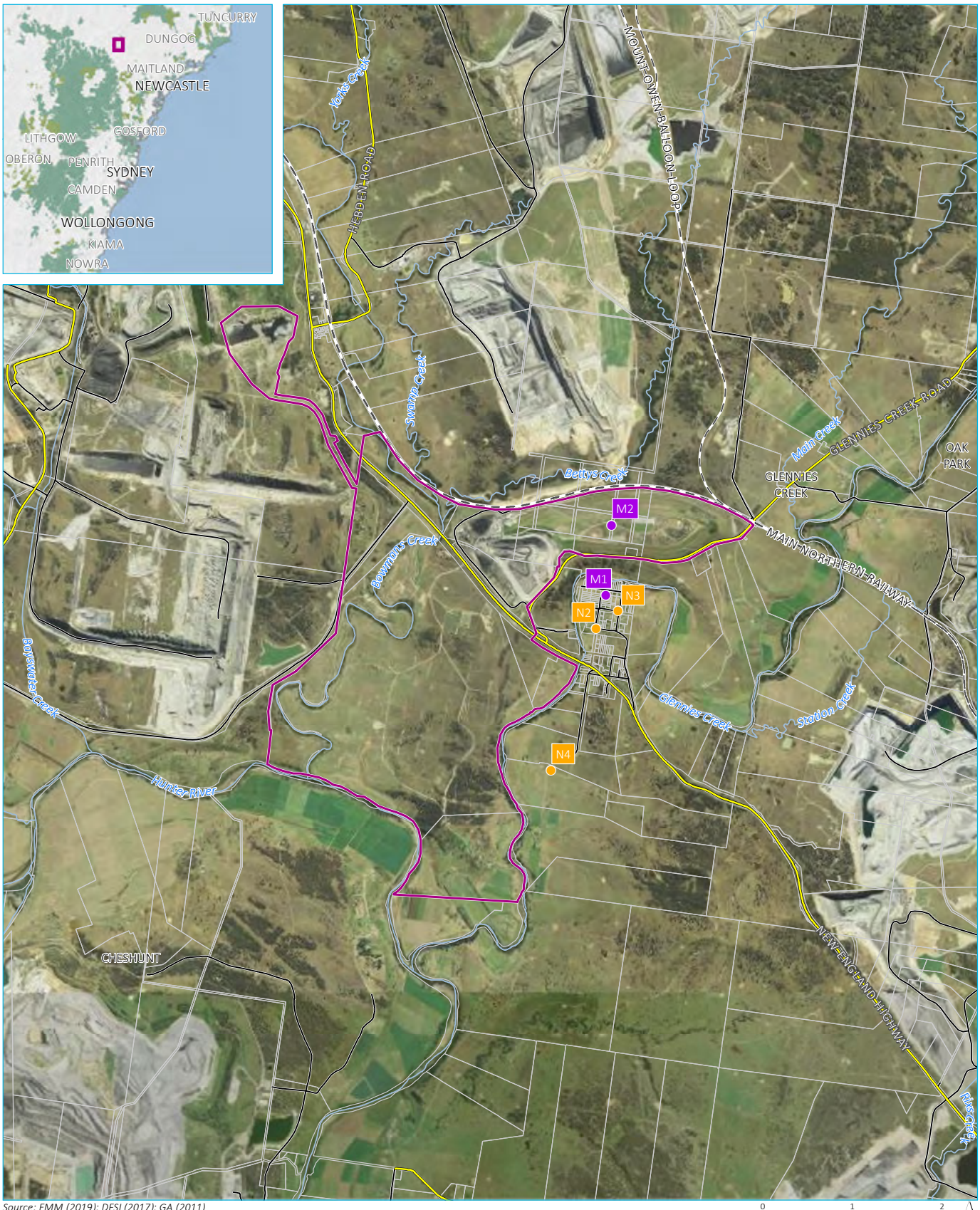
Attended environmental noise monitoring described in this report was done during the night period of Thursday 18 December 2025 at three monitoring locations.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

Table 1.1 Attended noise monitoring locations

Location descriptor/ID	Description/address	Coordinates (GDA94 MGA Zone 56)	
		Easting	Northing
N2	Camberwell Village (west)	320297	6405670
N3	Camberwell Village (north-east)	320554	6405839
N4	South of New England Highway	319776	6404101



Source: EMM (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Site boundary
- Noise monitoring location
- Meteorological station
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Cadastral boundary

Noise monitoring locations and Ashton colliery boundary

Ashton Coal
Monthly attended noise monitoring
Figure 1.1

EMM creating opportunities

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1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1% of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1% of the specified time period of one minute.
L_{A10}	The A-weighted noise level which is exceeded for 10% of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50% of the time, and is also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90% of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure are measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres (m).
VTG	The vertical temperature gradient in degrees Celsius per 100 m altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday–Saturday: 7:00 am to 6:00 pm, on Sundays and public holidays: 8:00 am to 6:00 pm.
Evening	Monday–Saturday: 6:00 pm to 10:00 pm, on Sundays and public holidays: 6:00 pm to 10:00 pm.
Night	Monday–Saturday: 10:00 pm to 7:00 am, on Sundays and public holidays: 10:00 pm to 8:00 am.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Ashton Coal noise limits are provided in Table 1, Condition 2 of Appendix 6 of the current development consent 309-11-2001-i (DC) dated 6 July 2022. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Ashton Coal noise limits are provided in Condition L4.1 of the current EPL 11879 (EPL) dated 20 August 2025. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved current NMP (dated April 2023) adopts three attended noise monitoring locations that are representative of residences outlined in the DC and EPL. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise limits based on the NMP and consistent with the DC and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N2	38	38	36	46
N3	38	38	36	46
N4	38	38	36	46

2.5 Meteorological conditions

The DC and EPL specify the following meteorological conditions under which noise limits do not apply during:

- periods of rain or hail
- average wind speed at microphone height exceeds 5 metres per second (m/s)
- wind speeds are greater than 3 m/s at 10 m above ground level
- temperature inversion conditions are greater than 3°C/100 m.

2.6 Additional considerations

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055:2018 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Ashton Coal on-site weather station (AWS) which allowed the correlation of atmospheric parameters with measured noise levels.

3.2 Attended noise monitoring

Attended noise monitoring was done during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

As per EPL Condition L4.4, this assessment determined stability categories for the attended monitoring period using the direct measurement method as per Fact Sheet D of the Noise Policy for Industry (2017).

The temperature lapse rate was calculated using data from two weather stations; Sentinex Unit 40 weather station (M1) located in Camberwell Village and Ashton Coal 'repeater' weather station (M2 – the site AWS) located in the north-eastern open cut area as shown in Figure 1.1. This was calculated for each 15-minute measurement using the following formula:

$$\text{Temperature lapse rate} = (\Delta T) \times (100/(\Delta H))$$

Where:

- ΔT = temperature measured at M2 (at 10 m above local ground level) minus temperature measured at M1 (at 10 m above local ground level).
- ΔH = the vertical height difference between M2 and M1 (equal to 73 m).

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. If applicable, modifying factor penalties have been reported and added to the measured site only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Isaac Hepworth. Qualifications, experience, and/or demonstration of competence is in accordance with the EPA's Approved methods and supportive documentation is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA-28 sound level meter	00701424	21/05/2027	IEC 61672-1:2002
Pulsar 105 calibrator	78226	04/03/2026	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall (all sources) noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the sources responsible for measured levels is provided in Chapter 5 of this report.

Table 4.1 Total measured noise levels, dB – December 2025[1]

Location	Start date	Time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
N4	18/12/2025	22:00	54	47	43	40	38	35	32
N3	18/12/2025	22:53	57	53	48	44	40	36	33
N2	18/12/2025	23:13	55	50	47	43	40	35	34

Notes: 1. Levels in this table are not necessarily the result of activity at the site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 m above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.2 Atmospheric conditions measured at microphone height – December 2025

Location	Date	Time	Temperature °C	Wind speed m/s	Wind direction ° Magnetic north[1]	Cloud cover 1/8s
N4	18/12/2025	22:00	29.8	<0.5	-	1
N3	18/12/2025	22:53	29.2	<0.5	-	0
N2	18/12/2025	23:13	25.9	<0.5	-	0

Note: 1. Degrees magnetic north, "-" indicates calm conditions.

4.1.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.1.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.3 Site noise levels and limits – December 2025

Location	Start Date	Time	Wind		Stability Class	VTG °C/100m	Limits apply? [1]	Limit, dB		Site level, dB [2]		Exceedance, dB	
			Speed m/s	Direction° [3]				$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
N4	18/12/2025	22:00	0.6	176	G	5.3	No	36	46	IA	IA	Nil	Nil
N3	18/12/2025	22:53	1.7	186	F	3.6	No	36	46	IA	IA	Nil	Nil
N2	18/12/2025	23:13	1.9	182	G	4.4	No	36	46	IA	IA	Nil	Nil

Notes:
1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 2.5. N/A in exceedance column indicates that limits were not applicable due to weather conditions.
2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.
3. Degrees magnetic north, "-" indicates calm conditions.
4. IA in the site level column means that the site was deemed inaudible at that location.
5. NM (not measurable) in the site level column means that the site noise was audible and satisfied the relevant limits but could not be quantified.

5 Discussion

5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken, and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1,000 Hz.

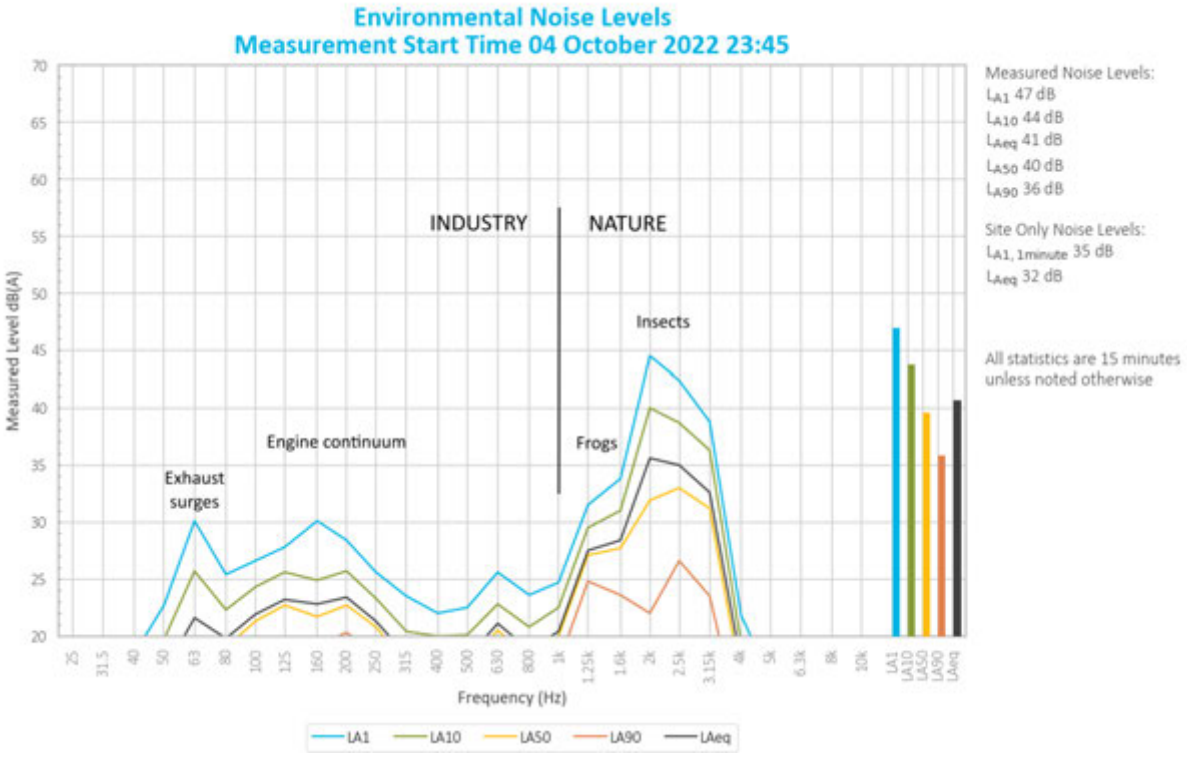

Figure 5.1 Example graph

5.2 N2 – Camberwell Village (west)

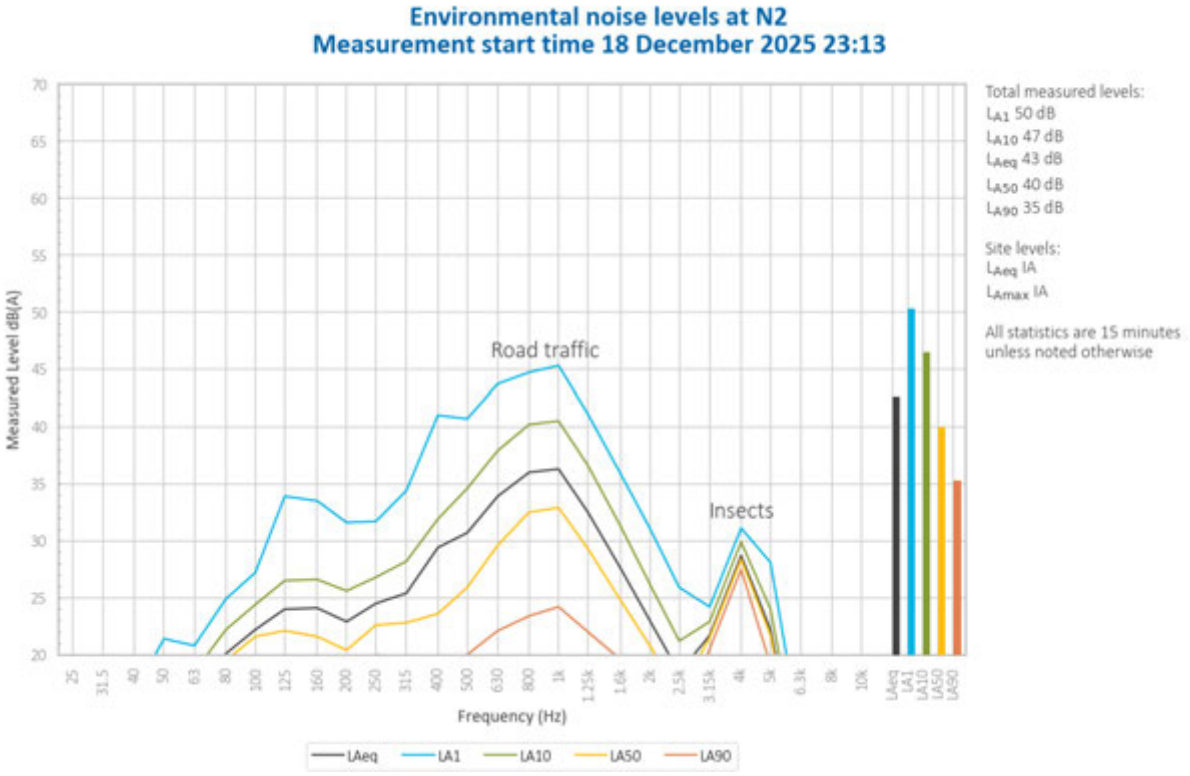

Figure 5.2 Environmental noise levels - N2, Camberwell Village (West)

Ashton Coal was inaudible throughout the measurement.

Road traffic and insects were responsible for total measured levels.

Noise from frogs, dogs and trains was also noted.

5.2.1 Cumulative mining noise at N2

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.2.

5.3 N3 – Camberwell Village (north-east)

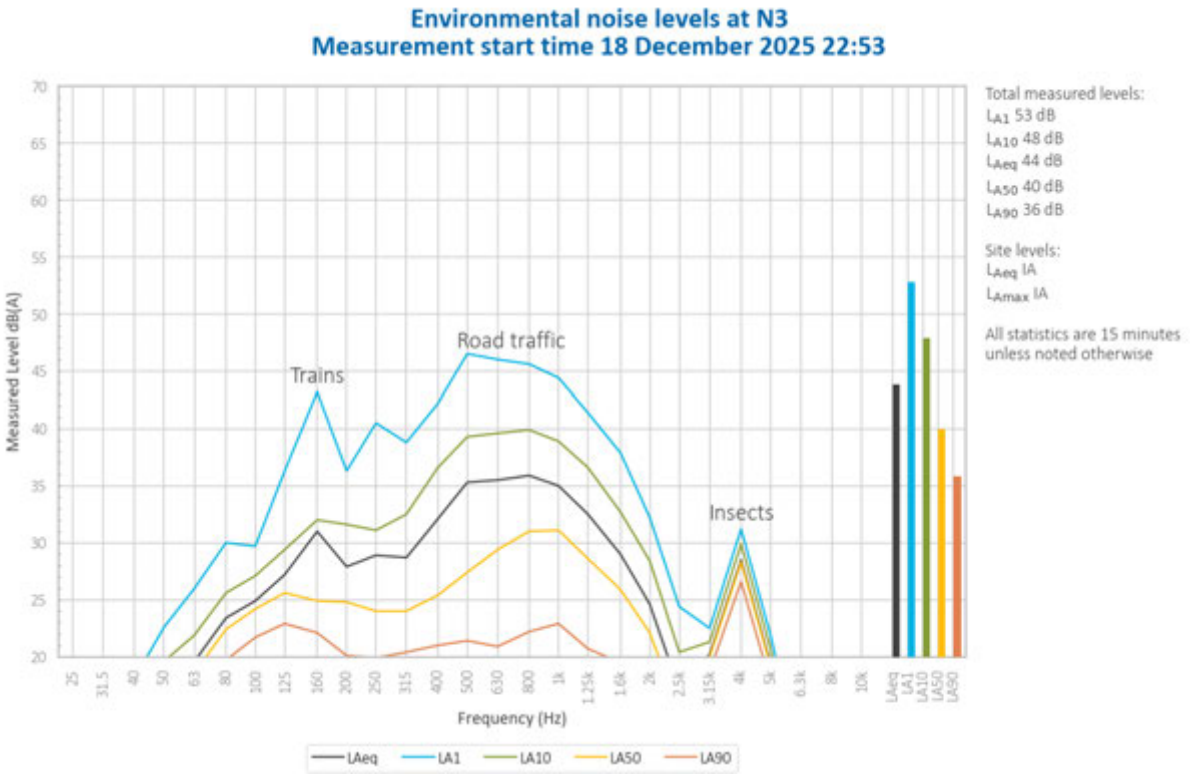

Figure 5.3 Environmental noise levels – N3, Camberwell Village (North-East)

Ashton Coal was inaudible throughout the measurement.

Road traffic and insects were responsible for total measured levels.

Noise from frogs, dogs, trains and other mining continuum was also noted.

5.3.1 Cumulative mining noise at N3

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.3.

5.4 N4 – South of New England Highway

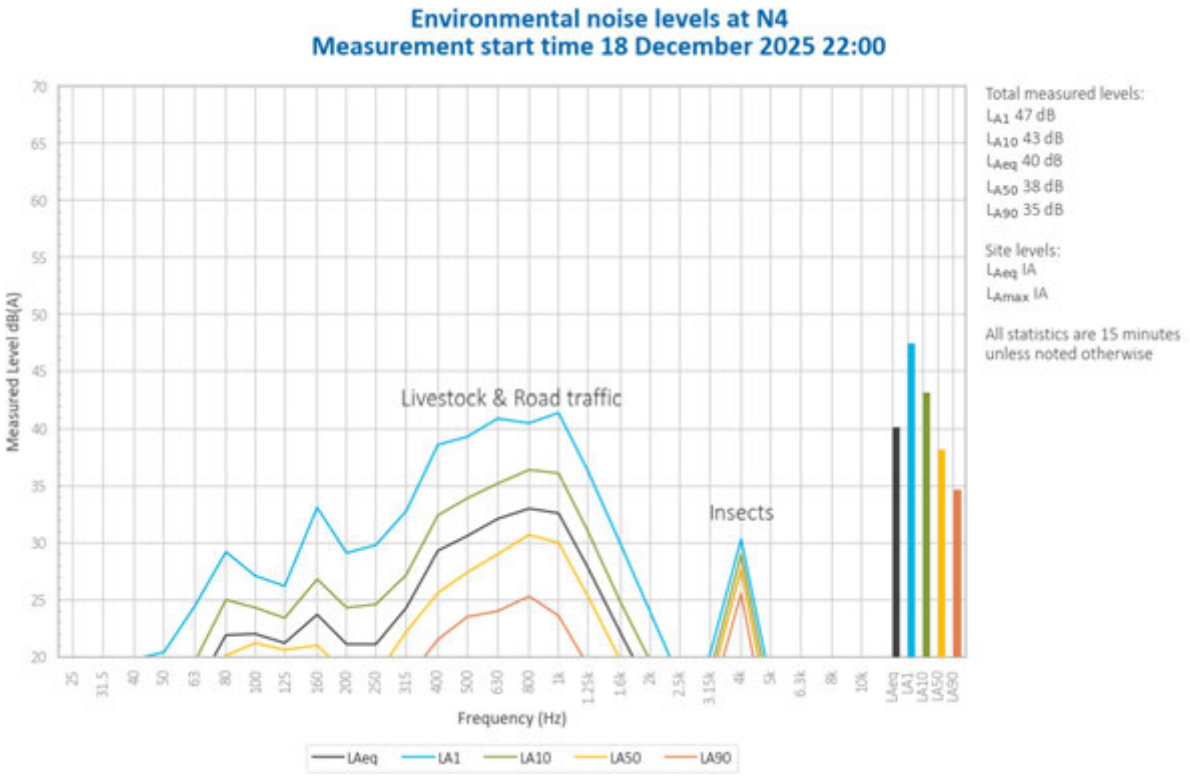

Figure 5.4 Environmental noise levels – N4, South of New England Highway

Ashton Coal was inaudible throughout the measurement.

Road traffic and livestock were primarily responsible for total measured levels.

Noise from insects and frogs was also noted.

5.4.1 Cumulative mining noise at N4

Ashton Coal was inaudible and, therefore, did not contribute to any mining noise at this location. A graph of the total noise levels measured in the one-third octave frequency bands is shown in Figure 5.4.

6 Summary

EMM Consulting Pty Limited (EMM) was engaged by Ashton Coal Operations Pty Ltd to conduct a monthly noise survey of operations at Ashton Coal. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the night period of Thursday 18 December 2025 at three monitoring locations as per the approved NMP.

Noise from the site complied with relevant limits at all monitoring locations during the December 2025 survey.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or a quarter) as loud

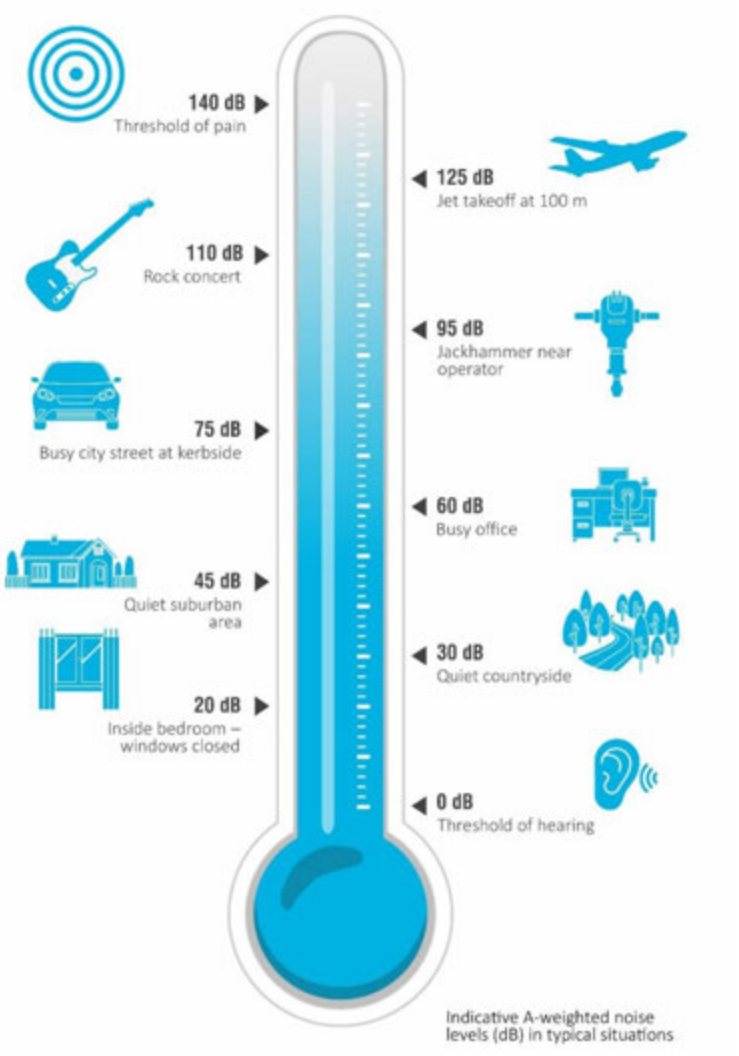

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

APPENDIX 6

ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Planning Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{A1\ (1\ min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	***Receiver***	***Day*** ($L_{Aeq\ (15min)}$)	***Evening*** ($L_{Aeq\ (15min)}$)	***Night*** ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8

NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   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 measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating 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) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

B.2 Environmental protection licence

31	Groundwater monitoring	Monitoring mid-gradient of Upper Liddell coal seam, marked and shown as "WML183" on the Plan.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
12	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological monitoring, marked and shown "Repeater - Meteorological Station" on the Plan.
13	Noise monitoring	Noise monitor, marked and shown "N3" on the Plan.
14	Noise monitoring	Noise monitor, marked and shown "N2" on the Plan.
15	Noise monitoring	Noise monitor, marked and shown "N4" on the Plan.
32	Meteorological Station – to determine meteorological conditions for noise monitoring	Meteorological Station, marked and shown as "M1" on the Plan.

P1.5 For the purposes of conditions P1.1 to P1.4 and L4.1; the "Plan" refers to the Plan titled "Ashton Underground Mine Environment Protection Licence 11879 Premises Boundary", Drawing No. A-1005_Mon, Revision No. 2025, dated 29 May 2025 (EPA ref. DOC25/503163).

The datum for grid references in the Plan is the Geodetic Datum of Australia 1994 (GDA94), MGA Zone 56.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 Flares must be operated by the licensee such that there is no visible emission other than for a total period of no more than 5 minutes in any 2 hours, except for heat haze.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises unless specified in this licence.

L3.2 The licensee must not dispose of waste on the premises unless authorised by a condition of this Licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed the noise limits specified in the table below.

Residences referenced in this table are from the consent DA 309-11-2001-i and the Plan.

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
EPA Point 13	38	38	36	46
EPA Point 14	38	38	36	46
EPA Point 15	38	38	36	46
All other privately owned residences	38	38	36	46

L4.2 For the purpose of condition L4.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L4.3 The noise emission limits identified in condition L4.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3 degrees C/100m.

L4.4 For the purposes of condition L4.1:

a) Data recorded by the closest and most representative meteorological station installed on the premises at Point 12 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017) using Points 12 and 32.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

B.3 Noise management plan

Relevant parts of the DA have been reproduced in Appendix A along with reference to where they have been addressed in this document.

4.2 Applicable Criteria

Noise criteria for the ACP are divided into three categories:

- Impact assessment criteria;
- Additional noise mitigation criteria; and
- Cumulative noise acquisition criteria.

The RUM must adhere to a single set of noise criteria relating to noise generated by the RUM development.

4.2.1 Impact Assessment Criteria

In accordance with Condition 2, Appendix 6 of the Ashton DA and Condition L4.1 of EPL 11879, noise generated by the development within the ACP must not exceed the limits specified in **Table 3** at any privately-owned land or on more than 25 per cent of any privately-owned land. The noise limits are provided in decibels (dB).

Table 3: Ashton Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	36	46

In accordance with Condition 12, Schedule 3 of the RUM DA, noise generated by development in the ACOL-operated RUM must not exceed the limits specified in **Table 4** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 4 RUM Noise Impact Criteria dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{A1} (1 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	35	35	35	45

4.2.2 Additional Noise Mitigation Criteria

If noise emissions generated by the ACP exceed the criteria displayed in **Table 5** at any residence on privately-owned land, then, upon receiving a written request from the landowner, ACOL will implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at the residence in consultation with the owner.

Table 5 Additional Noise Mitigation Criteria dB(A)#

Location	Day	Evening	Night
	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)	L_{Aeq} (15 minute)
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit.	38	38	38

* Exceedance of the criteria must be systemic.

4.2.3 Cumulative Noise Acquisition Criteria

If noise emissions generated by the ACP, and other mines exceed the criteria in **Table 6** at any residence on privately-owned land or on more than 25 per cent of any privately-owned land (except for noise affected residential receivers in Condition 1, Schedule 3 of the Ashton DA) then, upon receiving a written request for acquisition from the landowner, ACOL together with the relevant mines, will acquire the land in accordance with the Acquisition Process (as defined in Conditions 7 and 8, Schedule 4 of the Ashton DA).

Table 6 Cumulative Noise Acquisition Criteria dB(A)

Location	Day	Evening	Night
	L_{Aeq} (period)	L_{Aeq} (period)	L_{Aeq} (period)
Camberwell Village	60	50	45
All other privately-owned land	55	50	45

4.3 Existing Environment

The ACP is located in the Hunter Valley region of New South Wales and is bound by the Main Northern Railway to the north, Hunter River to the south and Glennies Creek to the east with the New England Highway dividing the open cut from the underground mining areas.

Other mining operations in the area include the Ravensworth Complex, the Mount Owen Complex, Rix's Creek Open Cut, Integra Underground and Hunter Valley Operations.

The closest sensitive receivers are located in Camberwell. There are currently 13 private landholdings in the local area, 11 of these have an occupied residence.

Ambient noise levels within the village of Camberwell are influenced by the New England Highway to the south, the railway line to the northeast and surrounding mining operations. Attended noise monitoring has confirmed that the major contributing noise source is usually the New England Highway. Noise from ACP has been noted at times in Camberwell Village, historical reports show this has been infrequent and at relatively low levels.

Based on the historical meteorological data collected by ACOL's M2 (repeater) weather station the most common winds in winter are from the west-northwest and the east-southeast in summer. Prevailing winds act to enhance noise from surrounding noise sources (road, rail and mining).

Appendix C
Calibration certificates

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM52717

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	Rion		
Type No:	NA-28	**Serial No:**	30131882
Mic. Type:	Rion UC-59	**Serial No:**	04739
Pre-Amp. Type:	Rion NH-23	**Serial No:**	11942
Filter Type:	1/3 Octave	**Test No:**	FILT9709

Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300

Tests Performed: IEC 61672-3:2013,
IEC 1260:1995, & AS/NZS 4476:1997

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	1000	hPa ±1 hPa	**Date of Receipt :**	31/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	06/02/2025
Relative Humidity	46	% ±5%	**Date of Issue :**	06/02/2025

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Hein Soe

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 through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

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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NATA
WORLD RECOGNISED ACCREDITATION
Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

CERTIFICATE NO: SLM52717

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 successfully completed the periodic tests of IEC 61672-3:-2013, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:-2013 because evidence was not publically available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:-2013 and because the periodic tests of IEC 61672-3:-2013 cover only a limited subset of the specifications in IEC 61672-1:-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 on request.

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C54969

EQUIPMENT TESTED : Acoustic Calibrator

Make & Model:	Svantek SV 36	**Serial No:**	138014
Class:	1		
Owner:	EMM Consulting Suite 01, 20 Chandos St St Leonards NSW 2065		
Tests Performed:	Measured Output Pressure level, Frequency & Distortion		
Comments:	See Details and Class Tolerance overleaf.		

CONDITION OF TEST:

Ambient Pressure	1012	hPa ±1 hPa	**Date of Receipt :**	06/08/2025
Temperature	20	°C ±1° C	**Date of Calibration :**	12/08/2025
Relative Humidity	44	% ±5%	**Date of Issue :**	12/08/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: A. Nowosadzka **AUTHORISED SIGNATURE:** .....

H. Soe
Lab Manager

Accredited for compliance with ISO/IEC 17025 - Calibration

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Acoustic and Vibration
Measurements

CERTIFICATE NO: C54969

The Calibrator described in this report has been tested to the requirements of the standard IEC 60942-[Ed 4]:2017-11.
The tests described in Annex B of the standard (Periodic tests) were carried out under the environmental conditions listed above to the following clauses:

Clause	Test description
B4.6	Sound Pressure Level (By comparison with a reference calibrator).
B4.7	Frequency (By measurement with a calibrated frequency meter).
B4.8	Total distortion and noise. (By measurement with a calibrated Noise and Distortion meter).

Notes:

1. The calibrator was calibrated with the main axis vertical and facing down.
2. No corrections have been made for atmospheric pressure, temperature, or humidity.

Parameter	Pre-Adj	Adj Y/N	Output: (dB re 20 µPa)	Frequency (Hz)	THD&N (%)
Level1:	NA	N	93.99 dB	1000.02 Hz	0.32 %
Level2:	NA	N	113.95 dB	1000.01 Hz	0.63 %
Uncertainty			±0.11 dB	±0.05%	±0.40 %
Uncertainty (at 95% c.l.) k=2					

Parameter	Class 1		Class 2	
Nominal Frequency	250 Hz	1 kHz	250 Hz	1 kHz
Output dB SPL	0.25 dB	0.25 dB	0.40 dB	0.40 dB
Frequency Hz	0.7 % (1.75 Hz)	0.7 % (7 Hz)	1.7 % (4.25 Hz)	1.7 % (17 Hz)
THD&N	2.5 %	2.5 %	3.0 %	3.0 %

Tolerance limits from AS/IEC60942 (edition 4)

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

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%.

----oooo0oooo----

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Appendix 2

Annual Groundwater Monitoring Review 2025

(No. of pages including blank pages = 243)

Australasian Groundwater & Environmental Consultants

Report on

Yancoal – Ashton Coal Annual Groundwater Monitoring Review 2025

Prepared for
Ashton Coal Operations Pty Ltd

Project No. 20250002.ASH5028.001
March 2026

ageconsultants.com.au

ABN 64 080 238 642

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Yancoal – Ashton Coal
Annual Groundwater Monitoring Review 2025

1 Introduction

The Ashton Coal Project (ACP) is located 14 km north-west of Singleton in the Hunter Valley region of New South Wales (NSW) (Figure 1.1). The ACP consists of decommissioned open cut and active underground mining to access a series of coal seams within the Permian Foybrook Formation. Ashton Coal Operations Ltd (ACOL) is wholly owned and operated by Yancoal Australia Limited (Yancoal).

Between 2003 and 2011, coal was recovered from eleven seams of varying thickness, down to and including the Lower Barrett Seam (LB), from an open cut mine known as the North-East Open Cut (NEOC). Between 2007 and 2016 underground longwall (LW) mining extracted coal from the Pikes Gully Seam (PG) and underlying Upper Liddell (ULD). Mining of the Upper Lower Liddell Seam (ULLD) commenced July 2017. Extraction of longwall panel LW206B (within the ULLD) commenced in mid-November 2022 and was completed in mid-March 2023. Mining in LW207A commenced in mid-June 2023 and was completed in mid-July 2024. Mining in LW207B commenced at the beginning of September 2024 and was completed in mid-December 2024. Mining in LW208 commenced in January 2025 and was completed in May 2025. ACOL commenced mining LW403 (PG) in the Ravensworth Underground Mine (RUM) during November 2025. Collectively, combined ACOL and RUM mining is referred to as 'RUMex'.

The underground mine is located south of the New England Highway and includes a diversion of Bowmans Creek via two excavated and lined channels. The channels have re-routed Bowmans Creek to minimise any potential subsidence impacts on the creek line.

1.1 Objective

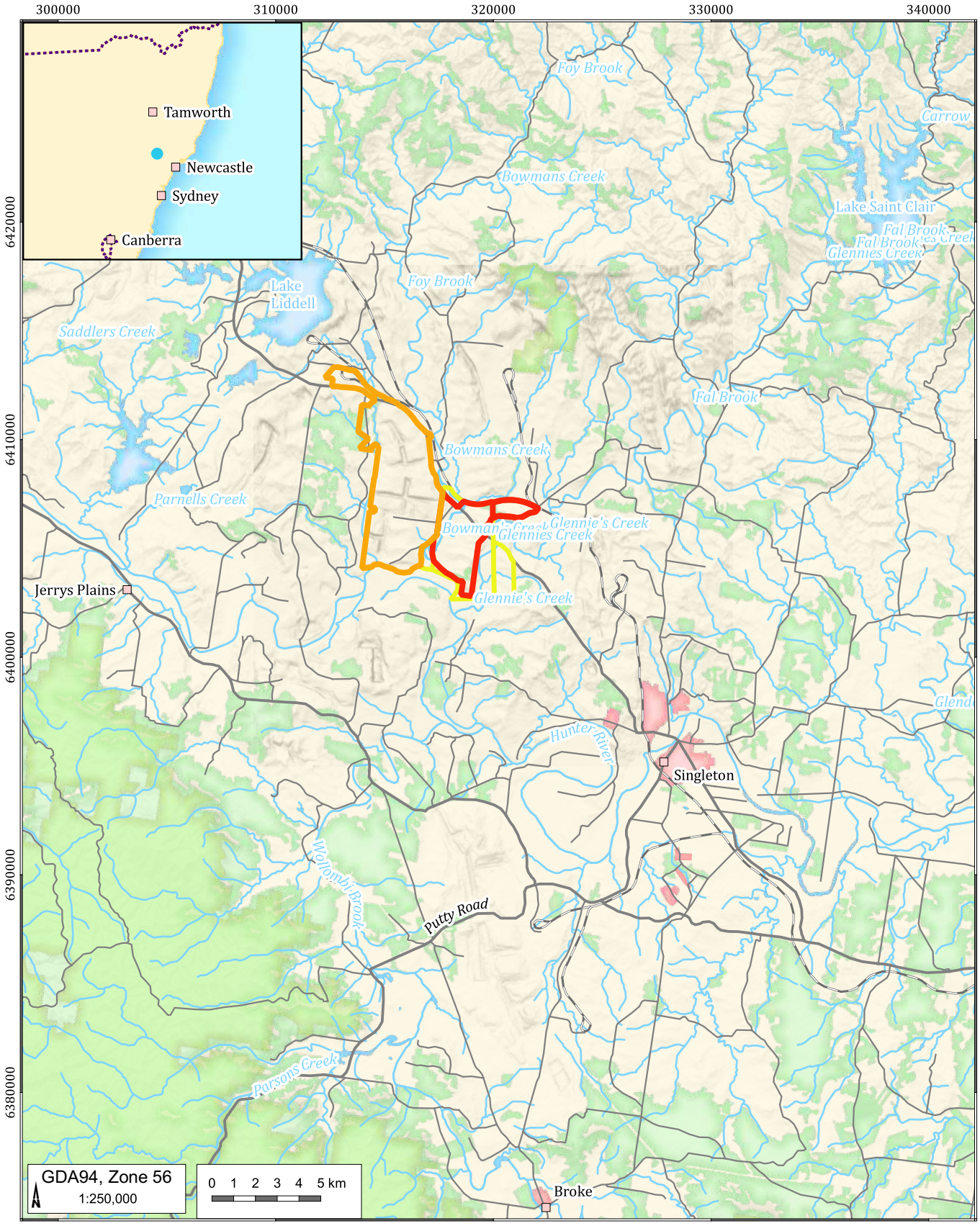
The ACOL development consent (DA 309-11-2001-i) last modified in July 2022, requires that groundwater be monitored for potential impacts from mining. In 2018, the Department of Planning and Environment (DPE) approved the current Water Management Plan (WMP - version 13, dated April 2025). The WMP outlines the groundwater monitoring program and establishes trigger values for groundwater levels and quality in the various groundwater systems located within the ACP site.

This report summarises the monthly data collected by Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) from January 2025 to December 2025. The aim of this report is to provide a consolidated summary of groundwater conditions at ACP throughout 2025.

1.2 Scope

The scope undertaken to achieve the objectives includes:

- review and assess rainfall, groundwater levels, pH, electrical conductivity (EC) and water chemistry data from groundwater monitoring campaigns;
- comparison of groundwater monitoring results against WMP triggers;
- notify ACOL of exceedances which require the enactment of the WMP groundwater response plan; and
- make recommendations regarding the groundwater monitoring network and program, where necessary, to ensure ongoing quality control/assurance of groundwater monitoring.



LEGEND

- Ashton mining lease
- Ashton exploration lease
- RUM mining lease
- Study area location
- Populated place
- Built up area
- Major road
- Minor road
- Rail
- Watercourse
- Water area
- Reserve
- Vegetation
- Land

Yancoal Ashton - Annual Groundwater Monitoring Review 2025 (ASH5028.001)

Study area location

AGE

DATE 19/01/2026

FIGURE No: **1.1**

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2 Physical setting

The Ashton underground mine is located south of the New England Highway, bounded by the Hunter River to the south and two Hunter River tributaries, Glennies Creek and Bowmans Creek, to the east and west, respectively (Figure 1.1). Underground operations intend extracting four coal seams; PG, ULD, ULLD and LB, via a longwall arrangement.

Mining in LW207A commenced in May 2023 and concluded in July 2024, while mining in LW207B began in September 2024 and ended in December 2024. LW207 is centrally located within the mining lease (ML), with the Hunter River and its alluvial deposits situated to the south. The final LW panels within the ULLD seams are positioned down dip of LW207, in the western portion of the ML. In November 2025 ACOL began mining LW403 in the RUMex. Future planned panels at RUMex target the Pikes Gully and Middle Liddell seams.

2.1 Climate and rainfall

Climate monitoring data for 2025 were collected from the Ashton weather station and the Bureau of Meteorology (BOM) station at Bulga (South Wambo) (BOM station 061191), located approximately 19 km southwest of Ashton. The Ashton weather station has recorded 20 years of rainfall data, spanning from 1 July 2005, to the present. In comparison, the Bulga (South Wambo) station boasts 66 years of rainfall records, dating back to 1959. A summary of average monthly rainfall from both stations for 2025 is provided in Table 2.1. Based on Ashton weather station data, rainfall at Ashton remained consistent in 2025 compared to the previous year. Six months in the year- February, June, July, September, October, November and December - experienced below-average rainfall. Overall total rainfall throughout the year was above average, with the remaining months all recording above average rainfall, the wettest of which were March, May and August.

Similarly, rainfall at the Bulga (South Wambo) station recorded below average readings in - January, February, June, October, November, and December - while the remaining months recorded above-average rainfall.

Table 2.1 Average Monthly Rainfall 2025 – Ashton Coal and Bulga

Month	Ashton weather station			Bulga (South Wambo) BOM station		
	2025 monthly rainfall (mm)	Long-term average (mm)	% of long-term average	2025 monthly rainfall (mm)	Long-term average (mm)	% of long-term average
Jan	92.8	66.4	139.75	68.4	85.7	79.8
Feb	39.2	83.6	-	59.8	85.4	70.0
Mar	126	112.1	112.4	124.1	75.8	163.7
Apr	80.8	60.8	133.0	57.9	47.3	122.4
May	239.4	48.2	496.4	100.9	40.6	248.5
Jun	20.2	63.4	31.8	19	43.2	44.0
Jul	39.8	40.1	99.2	35.2	33.1	106.3
Aug	146	48.2	303.1	117.5	36.1	325.5
Sep	46	50.3	91.5	67.8	38.8	174.7
Oct	37.8	53.3	70.9	42.6	55.6	76.6
Nov	32.8	77.4	42.4	27	63.9	42.3
Dec	24.8	66.8	37.1	23.8	71.6	33.2

An evapotranspiration (ET) rate of 1411.4 mm/year was sourced from the Bureau of Meteorology (BOM) database from Scone Airport (61363).

Long-term rainfall trends were assessed using the Cumulative Rainfall Departure (CRD) method (Bredenkamp et al., 1995). This method illustrates rainfall trends relative to the long-term monthly average, offering a historical perspective on wetter and drier periods. In a CRD plot, an upward gradient signifies periods of above-average rainfall, whereas a downward slope indicates below-average rainfall. The CRD analysis has been applied in this study to contextualise observed variations in groundwater levels and chemistry.

The CRD trends for the Ashton weather station and Bulga (South Wambo) (BOM station 061191) are presented in Figure 2.1. Both stations exhibit periods of above-average rainfall throughout most of 2025, as indicated by an increasing CRD. Conversely, below-average rainfall, represented by a decreasing CRD, was observed in February, September, October, November, and December.

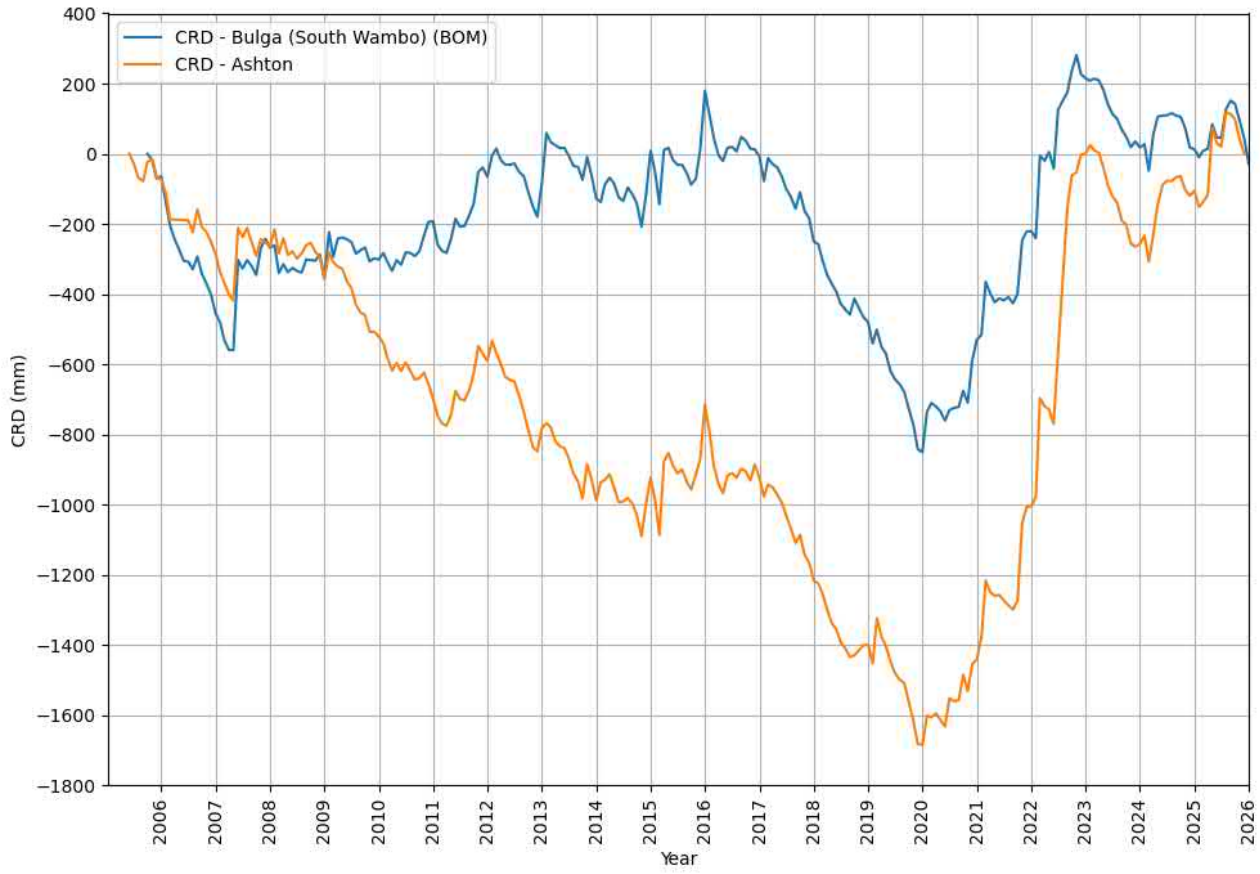


Figure 2.1 Cumulative Rainfall Departure – Ashton Coal and Bulga

2.2 Surface water

The Ashton Mine lease is bordered by Bowmans Creek to the west, Bettys Creek (a tributary of Bowmans Creek) to the north, Glennies Creek to the east, and the Hunter River to the south. Both Bowmans and Glennies Creeks flow into the Hunter River. Below is a description of the three main watercourses:

- The Hunter River is the primary surface water body, with a catchment area of 13,590 km² at Bowmans Creek. Its flow is regulated by Glenbawn Dam, as well as by other licensed water extractions and releases.
- Glennies Creek, along with its associated alluvium, is situated to the east of the underground workings and the PG sub-crop area, with a catchment area of approximately 600 km². Up to half of the catchment drains into Lake St. Clair, located in the far northeastern section. Water from Lake St. Clair is discharged into Glennies Creek through controlled releases.

- The natural channel of Bowmans Creek lies above longwall panels LW206B and LW207A, with its associated alluvium extending over LW205 to LW208. It serves as the primary watercourse over the underground workings area. To minimise mining impacts on the creek and reduce potential inflows to the underground workings, Bowmans Creek was diverted in two locations. Construction of the eastern diversion began in March 2011, and the western diversion started in February 2012. Both diversions were commissioned in November 2012 and are situated within the Bowmans Creek Alluvium (BCA). Designed to replicate the natural creek setting, the diversions include channel cross-sectional variability, natural bed levels, and ecological features such as resting pools. A geosynthetic clay liner was installed to minimise leakage from the creek.
- Bowmans Creek flow is unregulated and monitored in accordance with the WMP. A streamflow gauging station (Station No. 210130, regulated by WaterNSW) was installed in October 1993 to serve as a baseline for Bowmans Creek flow. With a catchment area of 240 km², this station is located in the midsection of the creek within the ML, upstream of the western diversion.

2.3 Mining

The longwall panels accessing the ULLD are typically offset by 24 m to the east and 10 m to the south from the overlying ULD longwall panels. This offset is specifically designed to minimise subsidence and its associated impacts on the surrounding environment. However, the northern extent of the PG, ULD, and ULLD longwalls, as well as the main gate road, are aligned, creating a "stacked edge." This alignment results in more noticeable surface subsidence impacts in this area compared to other locations.

The start and end dates of longwall panel mining at ACP are summarised in Table 2.2.

Table 2.2 Longwall panel schedule

Longwall panel	Target seam	Start date	End date
LW1	PG	12/03/2007	15/10/2007
LW2	PG	09/11/2007	22/07/2008
LW3	PG	20/08/2008	04/03/2009
LW4	PG	02/04/2009	15/10/2009
LW5	PG	04/01/2010	04/06/2010
LW6A	PG	08/07/2010	23/11/2010
LW7A	PG	22/03/2011	08/08/2011
LW7B	PG	28/09/2011	17/01/2012
LW8	PG	27/02/2012	06/06/2012
LW101	ULD	31/07/2012	14/06/2013
LW6B	PG	14/07/2013	10/10/2013
LW102	ULD	10/11/2013	24/07/2014
LW103	ULD	21/08/2014	21/06/2015
LW104A	ULD	23/07/2015	16/01/2016
LW104B	ULD	03/02/2016	11/04/2016
LW105	ULD	17/05/2016	26/09/2016
LW106A	ULD	18/10/2016	1/06/2017

Longwall panel	Target seam	Start date	End date
LW201	ULLD	07/07/2017	06/05/2018
LW202	ULLD	07/06/2018	21/08/2019
LW203	ULLD	13/10/2019	26/05/2020
LW204	ULLD	02/07/2020	12/04/2021
LW205	ULLD	27/05/2021	3/12/2021
LW206A	ULLD	13/01/2022	12/10/2022
LW206B	ULLD	11/11/2022	5/03/2023
LW207A	ULLD	30/05/2023	20/07/2024
LW207B	ULLD	04/09/2024	13/12/2024
LW208	ULLD	7/02/2025	7/06/2025
LW403	PG	17/11/2025	In progress

2.4 Conceptual hydrogeology

2.4.1 Hydrostratigraphy

Ashton is situated in the central Hunter Valley of NSW, where the lower sequences of the Wittingham Coal Measures (Singleton Supergroup) subcrop, as shown in Figure 2.2. Within the Ashton mining lease, the Hebden seam to the Bayswater seam (inclusive) subcrop. The underground operation primarily targets the PG, ULD, ULLD, and LB seams.

The Wittingham Coal Measures dip west-southwest in the Ashton area, with this orientation being locally influenced by the Camberwell Anticline to the east of the mine and the Bayswater Syncline to the west. The uppermost target coal seam at Ashton, the PG seam, subcrops beneath the Glennies Creek Alluvium (GCA) approximately 150 m east of the mine. In contrast, the lowest target coal seam, the LB seam, subcrops beneath regolith about 2 km to the east of the mine. In the western portion of the mining area, the overburden above the PG seam varies in thickness, ranging from 100 m at the north end of LW7 to 190 m at the south end of LW7.

The stratigraphic sequence in the region consists of two distinct units: Quaternary alluvium and Permian strata. The Permian strata contain coal seams, typically 2 m to 2.5 m thick, with overburden and interburden (usually around 30 m thick between successive seams) composed of sandstone, siltstone, tuffaceous mudstone, and conglomerate. The Quaternary alluvium consists of unconsolidated silt, sand, and gravel found in the alluvial floodplains of the Hunter River (HR), Bowmans Creek (BC), and Glennies Creek (GC). This alluvium unconformably overlies the Permian within the floodplains of HR, BC, and GC. In other areas, the Permian is covered by a regolith that includes colluvium, eluvium, and completely weathered rock, which interfaces with the floodplain alluvium along the valley flanks.

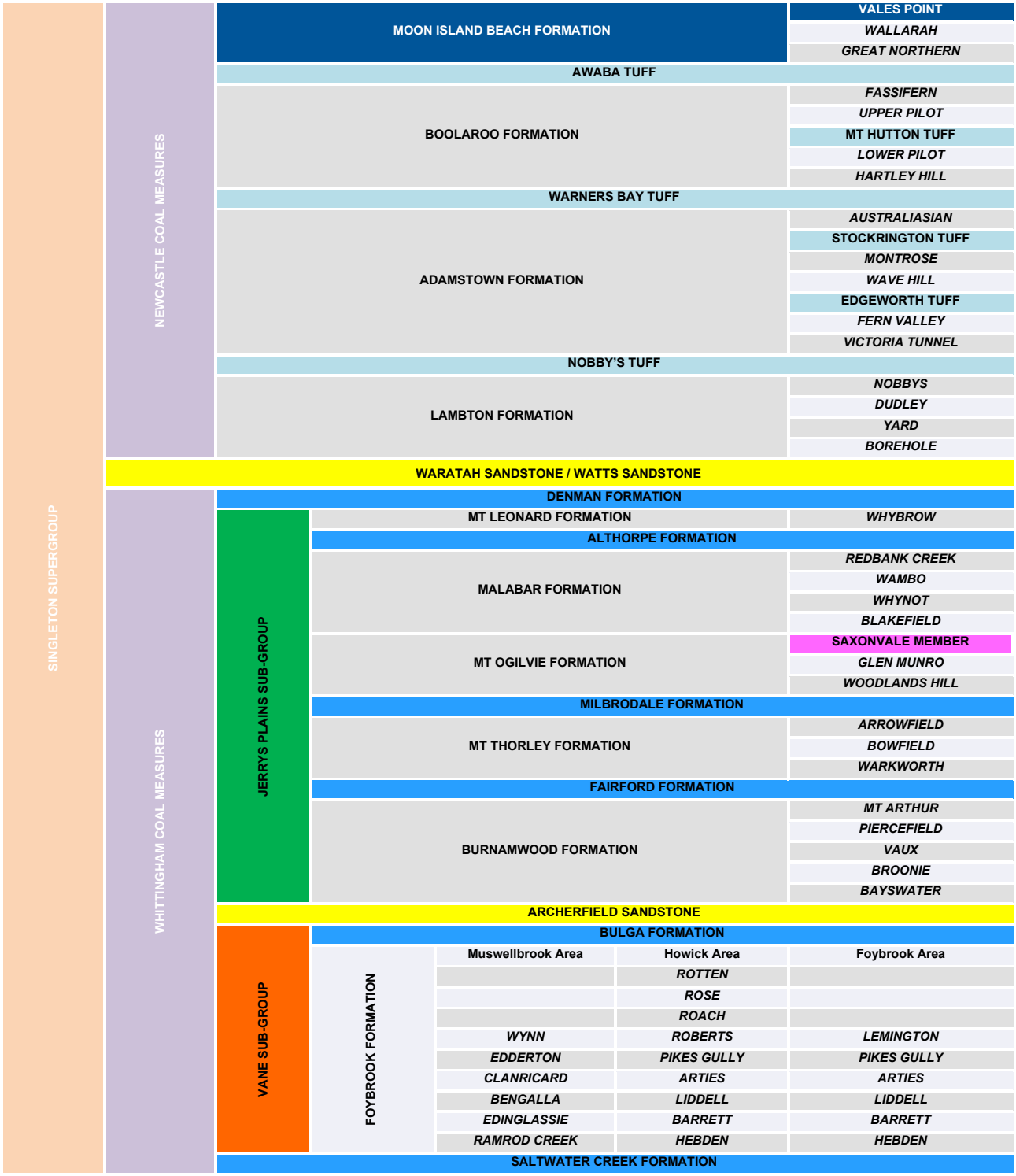


Figure 2.2 Singleton Super Group sequence stratigraphy (AGE, 2016)

2.4.1.1 Quaternary alluvium/Regolith

Ashton is covered by Quaternary alluvium associated with the Hunter River (HR), Bowmans Creek (BC), and Glennies Creek (GC). The Bowmans Creek Alluvium (BCA) and Glennies Creek Alluvium (GCA) are hydraulically connected to the Hunter River Alluvium (HRA). The Quaternary and recent alluvium, along with colluvium, found along the floodplains of the HR, GC, and BC, are composed of two primary depositional units: a surficial fine-grained sediment layer and a coarser basal material. The surficial alluvium consists of shallow sequences of clay, silty sand, and sand. Along minor drainage lines, the surficial alluvium is typically confined within 500 m of the creeks and varies in thickness from 7 m to 15 m.

Away from the floodplain areas, the Permian coal measures are overlain by a regolith layer, which consists of colluvium, eluvium, and completely weathered rock. This regolith has soil-like properties rather than rock characteristics and interfaces with the alluvium along the flanks of the floodplain areas. The thickness of the regolith layer varies but is typically between 15 m and 20 m above the underlying rock.

2.4.1.2 Permian strata

The Wittingham Coal Measures consist of Permian-aged coal seams interbedded with siltstone, sandstone, shale, and conglomerates. At Ashton, these measures reach a thickness of up to 400 m, while regionally they range from approximately 250 m to 600 m. The on-site profile at Ashton spans from above the Bayswater seam to the Hebden seam, encompassing the lower portion of the Wittingham Coal Measures (Figure 2.2).

Locally, the Wittingham Coal Measures are further subdivided into (AGE, 2016):

- four main target coal seams – PG, ULD, ULLD and LB;
- a range of additional coal seams and plies of varying thickness, including the Bayswater seam, up to 20 Lemington seam plies, the Arties seam, as well as several from the Liddell and Barrett seams, which are not proposed for mining in the Ashton underground mine; and
- interburden sediments consisting of siltstone, sandstone, conglomerate, and claystone.

The PG seam overburden contains more than 20 plies of the Lemington seam profile, along with the overlying Bayswater seam. The largest plies of the Lemington seam are of comparable thickness to the four target seams and may exhibit similar hydraulic properties.

2.4.2 Recharge

Recharge is believed to occur through direct rainfall, which infiltrates the ground surface and passes into the underlying formations via the thin soil cover and regolith. The Permian coal measures also subcrop in localised zones beneath the HRA, GCA, and BCA. In these areas, recharge is interpreted to happen through downward seepage, followed by downdip flow along the most permeable strata in the sequence, primarily the coal seams (Aquaterra, 2009; AGE, 2016).

The combined surface water catchment area potentially contributing recharge to the Ashton area is considerably larger than the mine area itself. Ashton is situated near the confluence of the Hunter River with Bowmans and Glennies Creeks. Both the surface and underground infrastructure at Ashton are entirely located within the catchments of Bowmans and Glennies Creeks, which extend approximately 30 km and 45 km to the north of Ashton, respectively.

Bowmans and Glennies Creeks are fed by tributaries up to the fourth order upstream of the site, with rainfall within these catchments flowing through the Ashton area. The catchment areas for Bowmans and Glennies Creeks cover approximately 300 km² and 600 km², respectively.

2.4.3 Groundwater flow

The Quaternary alluvium and regolith are interpreted (AGE, 2016) to form an unconfined groundwater system, recharged by rainfall infiltration, streamflow, and upward leakage from the underlying stratigraphy, particularly along GC and BC.

The water table in the alluvium/regolith reflects the topography in a subdued manner. Groundwater within the Hunter River Alluvium (HRA) generally flows eastward, while groundwater within GCA and BCA flows primarily southward towards the Hunter River, with localised flow towards the respective rivers and creeks.

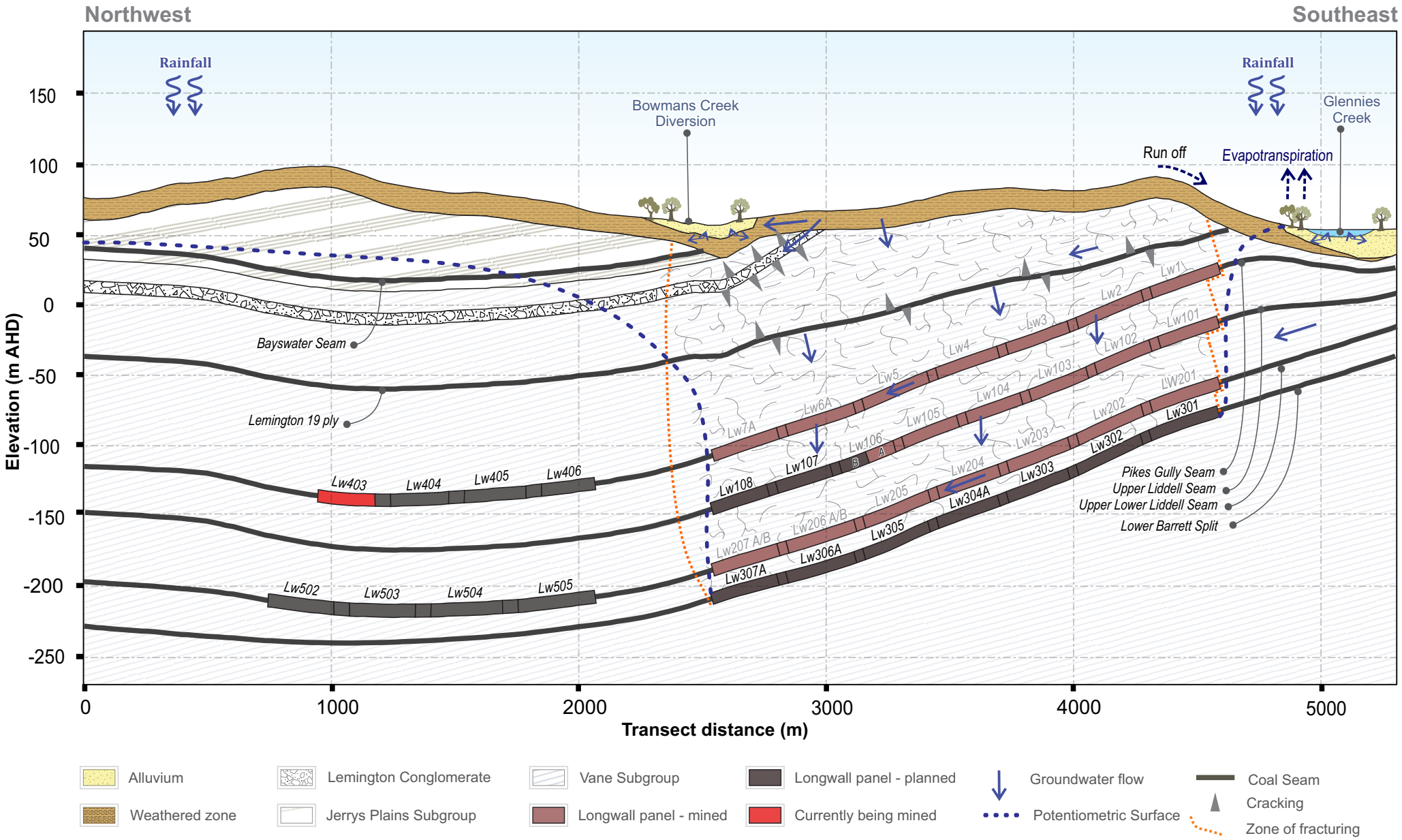
Groundwater flow within the coal seams is shaped by the local geomorphology, structural geology, and the region's extensive mining history. It is understood that groundwater in the Permian Coal Measures flows predominantly to the southwest, in alignment with the dip direction of the coal seams.

Mining of the PG and ULD seams has affected the groundwater regime at Ashton. Subsidence-induced cracking has extended to the surface in certain areas of the mine, particularly where the cover depth above the PG seam is shallower. In other areas, such as near the western side of the mine, where the cover is deeper, subsidence cracking is less pronounced. In regions with shallower cover, the cracking is likely to have affected both the PG overburden and the BCA. Surface cracking is also evident across the longwall panel areas, appearing shortly after subsidence occurs. This surface cracking is expected to be shallow, with its depth limited, and may or may not intersect with subsidence-induced cracks from the goaf, depending on the cover depth and subsidence magnitude.

Recharge from the GCA through connectivity with the PG seam is also a possibility (AGE, 2016). Hydraulic testing has shown that the PG seam is significantly more permeable near the outcrop compared to at depth (Peter Dundon and Associates, 2006). However, inflows into the workings during the mining of LW1 were not substantially greater than those during the mining of the LW1 tailgate (TG1A). This suggests that mining of LW1 did not increase the connectivity or flow from the PG seam in the subcrop beneath the GCA. While inflows were higher during the mining of TG1A compared to subsequent inflows from subsided strata during the extraction of LW1, the total inflows by the end of LW1 were below predicted levels. Additionally, the observed impacts on the GCA were less than anticipated, indicating that the proximity to Glennies Creek did not result in an unexpected increase in connectivity or inflows from the Glennies Creek floodplain.

The presence of subsidence cracking over parts of the underground mine enhances the potential connectivity between the mine and the water within the creeks and their associated alluvium. Planned LW panels within the underlying ULLD and LB seams could potentially reactivate subsidence and subsidence-related fracturing in these areas (AGE, 2016).

The conceptual hydrogeological model is depicted in Figure 2.3.



Schematic section showing conceptual hydrogeology - northwest to southeast

Figure - 2.3

Ashton Compliance Reporting 2025 (ASH5028.001)

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3 Groundwater management plan

The previous two versions of the WMP (2018 and 2020) were updated and submitted to DPI Water for approval in March 2018 and September 2020 respectively. The updated WMP (2025), hereafter referred to as the WMP, includes revised water quality triggers. A summary of the monitoring locations is provided in Appendix A, while the groundwater monitoring plan, including parameters and frequency, is outlined in Appendix B. The WMP was approved in April 2025, and as a result, groundwater monitoring has been conducted in accordance with WMP version 13 (2025) since its approval.

3.1 Groundwater monitoring network

The ACOL groundwater monitoring network includes over 100 monitoring bores, of which 64 bores and ten vibrating wire piezometer (VWP) installations are actively monitored as part of the WMP. Monitoring occurs through monthly, quarterly, and annual campaigns (Appendix A). The WMP details the monitoring plan and identifies key locations in areas potentially sensitive to mining impacts.

Monitoring of groundwater levels, VWP pressure heads, and water quality parameters at these bores effectively captures the lateral behaviour of the alluvial aquifers, interburden, and coal seam aquifers on site. The current groundwater monitoring network is deemed adequate for detecting changes in groundwater conditions across the site.

The WMP monitoring locations and their respective monitoring targets are illustrated in Figure 3.1. Detailed information on these locations is provided in Appendix A (Table A 1).

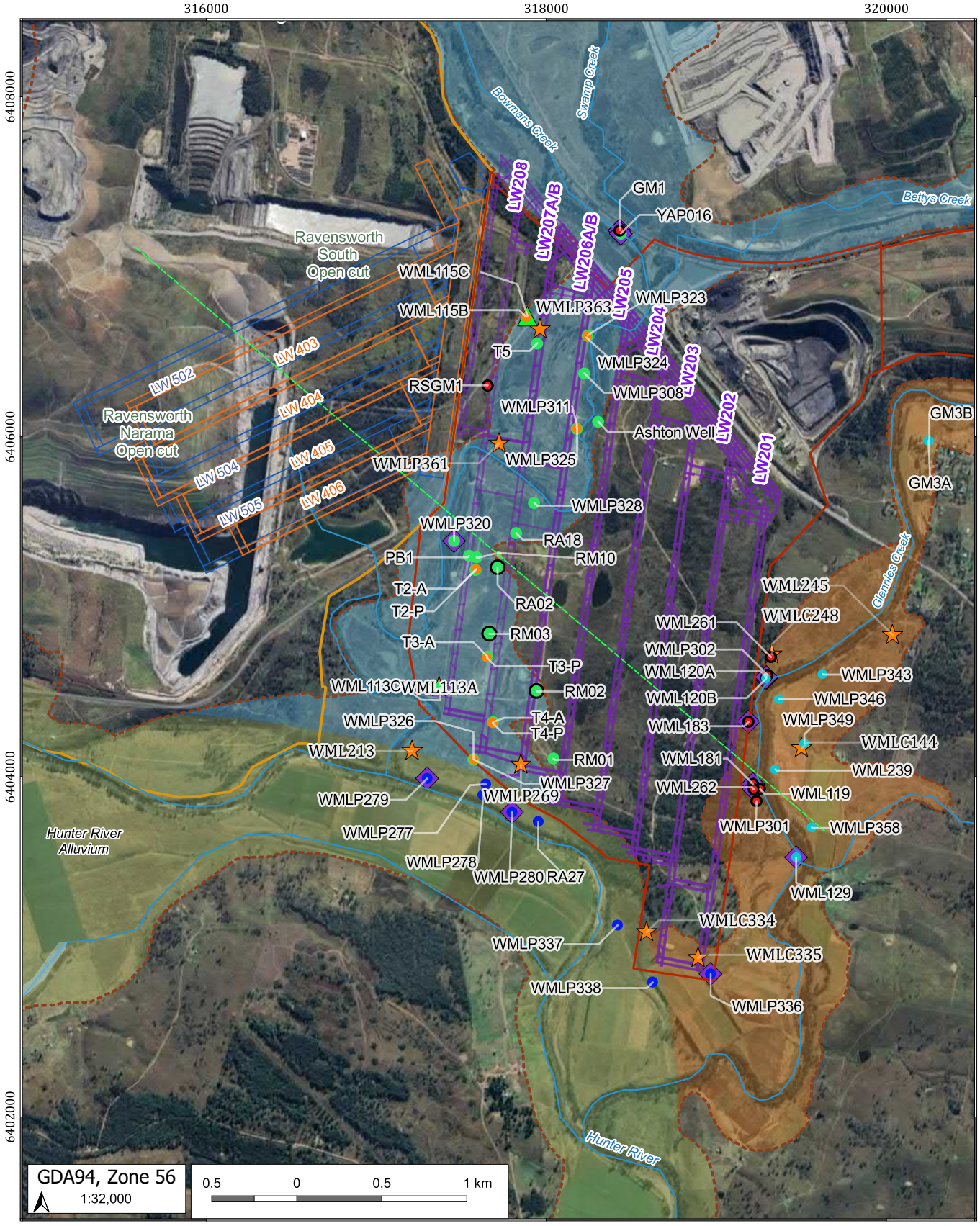
The groundwater monitoring program includes the monitoring of:

- groundwater levels;
- groundwater (piezometric) pressures;
- field water quality parameters – pH, EC, temperature and total dissolved solids (TDS);
- groundwater sampling for minor chemical lab analysis (including pH, EC, TDS, major ions (calcium, magnesium, sodium, potassium, chloride and sulfate as SO4 and alkalinity);
- groundwater sampling for comprehensive chemical lab analysis (including pH, EC, TDS, major ions, alkalinity, cations/anions, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, zinc, turbidity, cyanide, nitrate, nitrite, Kjeldahl nitrogen, total nitrogen and total phosphorous); and
- monitoring of groundwater levels and EC as required by Environmental Protection Licence (EPL) 11879.

Monitoring frequency is as follows (Appendix B):

- monthly monitoring at selected alluvial piezometers for water level and field water quality;
- monthly monitoring of water level and piezometric pressure in longwall-specific piezometers during active extraction at relevant longwalls;
- quarterly monitoring at selected piezometers for water level, field water quality and minor chemical analysis;
- biannual monitoring for bores specified by EPL 11879; and
- annual sampling at selected piezometers for minor and comprehensive chemical analysis.

The groundwater monitoring plan, including monitoring parameters and frequencies, is summarised in Appendix B (Table B 1).



LEGEND

- Bowmans Creek Alluvium
- Bowmans Creek Alluvium and Coal Measure Overburden
- Bowmans Creek Colluvium
- Coal measure
- Coal measure overburden
- EPL Bores - Updated Nov 2022
- Glennies Creek Alluvium
- Hunter River Alluvium
- VWPs
- Transect Line for Figure 2.3
- Ashton ULLD panels 2026
- Pikes Gully Seam Longwall layout
- Middle Liddell Seam Longwall layout
- Ashton leases
- RUM Development Consent Boundary

Alluvium boundaries

- Bowmans Creek Alluvium
- Glennies Creek Alluvium
- Hunter River Alluvium
- Rivers

Yancoal Ashton - Annual Groundwater Monitoring Review 2025 (ASH5028.001)

WMP groundwater monitoring network

AGE

DATE 18/02/2026

FIGURE **3.1**

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3.2 Trigger values

The WMP outlines trigger values for groundwater level and quality for monitoring bores in the Bowmans Creek BCA, GCA and the HRA.

A recorded water level below the defined trigger level at any monitoring bore, sustained for three consecutive months between March 2018 and the completion of mining in LW204 within the ULLD, would trigger a response under the WMP. In late 2019, AGE was requested by ACOL to validate and update the AGE (2016) groundwater model in accordance with NSW regulatory requirements, which mandate a model update every three years. ACOL is currently updating the groundwater model, and modelled drawdowns for longwall panels from LW205 onwards will be incorporated into a revised WMP, along with updated trigger criteria. In the meantime, recorded water levels (and water quality) will continue to be assessed in accordance with the approved WMP. Groundwater elevation trigger levels are summarised in Table 3.1.

Groundwater quality trigger levels are summarised in Table 3.2. Similar to groundwater elevation, three consecutive measurements outside of these trigger levels will prompt a response under the WMP. Additionally, if a recorded value at a monitoring bore significantly deviates from the preceding three readings and there are no identifiable events that could explain the difference, a response will be triggered. The WMP groundwater response plan, detailing the actions to be taken when trigger values are exceeded, is summarised in Appendix C.

Table 3.1 Groundwater elevation trigger levels for alluvial monitoring bores

Aquifer	Monitoring bore	Base of alluvium elevation (m AHD)	Assigned trigger value during of mining in LW208 (Upper Lower Liddell Seam) (m AHD)
BCA*	WMLP311	55.64	56.49
	WMLP323	59.47	57.94
	WMLP328	49.42	50.39
	T2A	49.69	52.76
GCA	WML129	45.44	49.9
	WML239	50.82	48.94
	WMLP343	50	50.03
	WMLP349	48.84	50.75
	WMLP358	50.16	50.79[$]
HRA	WMLP279	45.1	48.22
	WMLP280	44.92	48.75
	WMLP337	48.05	47.65
	WMLP336	47.87	48.1

Notes: * Bowmans Creek alluvium is approved to be dewatered in areas above the mine plan by end of mining of the Upper Liddell seam (Aquaterra, 2009). Trigger values are therefore intended as a guide representing updated, more conservative, impact predictions from the updated groundwater model (AGE, 2016).

[$] This water level trigger is based on the second lowest water level measured, as the lowest measured water level is an outlier in the dataset.

Table 3.2 Groundwater quality trigger levels for alluvial monitoring bores

Aquifer	Monitoring bore	Groundwater pH trigger - Lower (5th percentile)	Groundwater pH trigger - Upper (95th percentile)	Groundwater EC trigger (µS/cm) (95th percentile)
BCA	WMLC113C	6.6	7.4	1445
	WMLP311	6.5	8	1289
	WMLP323	6.5	8.1	1241
	WMLP326	6.6	7.5	2078
	WMLP328	6.6	8.2	1175
	T2A	6.7	7.7	1422
GCA	WML120B	6.4	7.7	1387
	WML129	6.7	8	740
	WML239	6.3	7.4	984
	WMLP343	6.7	7.2	994
	WMLP346	6.5	7.1	750
	WMLP349	6.5	6.8	983
	WMLP358	6.2	6.9	401
HRA	WMLP279	6.3	7.5	1276
	WMLP280	6.6	7.9	2034
	WMLP337	6.8	7.8	3254
	WMLP336	6.2	8.2	1708

3.3 Sampling methods

Standards and procedures:

- Fourth edition ISBN 978-0-646-81881-8.
- *Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples".* Australian/New Zealand Standard 5667.1:1998.
- Sundaram, B. (2009). *"Groundwater Sampling and Analysis – A Field Guide",* Australian Government – Geoscience Australia. GeoCat 60901.

Groundwater levels/pressure heads at Ashton in 2025 were measured as follows:

- manual measurements using a water level dipper;
- download of VWP data;
- downloadable pressure transducer (PT); and
- telemetric PT.

Groundwater quality field parameters were measured using a calibrated water quality meter. Water quality laboratory analysis is conducted by National Association of Testing Authorities (NATA) accredited group Australian Laboratory Services (ALS).

Throughout 2025, groundwater sampling was conducted by AGE Hydrogeologists Danijel Djukic and Daniel Rego.

4 Groundwater monitoring results

Groundwater monitoring and sampling was conducted at the locations and frequencies outlined in the WMP (Section 7.3). Groundwater levels and quality trends for alluvial bores are presented in Figure 4.1 through Figure 4.21. Groundwater levels and quality data for non-alluvial monitoring locations are presented in Figure 4.23 through Figure 4.31.

4.1 Alluvium monitoring

4.1.1 WMP compliance groundwater elevations

The groundwater elevation trends and trigger levels for the BCA, GCA and HRA compliance monitoring bores are presented in Figure 4.1, Figure 4.2, Figure 4.3 and Figure 4.4, respectively. Daily rainfall measurements and CRD have also been plotted and used to compare water level trends. The river and creek water levels (sourced from WaterNSW online database[1]) are presented graphically in Figure 4.5.

The following observations can be noted for 2025:

- Groundwater levels in the BCA bores were stable until May 2025, when rainfall recharge increased water levels. Water levels decreased from June to August, then increased again after heavy rain in early August. Following this, groundwater levels declined through the rest of 2025 due to below-average rainfall (Figure 4.1). T2A was dry from October 2023 but recovered in August and remained above its trigger level as water levels receded. Other BCA bores stayed above their trigger levels throughout 2025. The BCA is not a regulated stream, and ACP is approved under DA 309-11-2011-i MOD 5 to intercept the groundwater resource.
- GCA groundwater elevations remained stable throughout the year (see Figure 4.2 and Figure 4.3). Sampling at WMLP343 was not possible from August 2024 to August 2025 due to sediment accumulation in the screened interval. Water levels in the borehole recovered during 2025 as increased rainfall facilitated water sample collection, though a sediment blockage persists within the bore. Airlift development is scheduled to address the sediment obstruction. No GCA groundwater elevations exceeded established trigger levels during 2025.
- HRA regulatory bores showed rising groundwater elevations in mid-2025, followed by declines in the latter half (see Figure 4.4). Controlled upstream releases helped stabilise water levels, which stayed above trigger thresholds throughout 2025.
- Surface water levels in Bowmans Creek, Glennies Creek, and the Hunter River stayed mostly steady during the year, rising sharply only after heavy rain events (Figure 4.5).

The site received above-average rainfall from May to August 2025, as shown by an increasing CRD. These rainfall events led to increased groundwater elevations in BCA, GCA, and HRA regulatory bores. No mining-related impacts beyond predictions were observed in the alluvium.

[1] WaterNSW (2021). Real-time water data. Available at: http://realtimedata.water.nsw.gov.au/water.

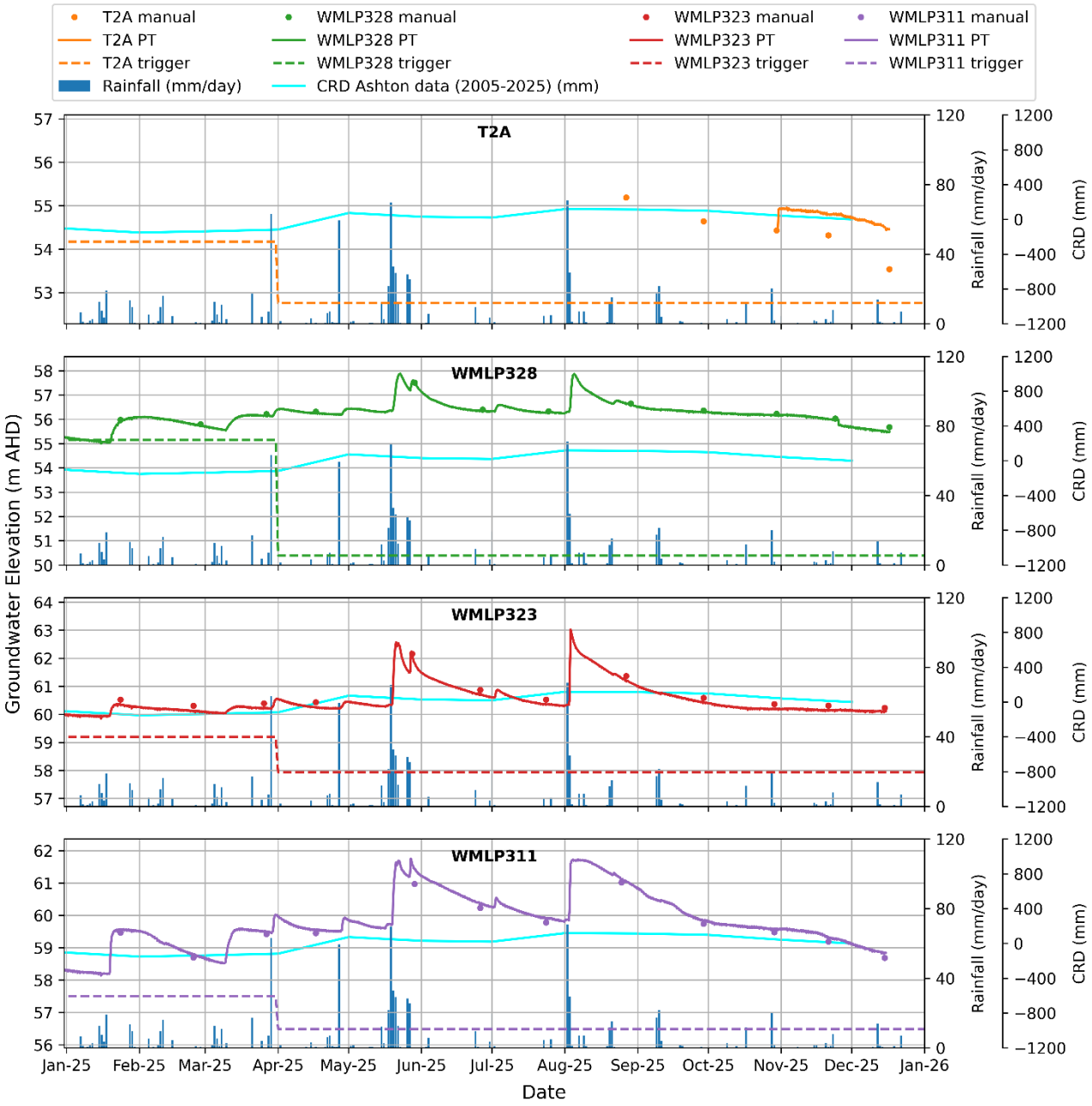

Figure 4.1 Bowmans Creek alluvium trigger bore hydrographs

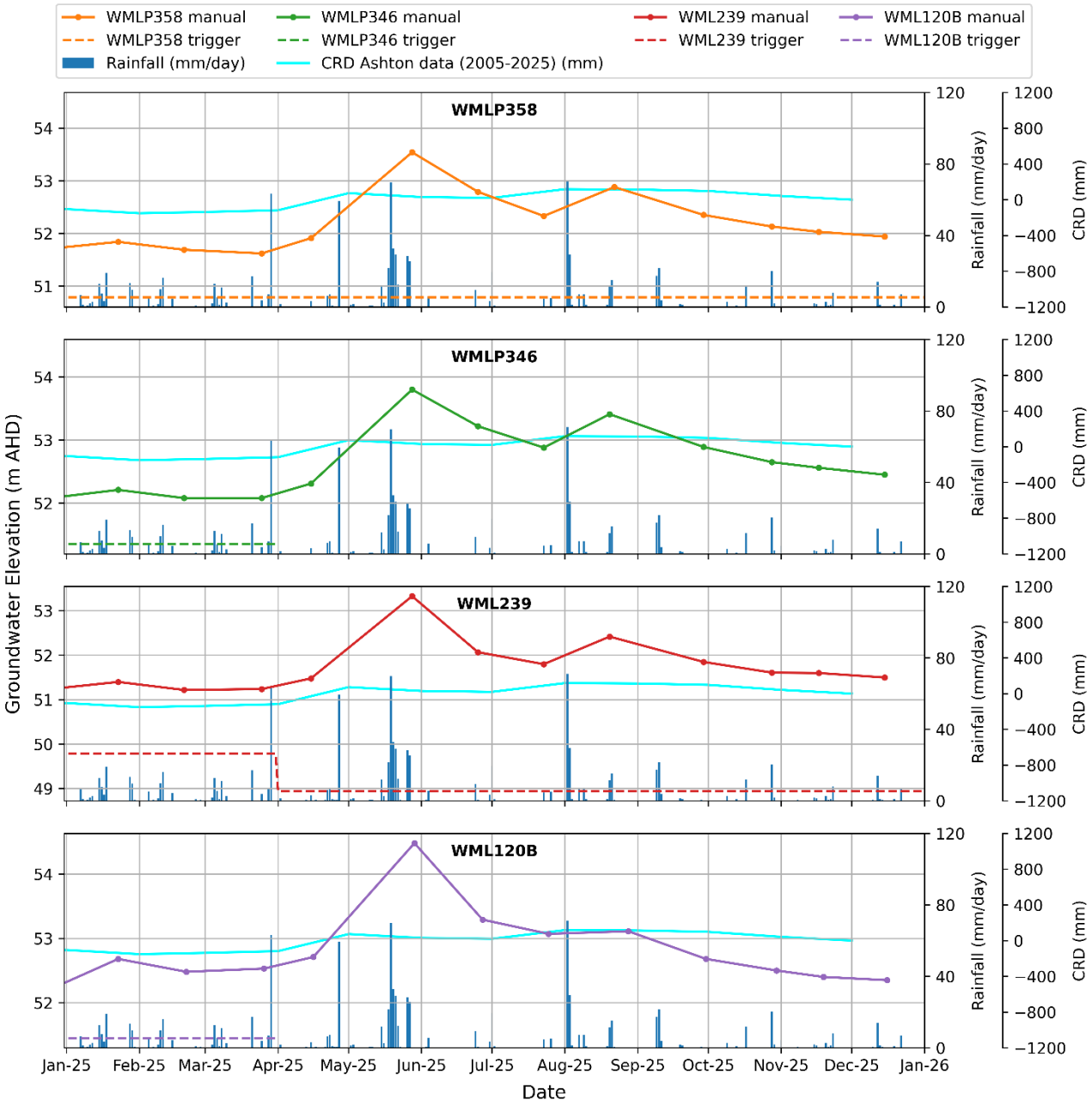

Figure 4.2 Glennies Creek alluvium trigger bore hydrographs (1)

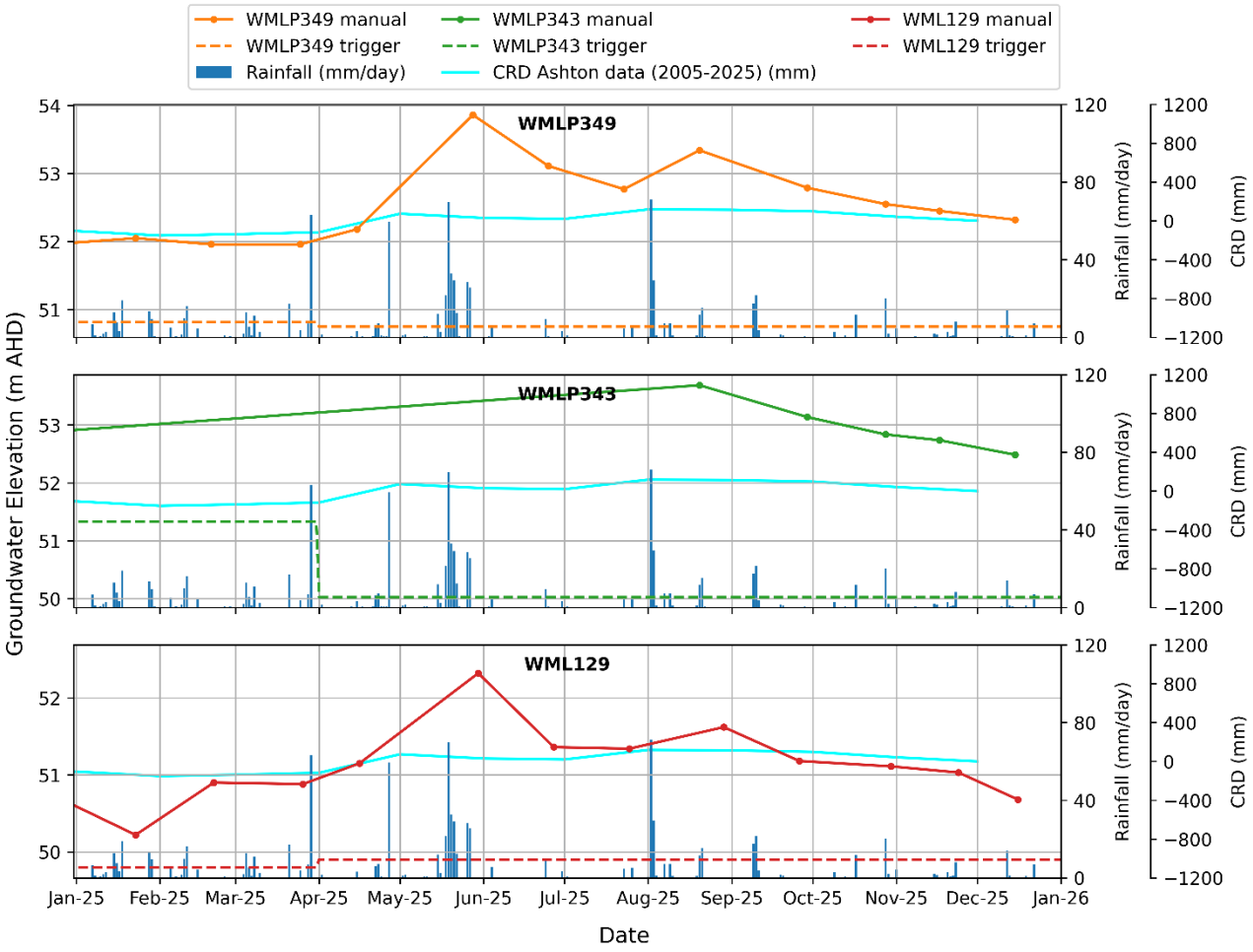

Figure 4.3 Glennies Creek alluvium trigger bore hydrographs (2)

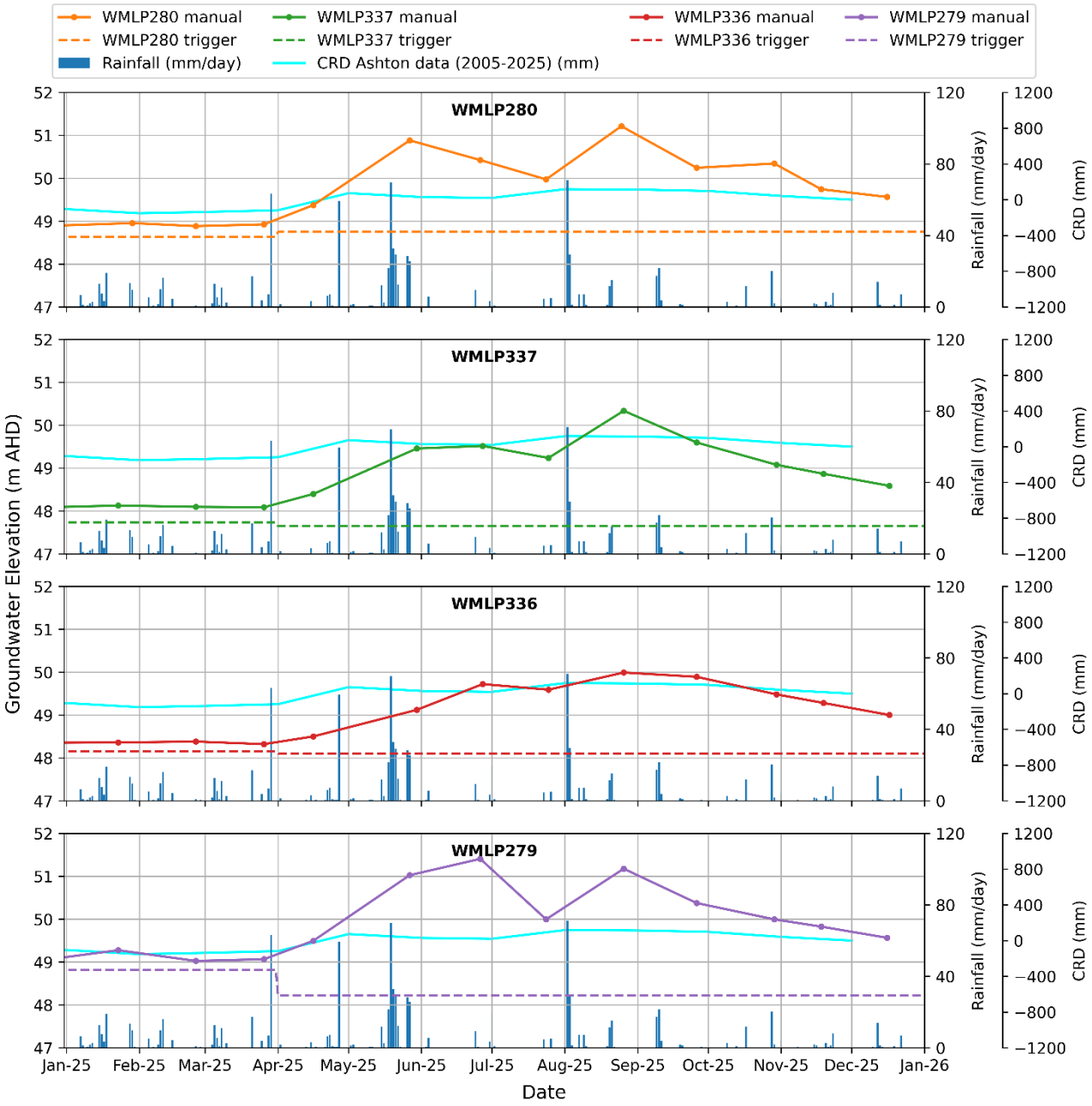

Figure 4.4 Hunter River alluvium trigger bore hydrographs

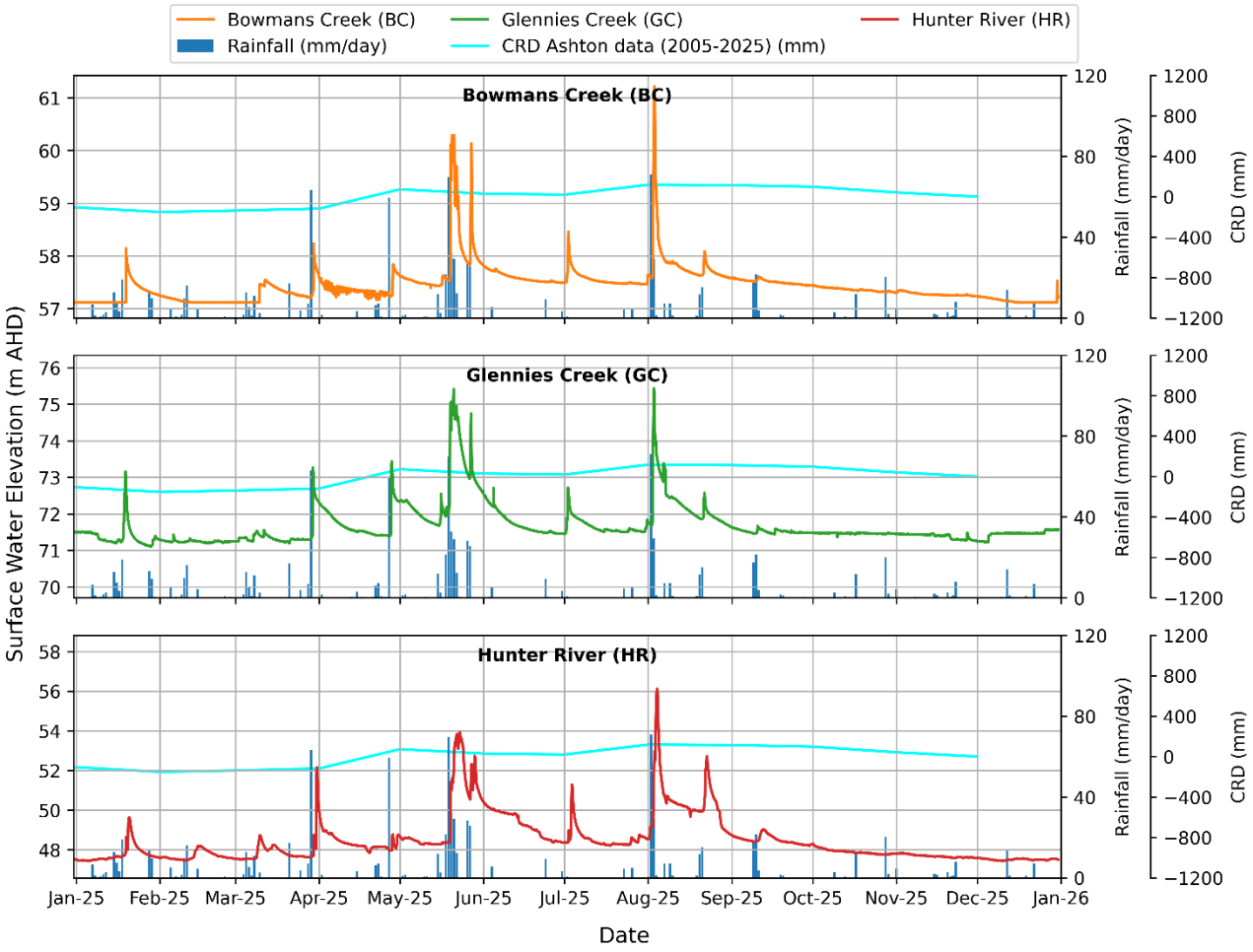

Figure 4.5 Surface water level hydrographs

4.1.2 Other alluvium groundwater levels

Groundwater elevation trends observed in 2025 for other BCA and HRA monitoring bores across the network are presented in Figure 4.6 and Figure 4.7, respectively. Daily rainfall measurements and CRD data have been plotted and analysed to assess water elevation trends. WML115C, WMLP308, RA18, and WMLP320 BCA alluvial bores remained relatively stable overall but showed similar trends to the regulatory BCA bores, with water levels generally increasing during the beginning of the year through to August and declining through the remainder of the year (commensurate with increasing rainfall trends). Non-regulatory bore T5 remained dry in all sampling events except May, August and September which all followed heavy rainfall events. Groundwater elevations in non-regulatory HRA bores also followed these rainfall trends throughout the year, with all bores recording sharp increases in groundwater level during May and August. No mining-related impacts beyond those predicted were observed.

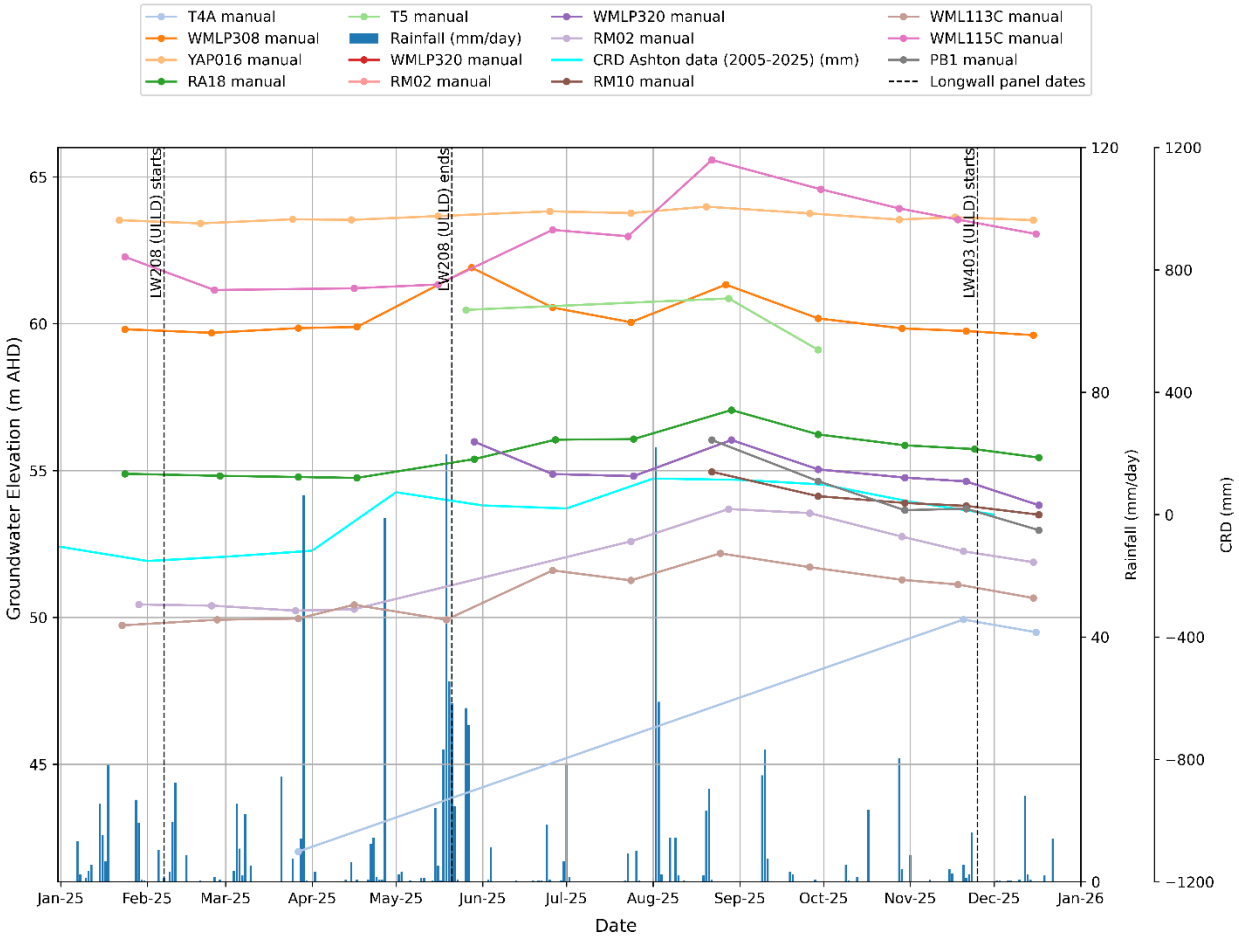

Figure 4.6 Other Bowmans Creek alluvium monitoring bore hydrographs

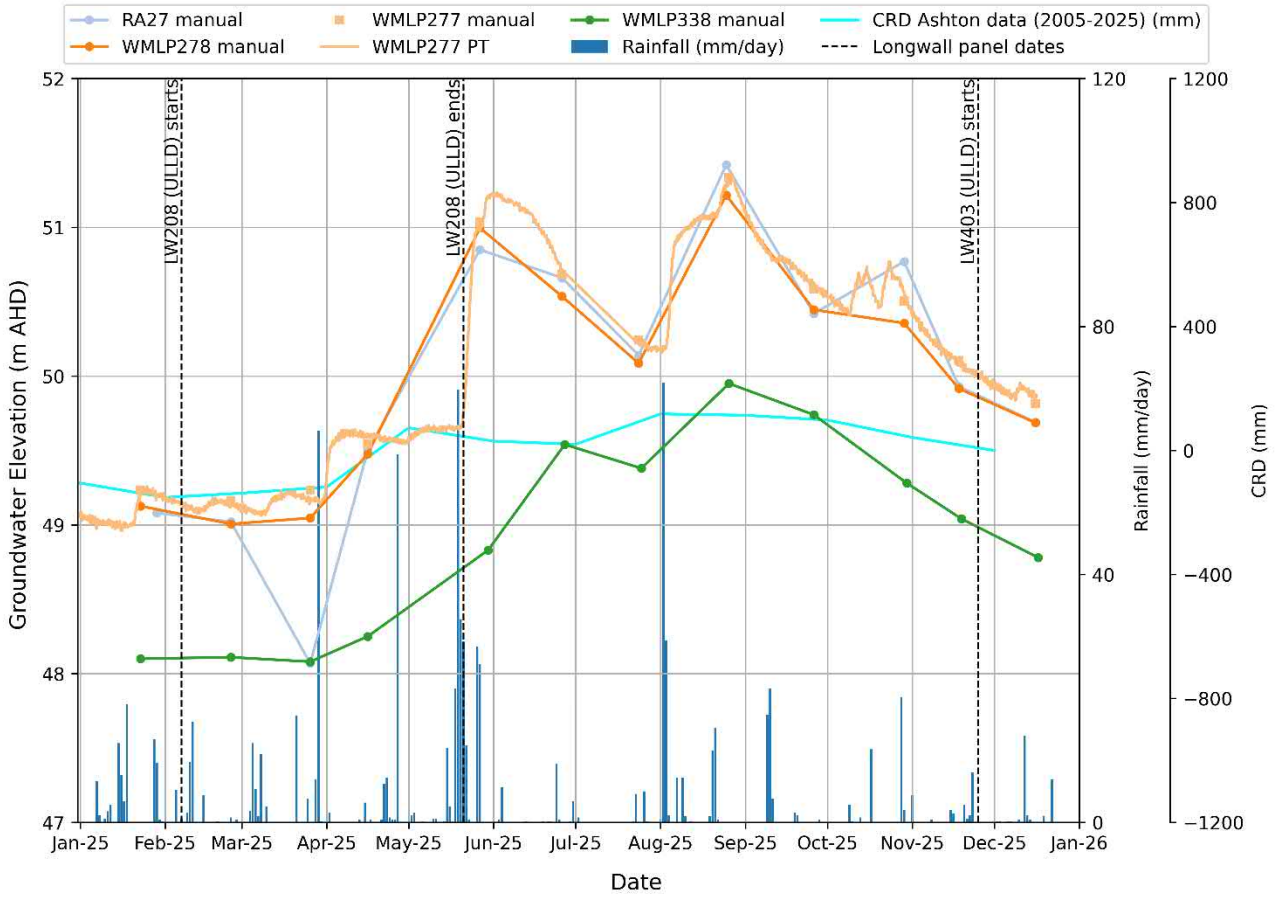

Figure 4.7 Other Hunter River alluvium monitoring bore hydrographs

4.1.3 pH, electrical conductivity and major ions

All alluvial bores across the ACP monitoring network were sampled for pH, EC, and major ions throughout 2025, with the results presented graphically in Figure 4.8 to Figure 4.21. A complete table of results for the aforementioned parameters is presented in Table D1 in Appendix D; along with a comprehensive analysis of measurements recorded during annual sampling in August 2025. All associated laboratory files can be found in Appendix F.

In contrast to the previous year, groundwater pH in alluvial bores was slightly alkaline to neutral in 2025. Two bores triggered a response due to exceedances of pH trigger values throughout the year, including:

- WLP358 in May and June; and
- WMLP349 in May and June.

WMLP349 and WMLP358 exceeded pH trigger criteria on three or more consecutive occasions, prompting an investigation into the causes of the exceedances (AGE, 2023). The investigation found no potential environmental harm or significant impact from mining operations. It was determined that the derived pH triggers were reflective of environmental conditions during a major drought between July 2017 and May 2020. Despite these exceedances, pH values remained relatively stable in 2025, generally ranging from 6.5 to 7.5, with only a few outliers outside this range which seem to correlate with heavy rainfall events. This recorded pH range is considered within the natural variation for the area.

The specific pH ranges measured within the BCA, GCA, and HRA in 2025 were as follows:

- BCA – pH 6.42 (WML113C) to pH 8.06 (WMLP326);
- GCA – pH 6.48 (WMLP129) to pH 8.32 (WMLP129); and
- HRA – pH 6.31 (WMLP336) to pH 8.51 (WMLP277).

Groundwater EC ranged from fresh to slightly brackish across the BCA, GCA, and HRA regulatory monitoring network in 2025, reflecting similar conditions to previous years. One bore (WMLP358) consistently recorded readings outside trigger level criteria in groundwater EC values during 2025, with trigger level exceedances recorded during September, October, November and December. WMLP349 exceeded trigger levels for the seventh and eighth consecutive times in January and February 2025, but groundwater EC continued to decline until mid-year, when exceedances in this bore stopped.

Investigations into the EC (and pH) trigger levels and exceedances for WMLP349 and WMLP358 were conducted (AGE, 2022a; AGE, 2023). These investigations confirmed that the dataset used to derive the GCA bore triggers had an adequate sample size, and the percentile calculations were accurate. Although the statistical methodology for trigger derivation was sound, the variability in rainfall recharge during the period used to derive the triggers did not reflect the typical long-term rainfall variation at Ashton. This suggested that the derived triggers may not fully capture natural environmental fluctuations in this bore. It was recommended that revised triggers be developed using the latest data, which better represent seasonal variability.

BCA monitoring bores recorded generally stable to declining EC values throughout 2025. Following significant rainfall events during the first half of 2025, water levels at T2-A recovered in August 2025 after an extended period of being dry (since November 2023), enabling the resumption of groundwater EC measurements at this bore.

Groundwater EC in GCA monitoring bores, except WMLP349 and WMLP358, was mainly stable in 2025. Most GCA bores showed rising EC in the latter half of the year, while WML129 and WML120B stayed steady. WMLP343 was blocked early in 2025, but water levels recovered above the blockage in August after heavy rain.

HRA monitoring bores exhibited generally stable EC trends throughout 2025 with most bores remaining stable or slightly declining. Groundwater EC in WMLP279 heavily declined during the first half of 2025 before stabilising and slightly inclining during the middle and second half of the year. No groundwater EC exceedances were recorded in HRA bores throughout 2025.

The observed EC ranges for alluvial bores in 2025 were as follows:

- BCA –213.4 µS/cm (WML115C) to 3,878 µS/cm (RM02);
- GCA – 230.1 µS/cm (WMLP358) to 1,049 µS/cm (WMLP349); and
- HRA – 378.2 µS/cm (WMLP278) to 3,169 µS/cm (WMLP337).

EC levels in rivers and creeks, sourced from the WaterNSW online database, were also analysed for 2025. Bowmans Creek remained heavily influenced by rainfall conditions, with sharp drops in EC corresponding with heavy rainfall events. Bowmans Creek ran dry between February and March and late December during 2025. Whilst EC levels in Glennies Creek remained mostly stable during 2025, there were multiple exceedances of EC trigger criteria in WMLP358 and WMLP349.

The Hunter River remained mostly stable during 2025 with small drops in EC corresponding with rainfall events. Towards the second half of 2025 the Hunter River showed an increasing EC trend.

The major ion content of each alluvial system was also assessed in 2025 as shown in the classification table and Piper diagram from August 2025 (Appendix E). The cation water type in all monitoring bores is typically Na or Ca cation dominant with a notable presence of Mg. Regarding anions, Cl is the dominant ion, with HCO3 and SO4 present in lower concentrations in the alluvial monitoring bores. The BCA and HRA water types are similar, but they can be differentiated from the GCA water types based on their respective water sources and the distinct recharge/discharge mechanisms associated with each body.

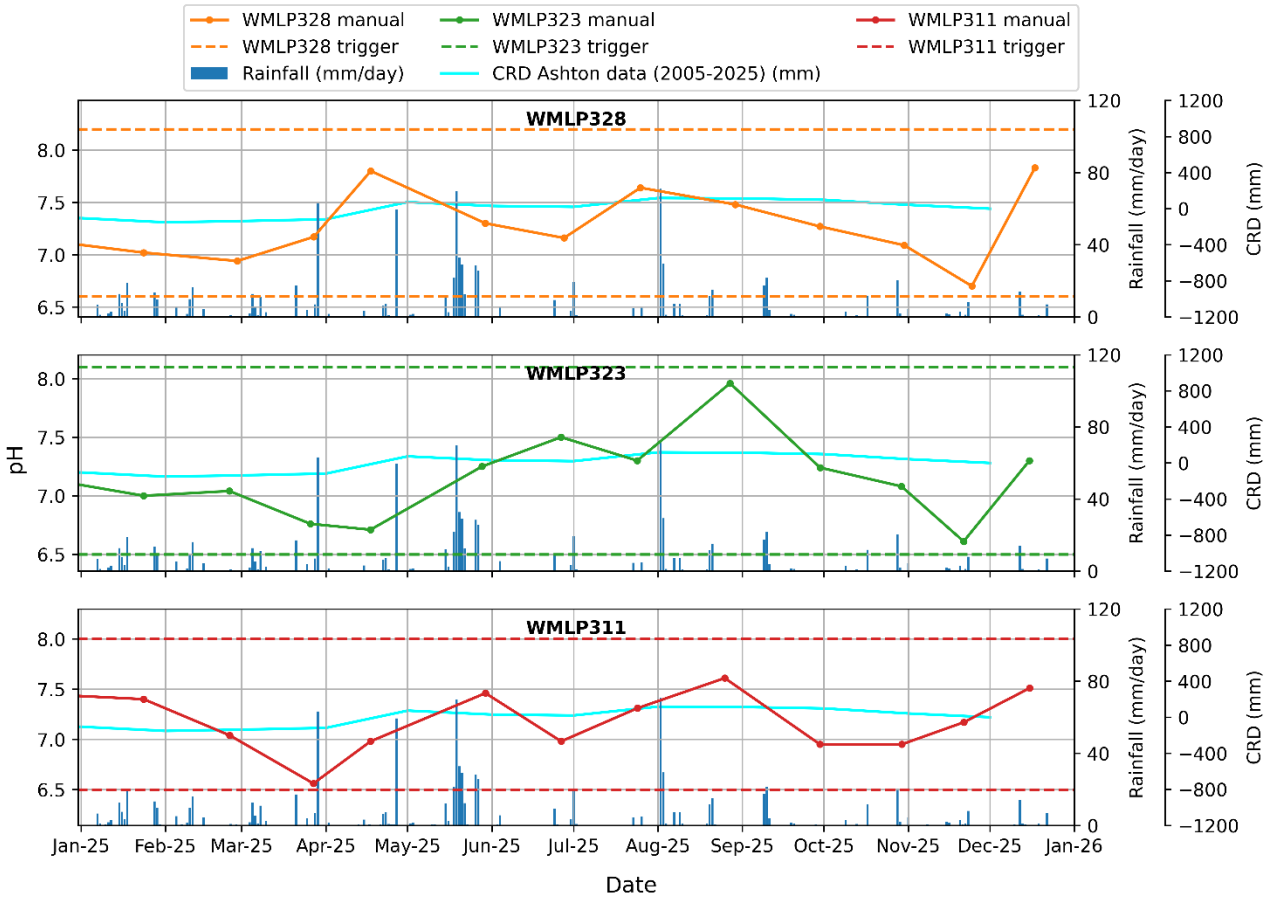

Figure 4.8 Bowmans Creek alluvium trigger bore pH trends (1)

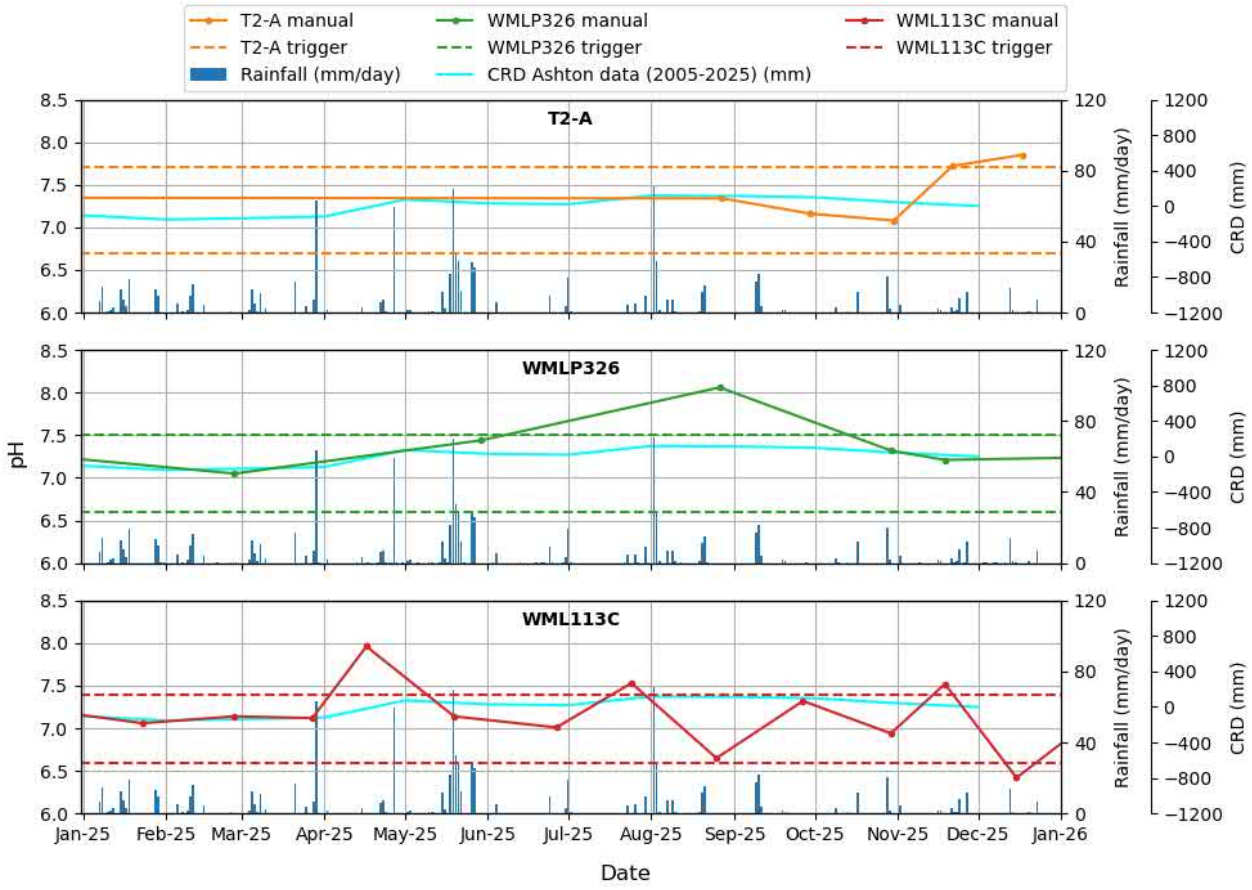

Figure 4.9 Bowmans Creek alluvium trigger bore pH trends (2)

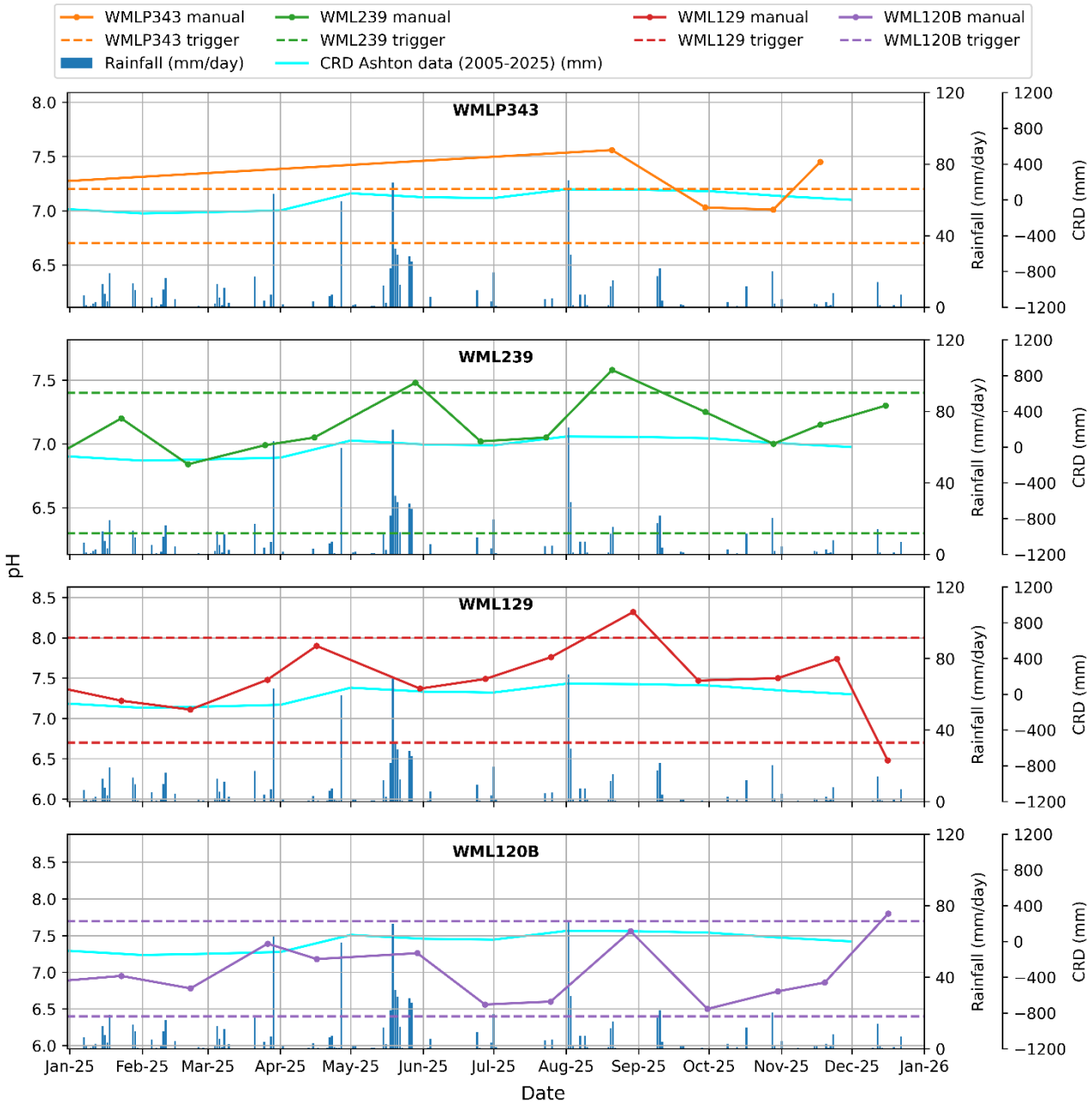

Figure 4.10 Glennies Creek alluvium trigger bore pH trends (1)

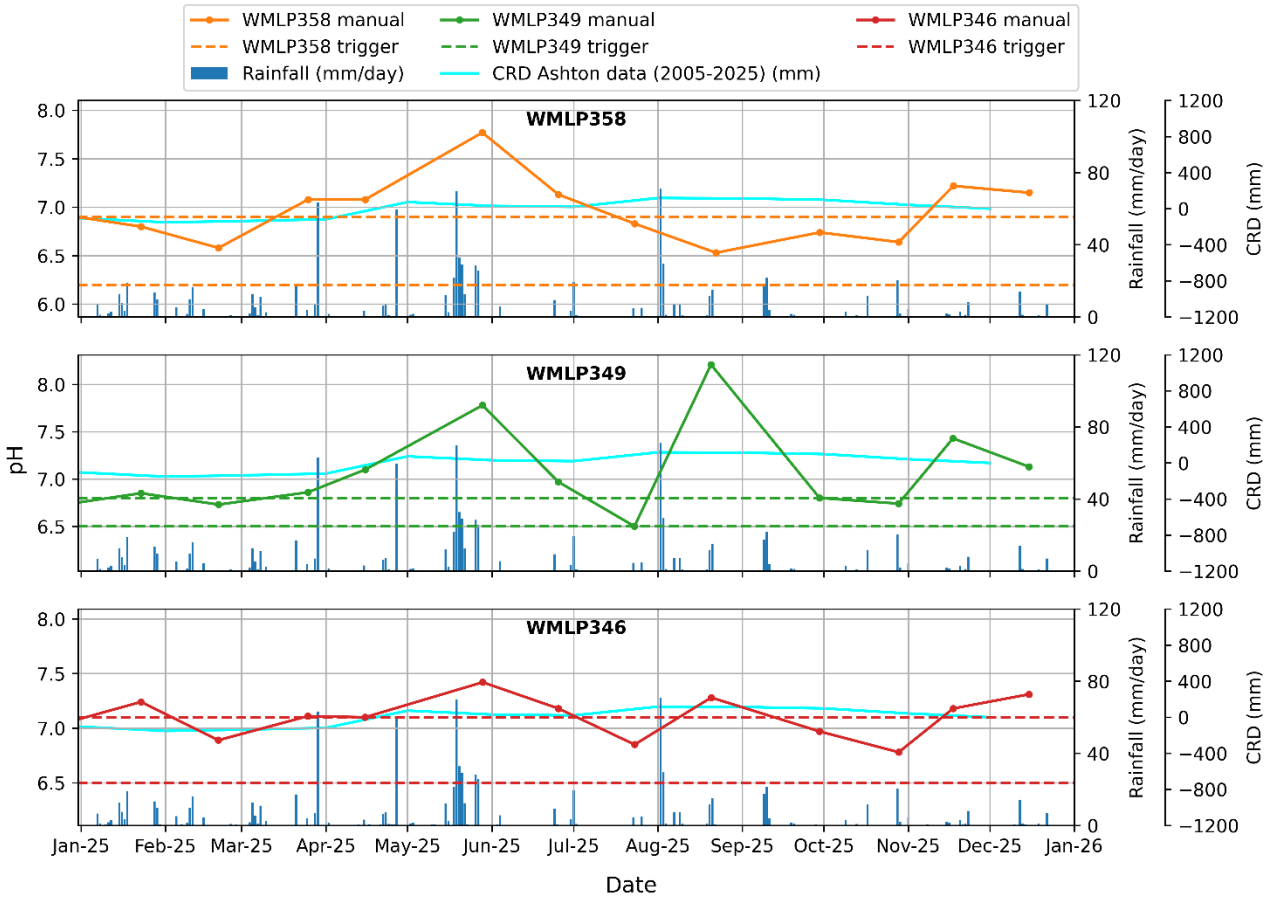

Figure 4.11 Glennies Creek alluvium trigger bore pH trends (2)

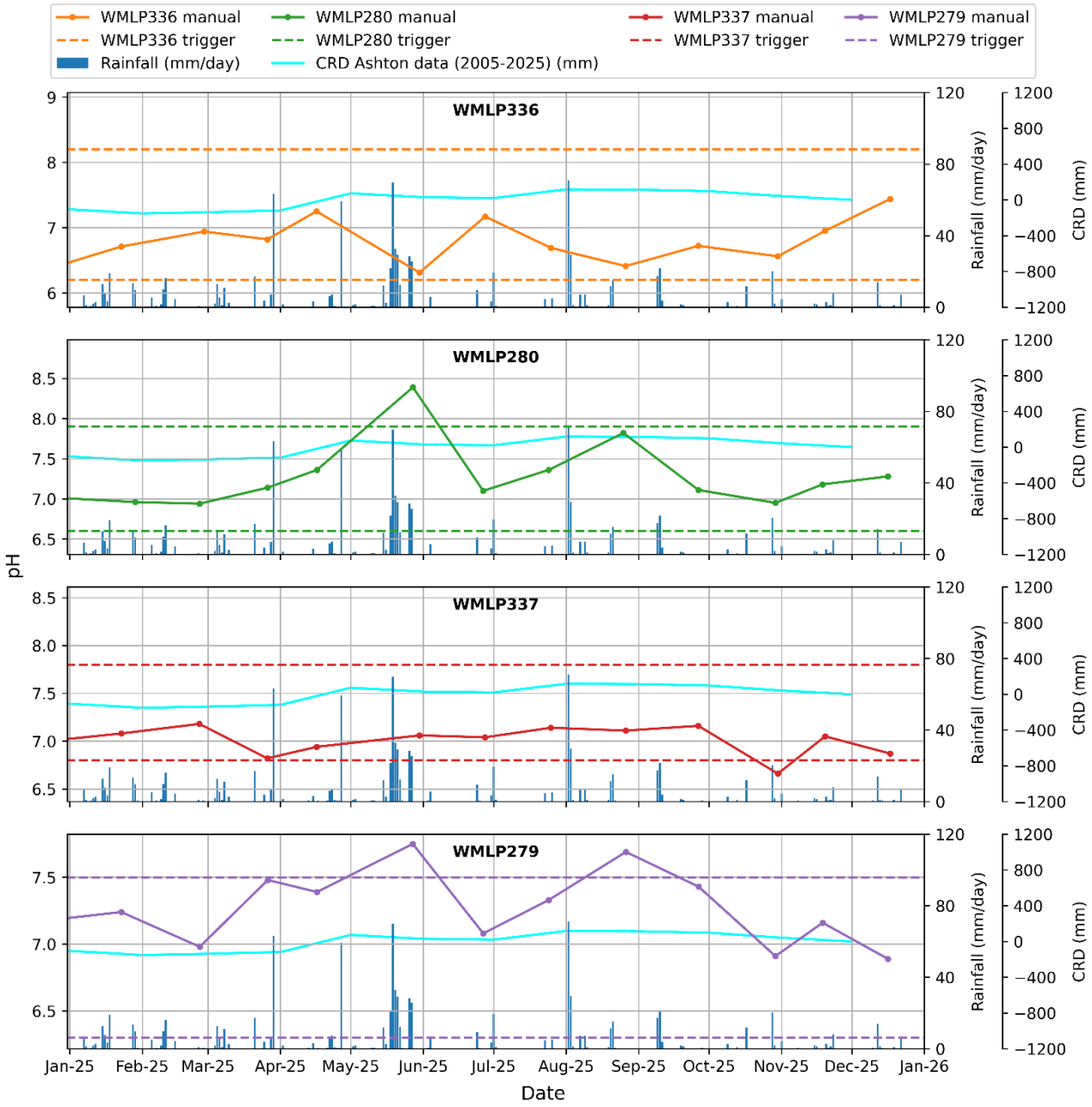

Figure 4.12 Hunter River alluvium trigger bore pH trends

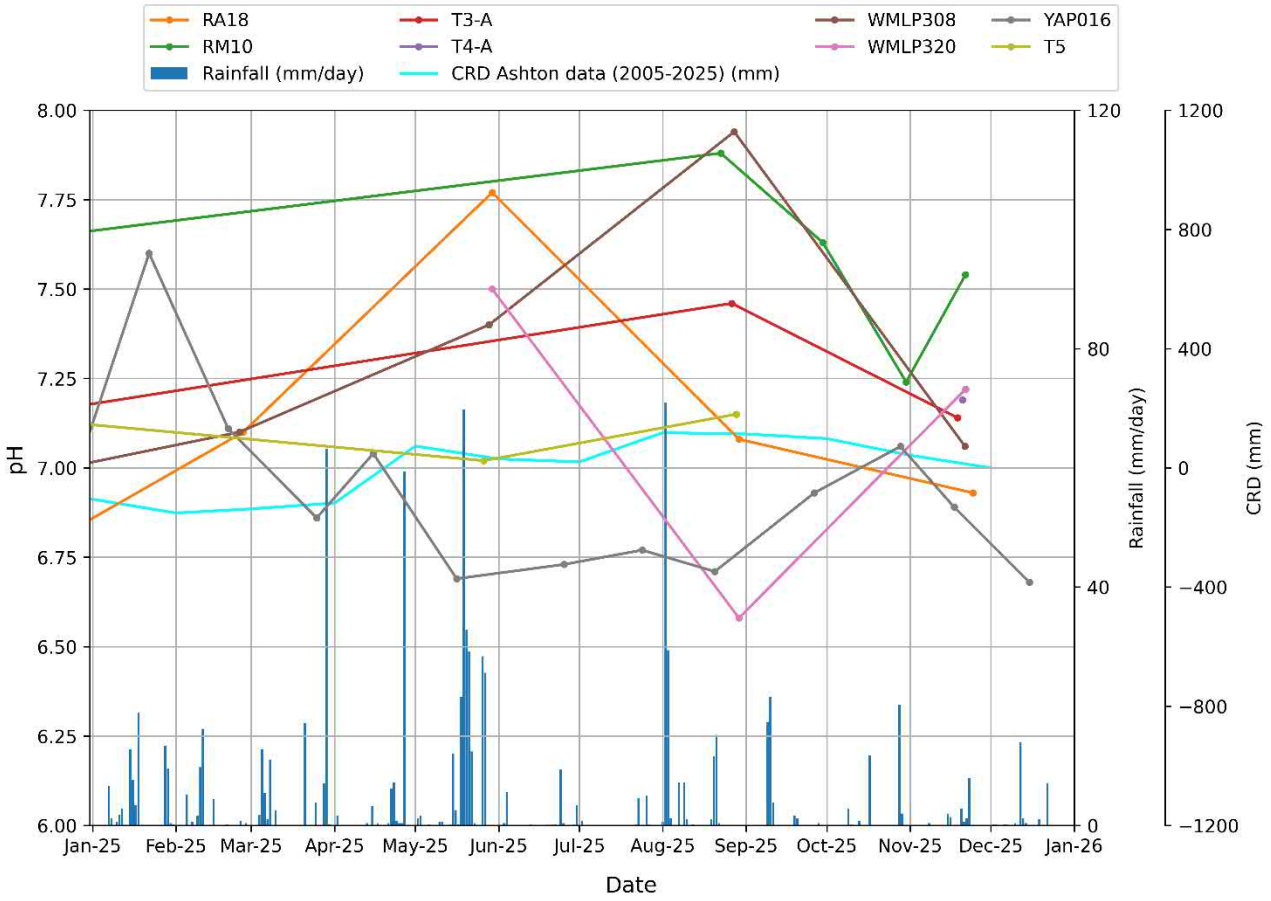

Figure 4.13 Other Bowmans Creek alluvium bore pH trends

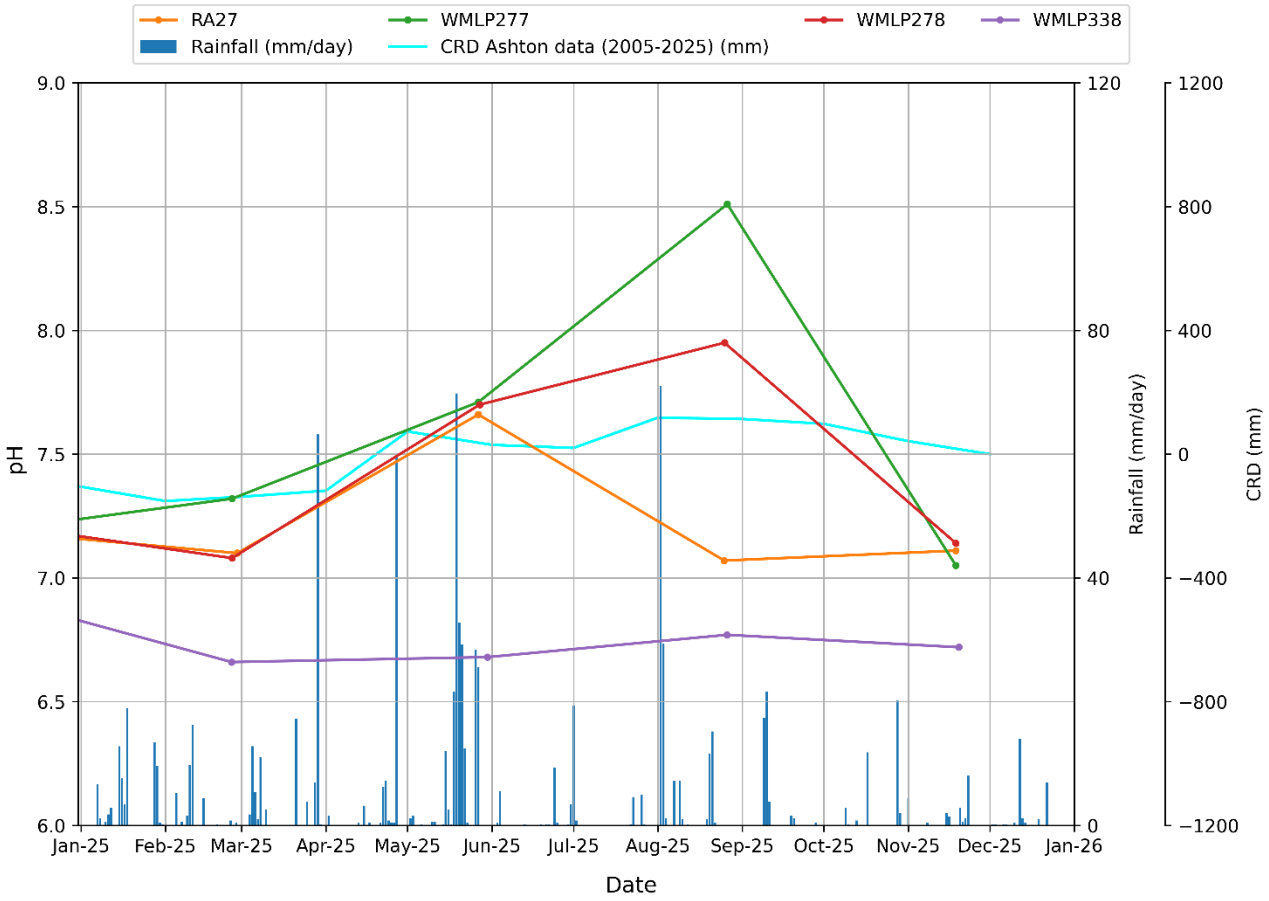

Figure 4.14 Other Hunter River alluvium bore pH trends

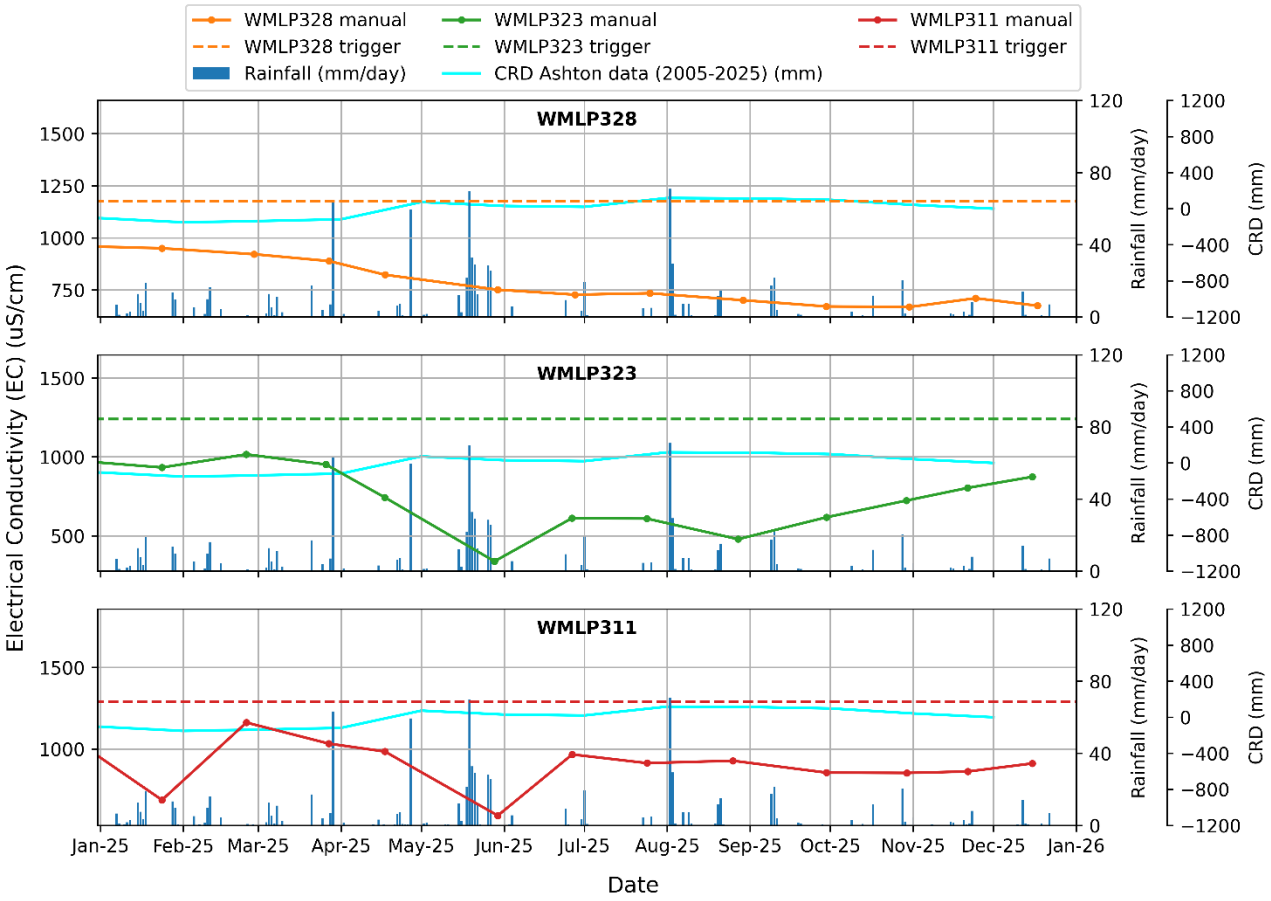

Figure 4.15 Bowmans Creek alluvium trigger bore EC trends (1)

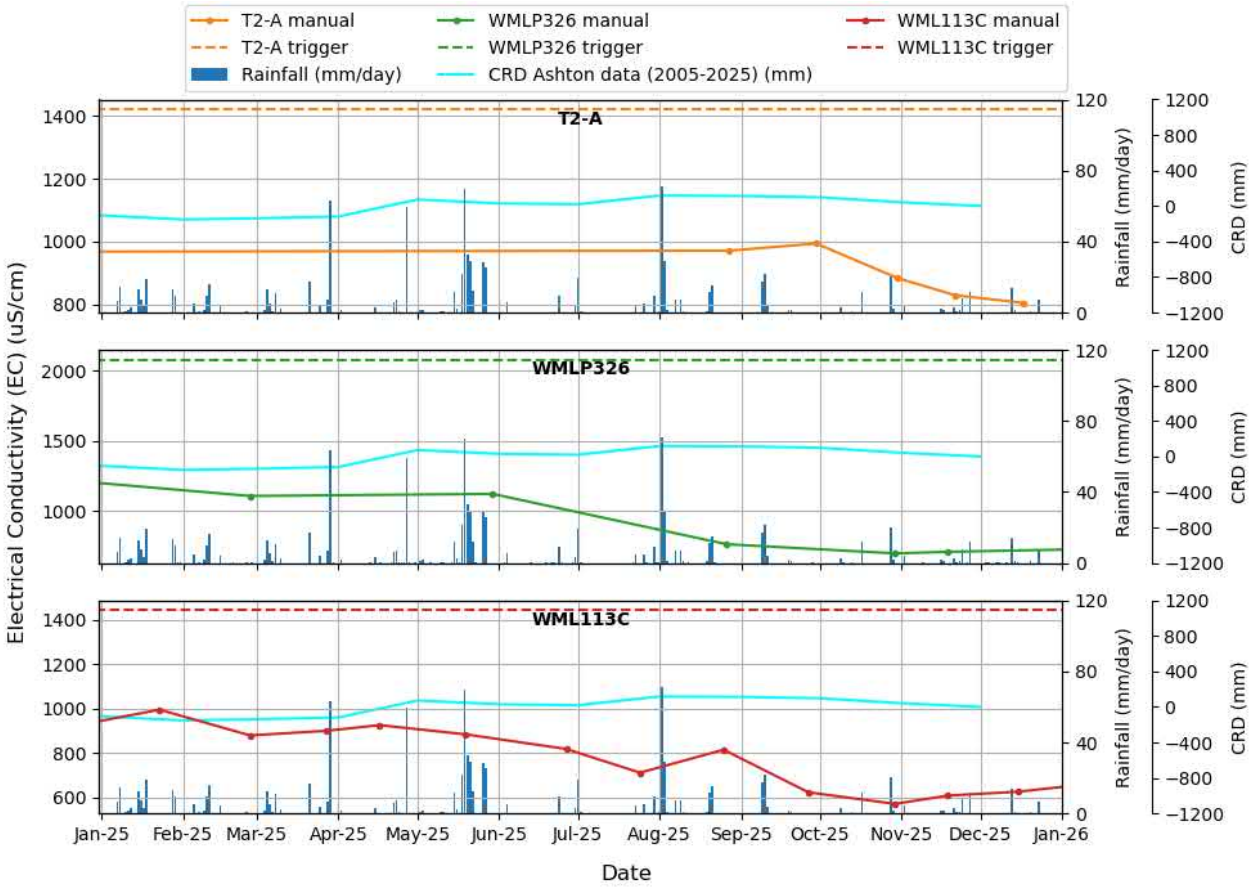

Figure 4.16 Bowmans Creek alluvium trigger bore EC trends (2)

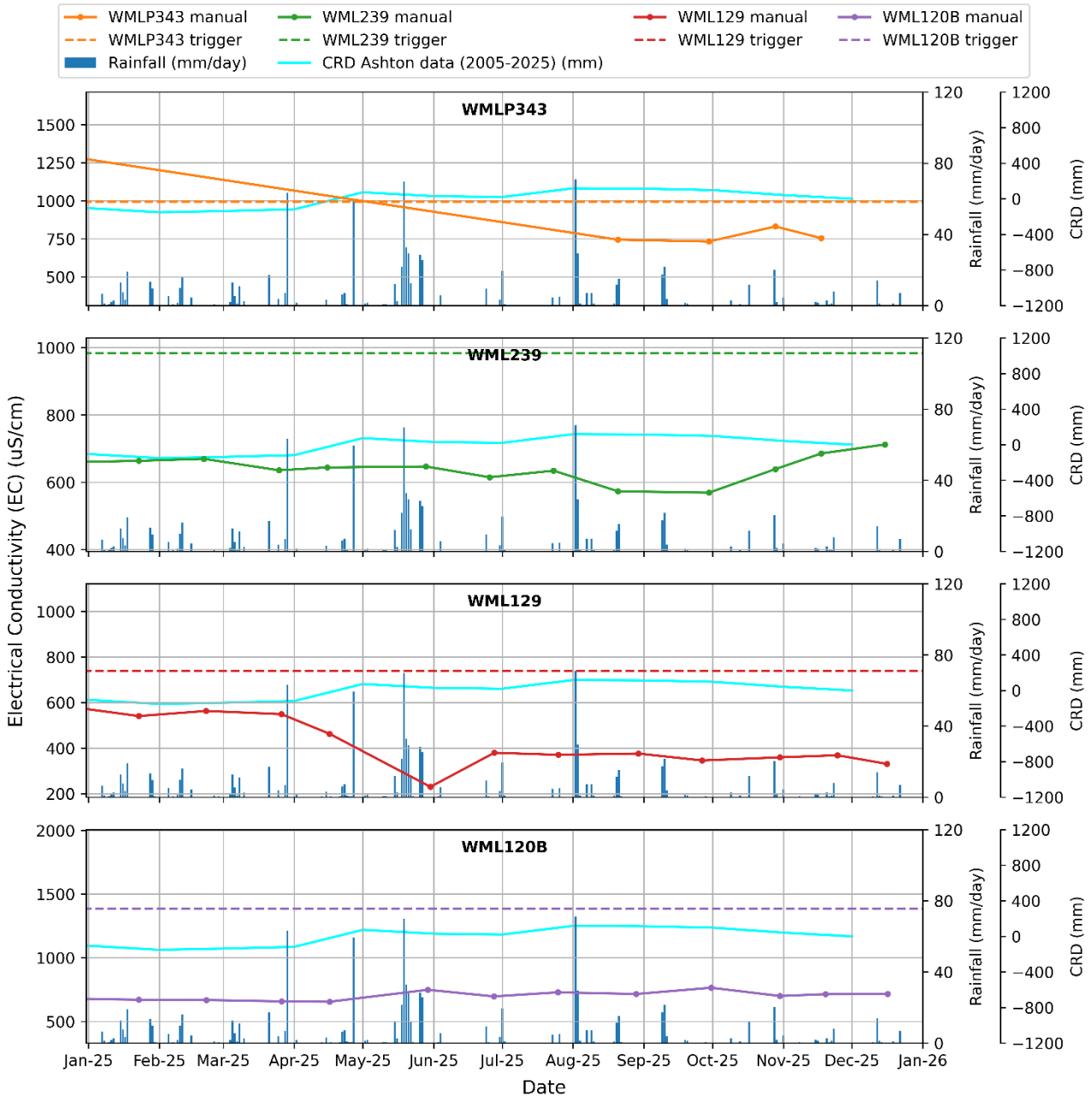

Figure 4.17 Glennies Creek alluvium trigger bore EC trends (1)

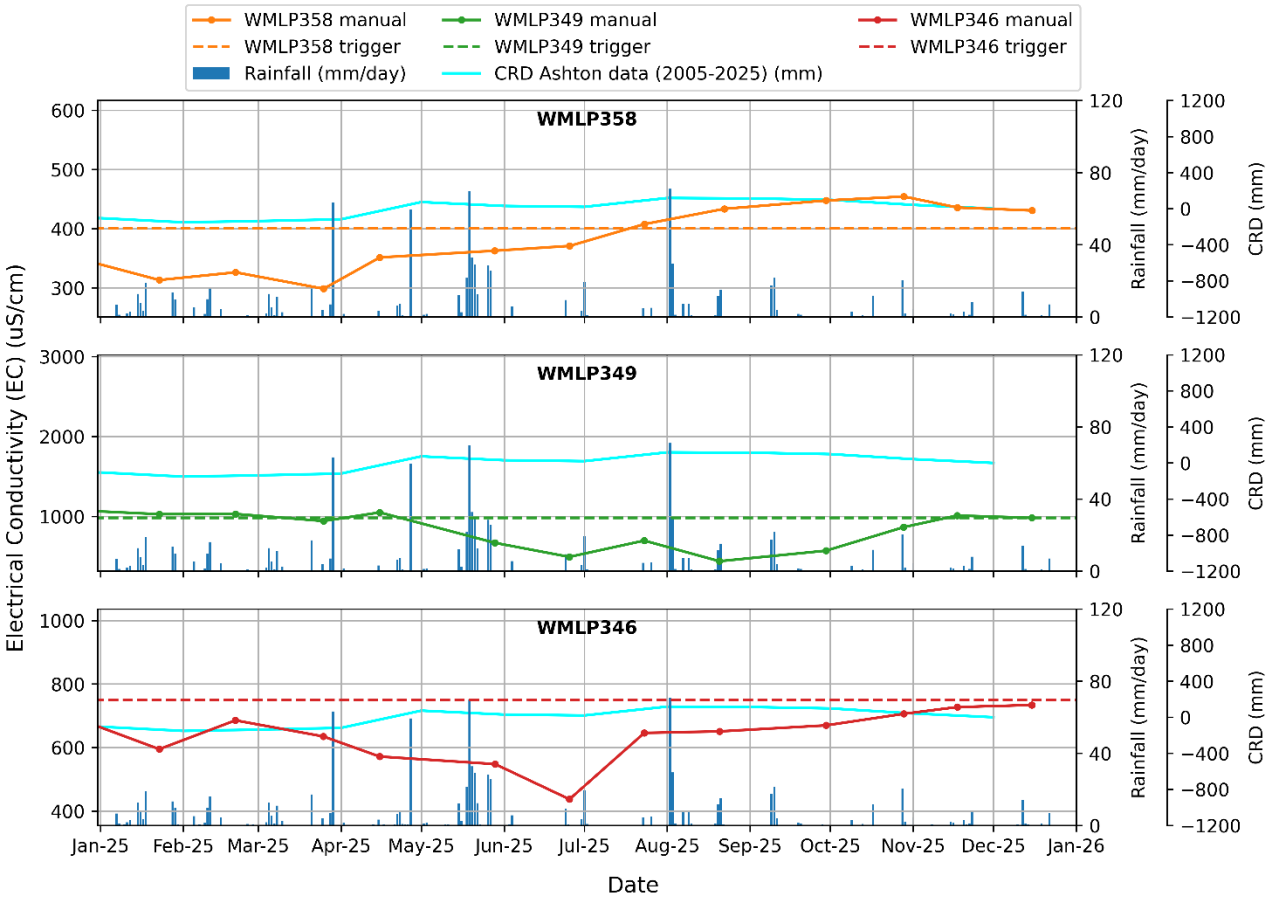

Figure 4.18 Glennies Creek alluvium trigger bore EC trends (2)

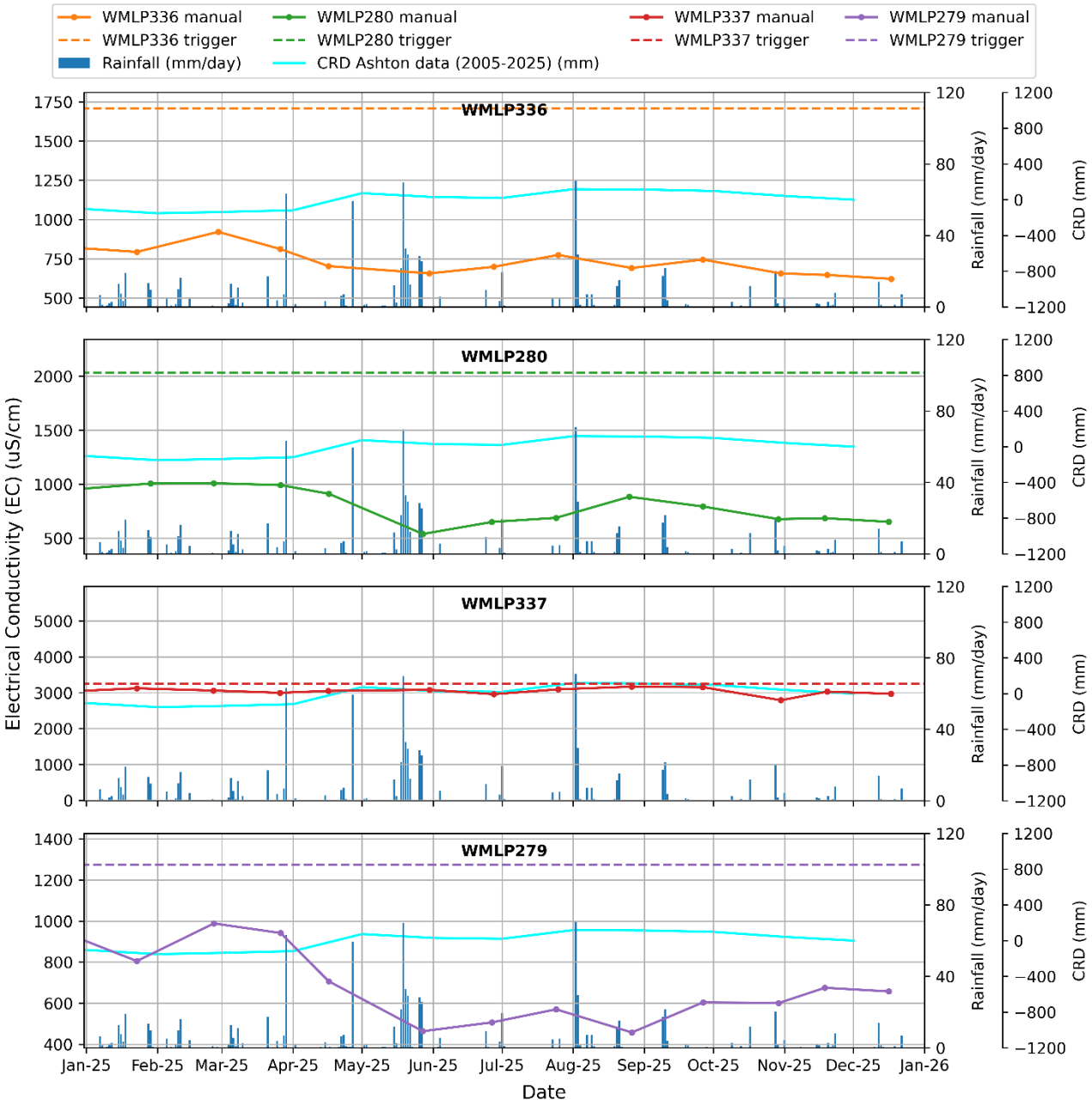

Figure 4.19 Hunter River alluvium trigger bore EC trends

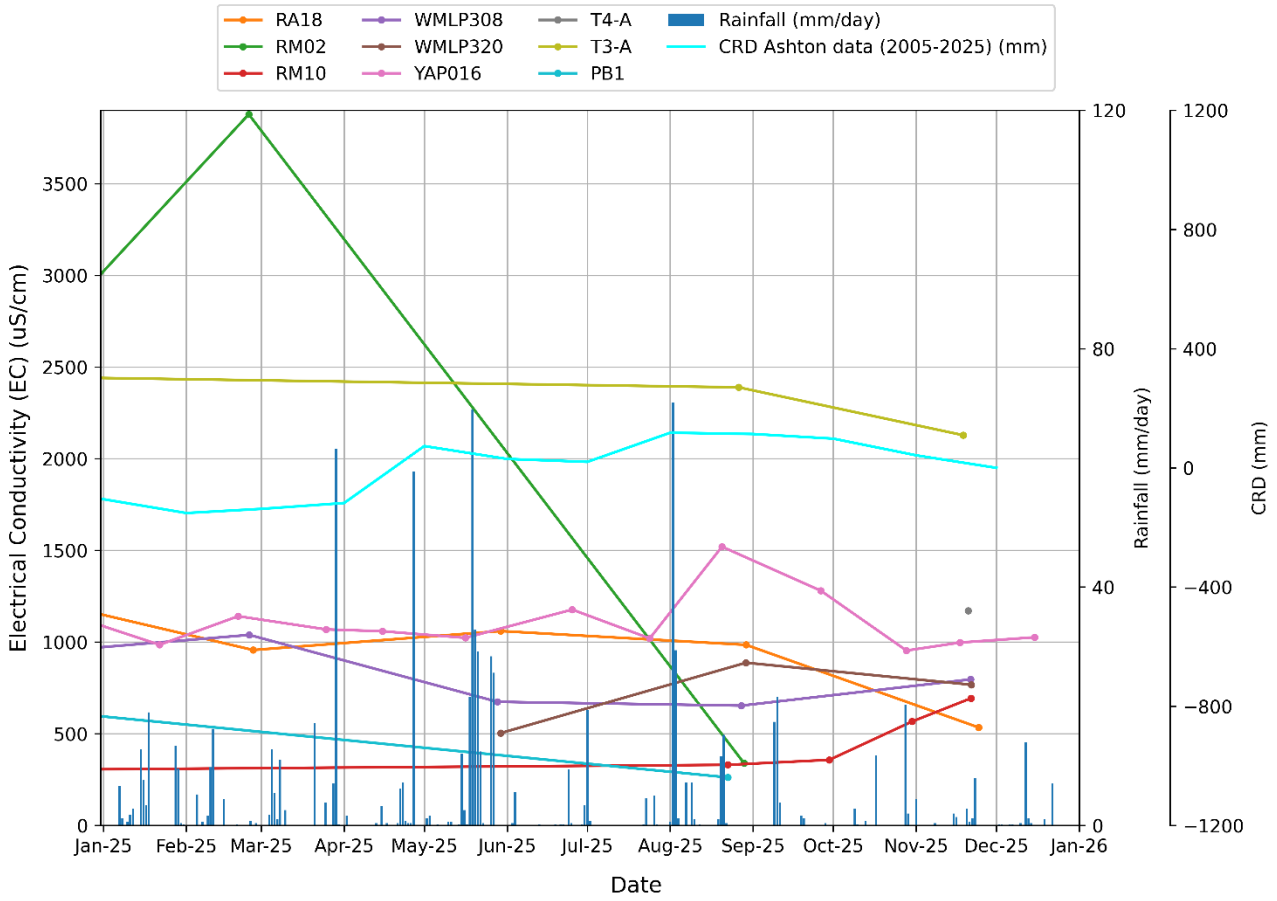

Figure 4.20 Other Bowmans Creek alluvium bore EC trends

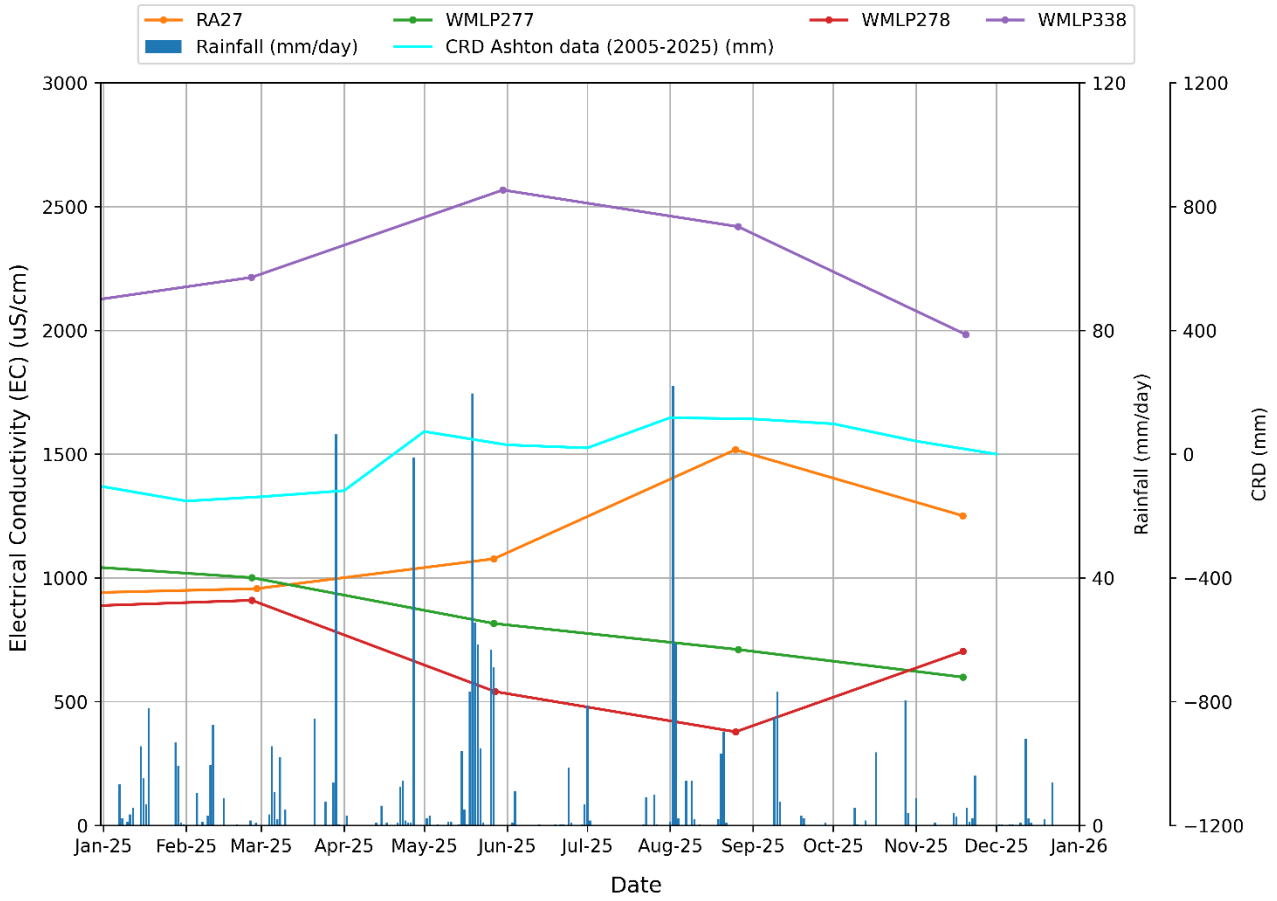

Figure 4.21 Other Hunter River alluvium bore EC trends

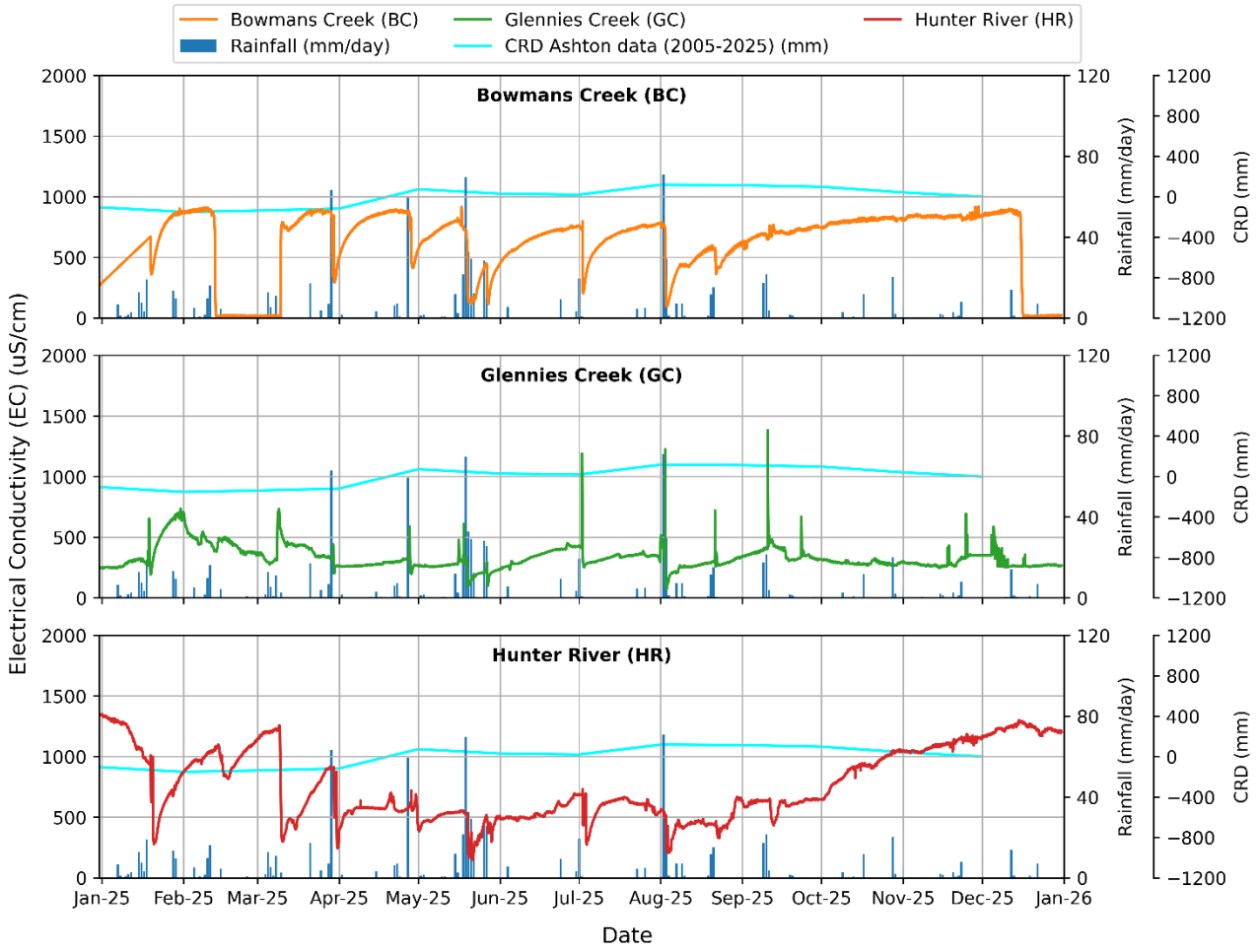

Figure 4.22 Surface water EC trends

4.1.4 BCA, GCA and HRA - Dissolved metals, select nutrients, turbidity and cyanide

Comprehensive laboratory analyses conducted in August 2025 included measurements of selected dissolved metals, nutrients, turbidity, and cyanide, as detailed in Appendix D. Concentrations of dissolved metals were assessed against ANZECC|ARMCANZ livestock water quality guidelines (ANZECC & ARMCANZ, 2000), with no exceedances observed for any of the metals tested, including arsenic, cadmium, chromium, copper, lead, nickel, selenium, and zinc. Manganese and iron were detected at trace levels; however, these metals are not considered specifically toxic at such concentrations, and no ANZECC|ARMCANZ livestock water quality guidelines are established for them.

Analysis of selected nutrients included nitrite and nitrate as N, total Kjeldahl nitrogen (TKN) as N, total nitrogen (TN) as N, and total phosphorus (TP) as P. All nitrogen-related concentrations were low, with nitrate levels remaining well below the ANZECC|ARMCANZ livestock guideline of 400 mg/L, and nitrite concentrations far below the 30 mg/L threshold. Total nitrogen values were significantly lower than the short-term trigger range of 25–125 mg/L. All bores remained below guideline phosphorus values (12 mg/L) as detailed in Appendix D. No site-specific analysis has yet been conducted at Ashton to establish an appropriate phosphorus trigger. Turbidity does not have a defined livestock guideline for comparison, but results indicate that bores typically hand-bailed rather than pumped exhibit the highest turbidity. Cyanide concentrations across all samples were below the limit of reporting (LOR), with no detections exceeding applicable standards.

4.2 Coal measure and coal measure overburden (CMOB) aquifer monitoring

Groundwater level and quality measurements for coal measure and CMOB monitoring bores were collected consistently throughout 2025. Additionally, longwall-specific VWP pressure heads were monitored. Detailed hydrographs for these bores are provided in Figure 4.23 to Figure 4.27.

4.2.1 Coal measure and CMOB aquifer groundwater levels

Groundwater level trends for both coal measure and CMOB monitoring bores are illustrated in Figure 4.23 and Figure 4.24, respectively. Detailed groundwater level measurements for the LW207A/LW207B monitoring bores are presented in Figure 4.25, while, longwall-specific VWP readings for LW208 and LW403 are depicted in Figure 4.26 and Figure 4.27. Additionally, daily rainfall measurements and CRD data are included to provide a comparative analysis of water elevation trends.

The following key observations were made for 2025:

- Groundwater elevations were mostly stable in coal measure bores throughout the year (Figure 4.23).
- During 2025, CMOB monitoring bores generally showed rising groundwater levels, as illustrated in Figure 4.24. Most CMOB bores saw elevations increase until mid-2025, after which groundwater levels gradually evened out and began to decline toward the end of the year, particularly in late October—a trend that aligned with rainfall patterns. The WMLP324 bore was an exception, remaining nearly stable or slightly declining throughout 2025.
- Groundwater elevations in monitoring bores near active mining panels continue to be heavily influenced by the CRD, with elevations generally increasing until the end of August and declining thereafter, as shown in Figure 4.25.
- Pressure head at VWP WML113A, south of LW208, showed variable patterns throughout 2025 (Figure 4.26). The 40 m sensor followed trends similar to nearby shallow bores, rising mid-year due to increased rainfall, then gradually declining as rainfall decreased. The 65 m sensor exhibited a steady drop in pressure head, with groundwater levels falling by about 7 metres across the year. Data from the 95 m sensor was invalid between July and November due to a connection issue, but after fixing it in November, pressure head showed a steady or slight increase. The 124 m sensor consistently produced invalid data.
- WMLP361 is a VWP located nearer to active mining than WML113A. In 2025, its sensors showed variable trends: the 51 m sensor saw a pressure head rise in May followed by a steady decline; the 161 m sensor had invalid data in mid-March and late May but overall showed a slight increase; the 191 m sensor steadily decreased throughout the year. Sensors at 28 m and 109.5 m stopped providing valid readings as of February 2023 and October 2020. In July 2025, the logger stopped collecting data but was repaired in November and resumed normal operation thereafter (Figure 4.27).
- Coal measure and CMOB bores were not impacted by mining activities beyond what was predicted in 2025.

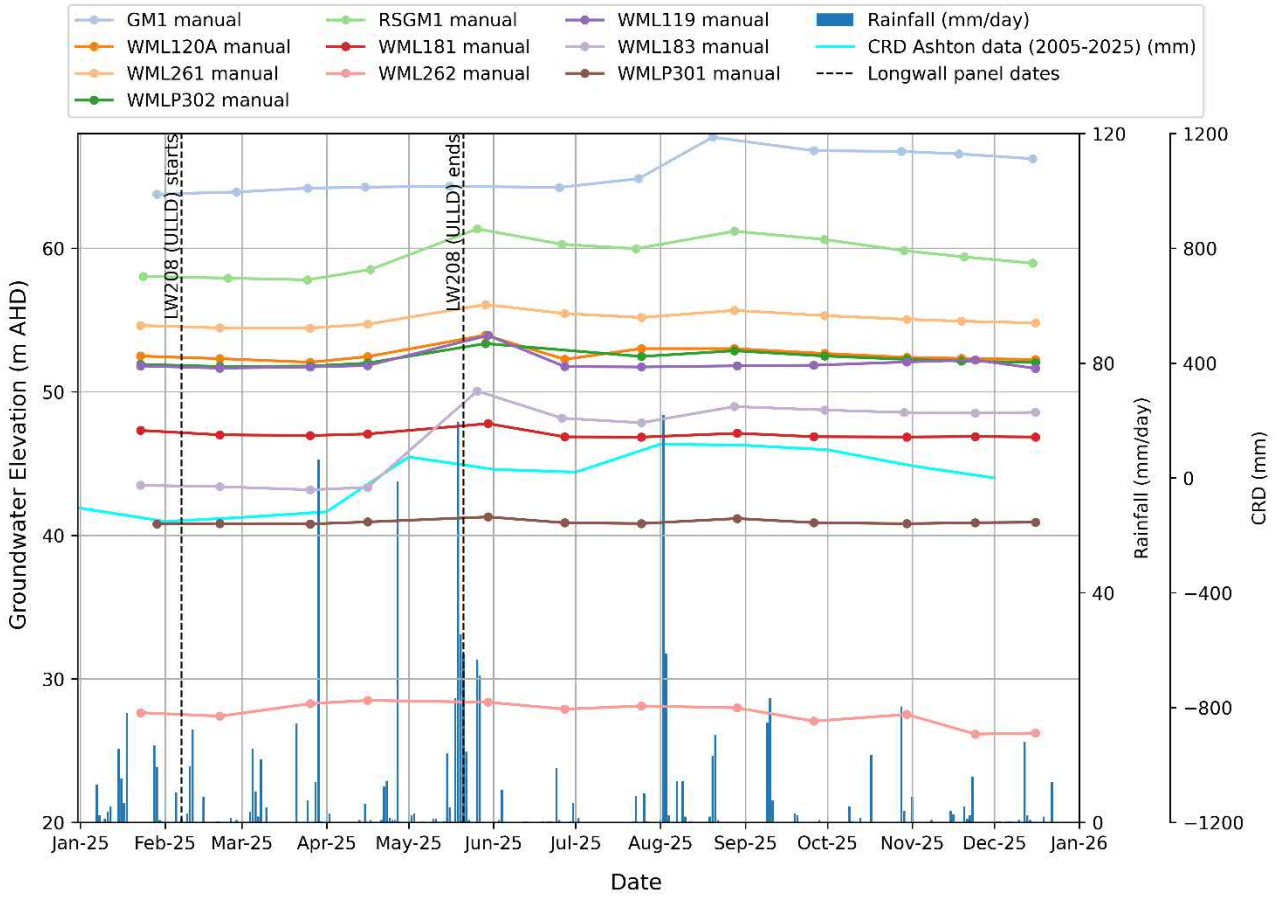

Figure 4.23 Coal measure bore hydrographs

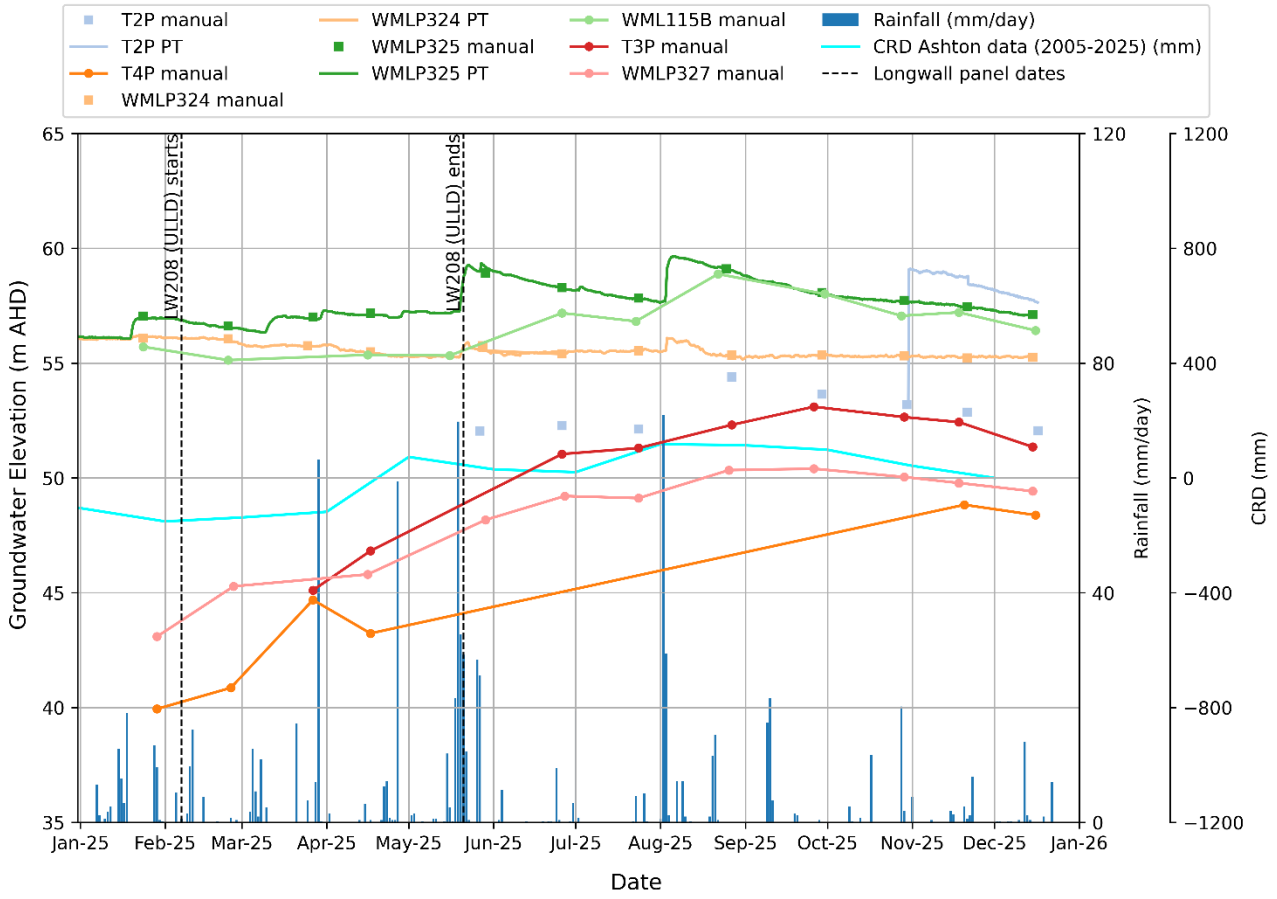

Figure 4.24 Coal measure overburden bore hydrographs

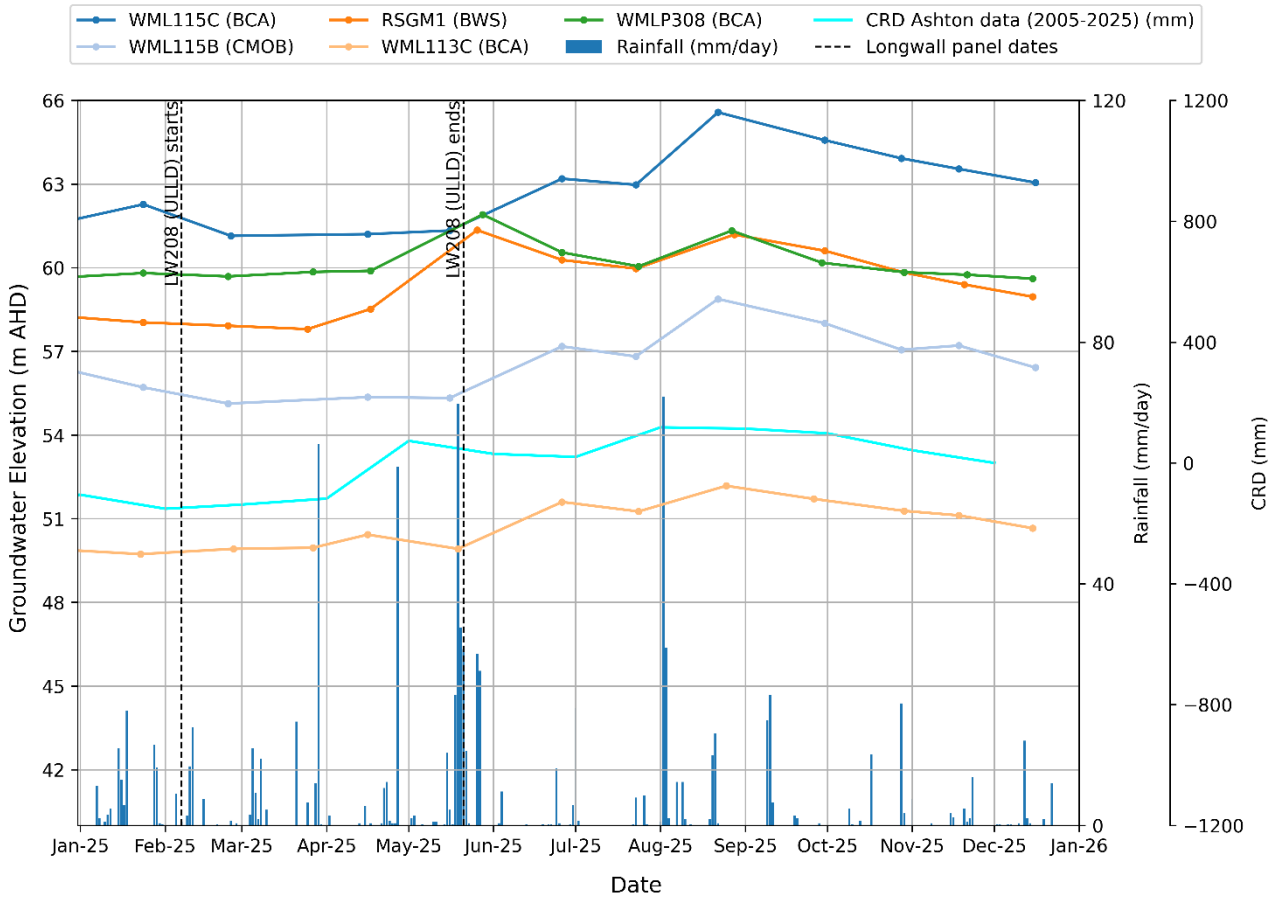

Figure 4.25 Hydrographs for monitoring bores in vicinity of LW208

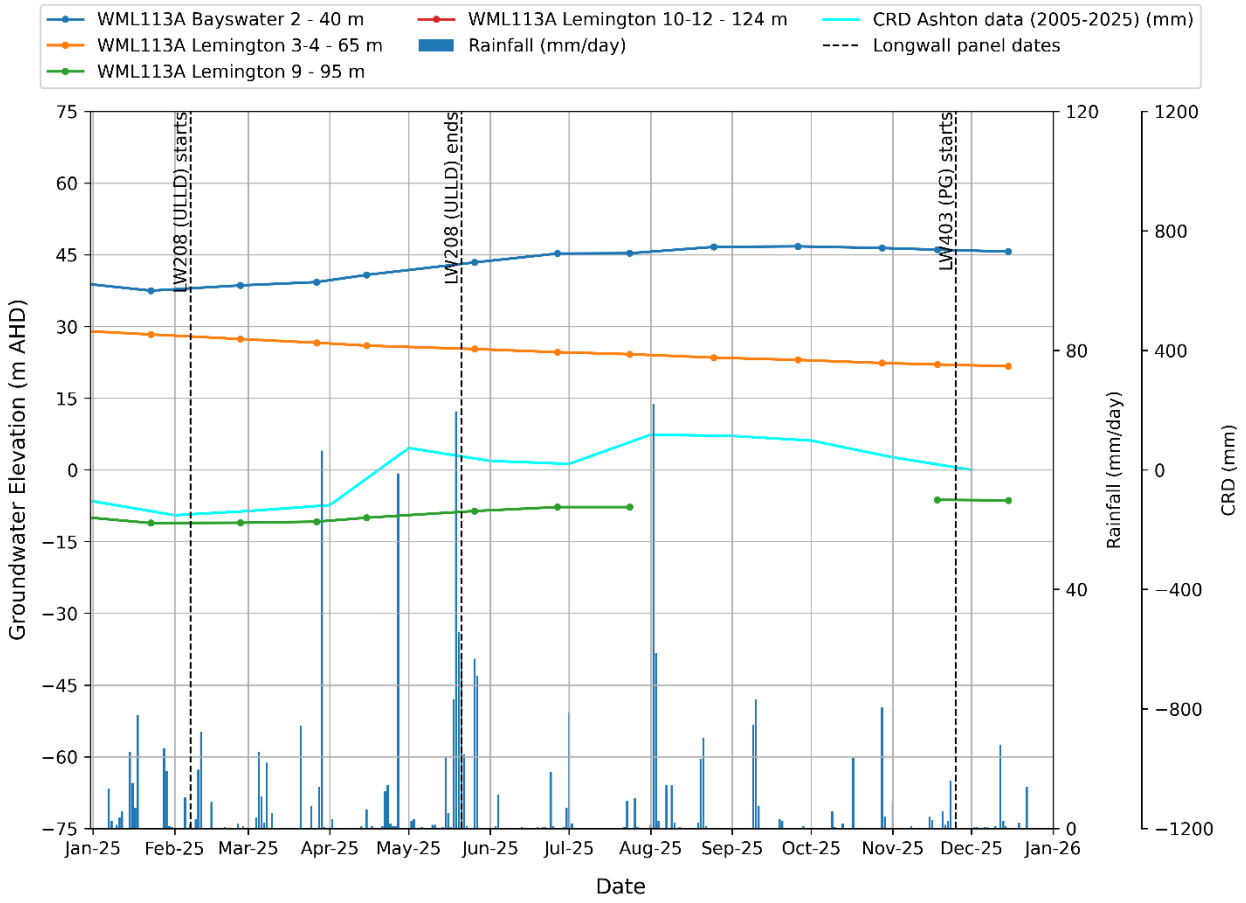

Figure 4.26 Hydrographs for VWP WML113A in vicinity of LW208 (1)

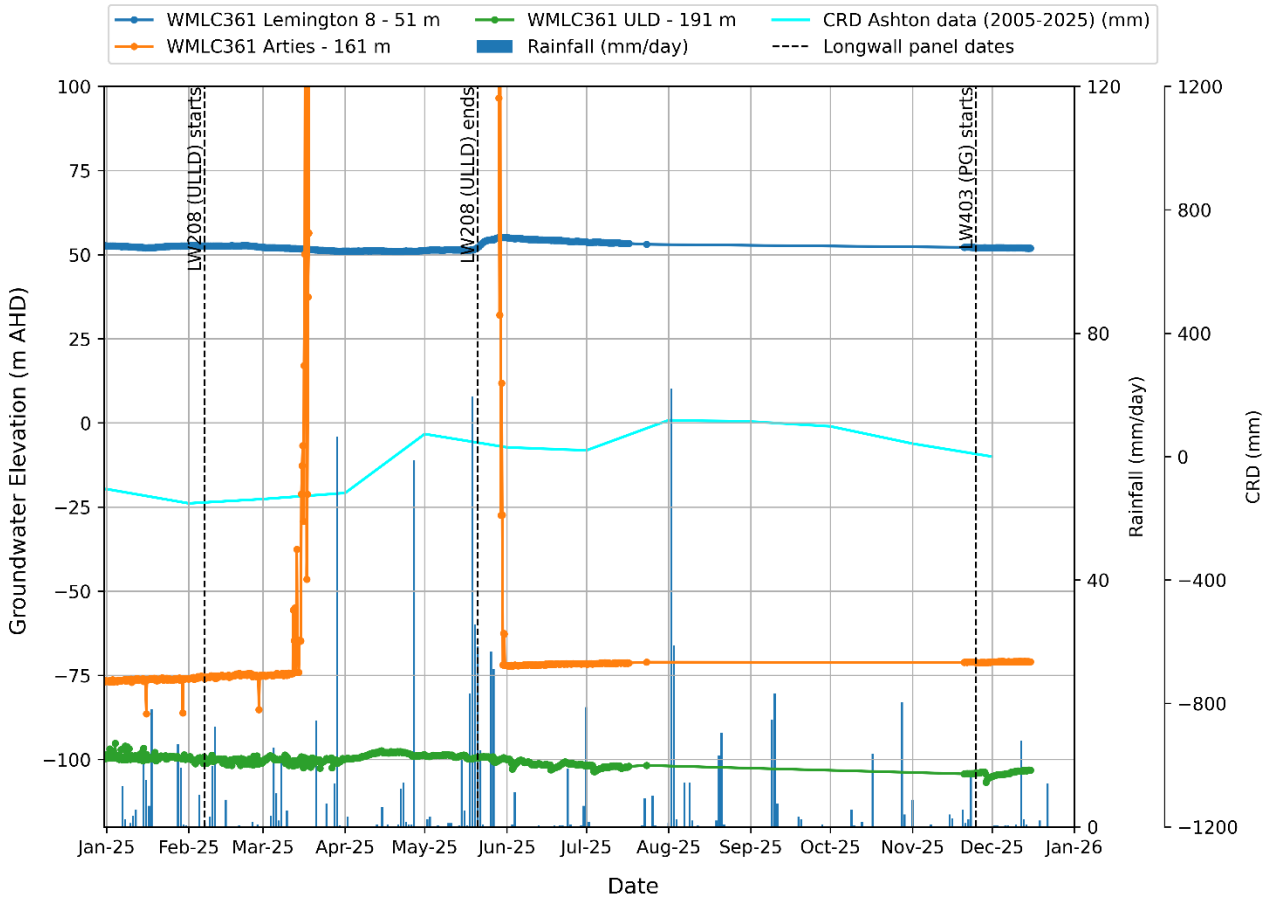

Figure 4.27 Hydrographs for VWP WMLP361 in vicinity of LW208 and LW403 (2)

4.2.2 pH, electrical conductivity and major ions

Coal measure and CMOB monitoring bores within the ACP monitoring network were sampled for pH, EC, and major ions throughout 2025, with the results displayed in Figure 4.28 to Figure 4.31. A detailed table of these results is provided in Appendix D, along with comprehensive analysis from the annual sampling conducted in August 2025. All related laboratory files are available in Appendix F for reference.

Groundwater pH in coal measure and CMOB bores was generally neutral to slightly alkaline throughout 2025, consistent with previous years. Readings for pH remained largely stable, predominantly ranging from 6.46 to 7.64. Any deviations outside this range were minimal and considered within the natural variation expected. The specific pH ranges observed within coal measure and CMOB bores in 2025 were as follows:

- coal measure – pH 6.46 (WML261) to pH 8.64 (WML119); and
- CMOB – pH 6.79 (WMLP324) to pH 7.95 (WMLP324).

In 2025, groundwater EC across the coal measure and CMOB monitoring network ranged from fresh to brackish. Most coal measure bores showed a decrease in EC throughout the year, except for WML181, which recorded a slight overall increase.

The EC ranges for coal measure and CMOB bores in 2025 were as follows:

- coal measure – 104.1 µS/cm (WML119) to 4,604 µS/cm (WML183); and
- CMOB – 437.2 µS/cm (WMLP324) to 1,940 µS/cm (WML115B).

The major ion content for coal measure and CMOB bores was assessed in 2025 (Appendix E). The cation water type in all monitoring bores was predominantly Na with lesser contributions from Ca and Mg. Anion chemistry is consistently dominated by Cl, coal measure and CMOB monitoring bores. Notably, the water types in coal measure bores were distinct from those in CMOB bores, with coal measure bores comparatively higher Mg contributions, while CMOB bores contained slightly higher concentrations of Ca.

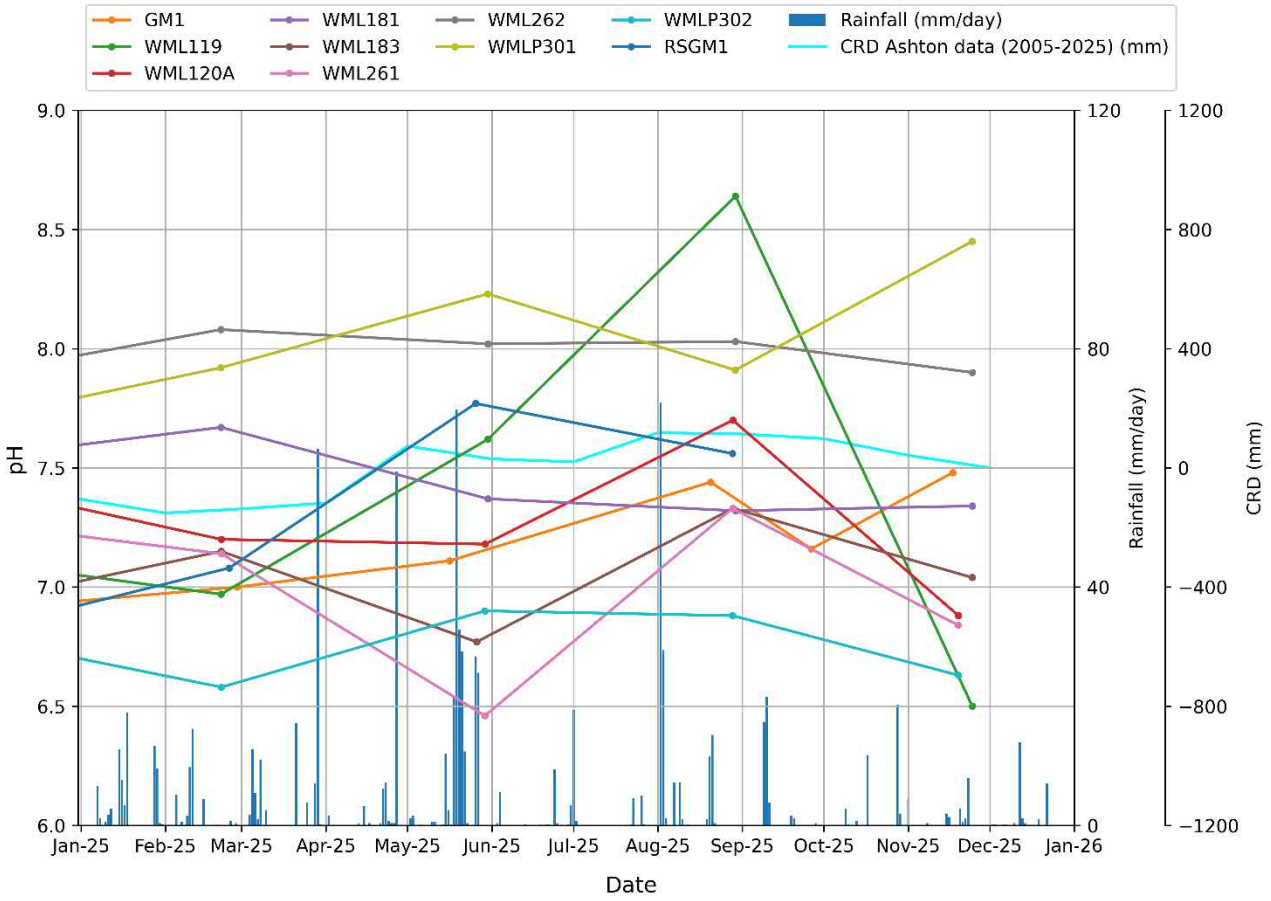

Figure 4.28 Coal measure bore pH trends

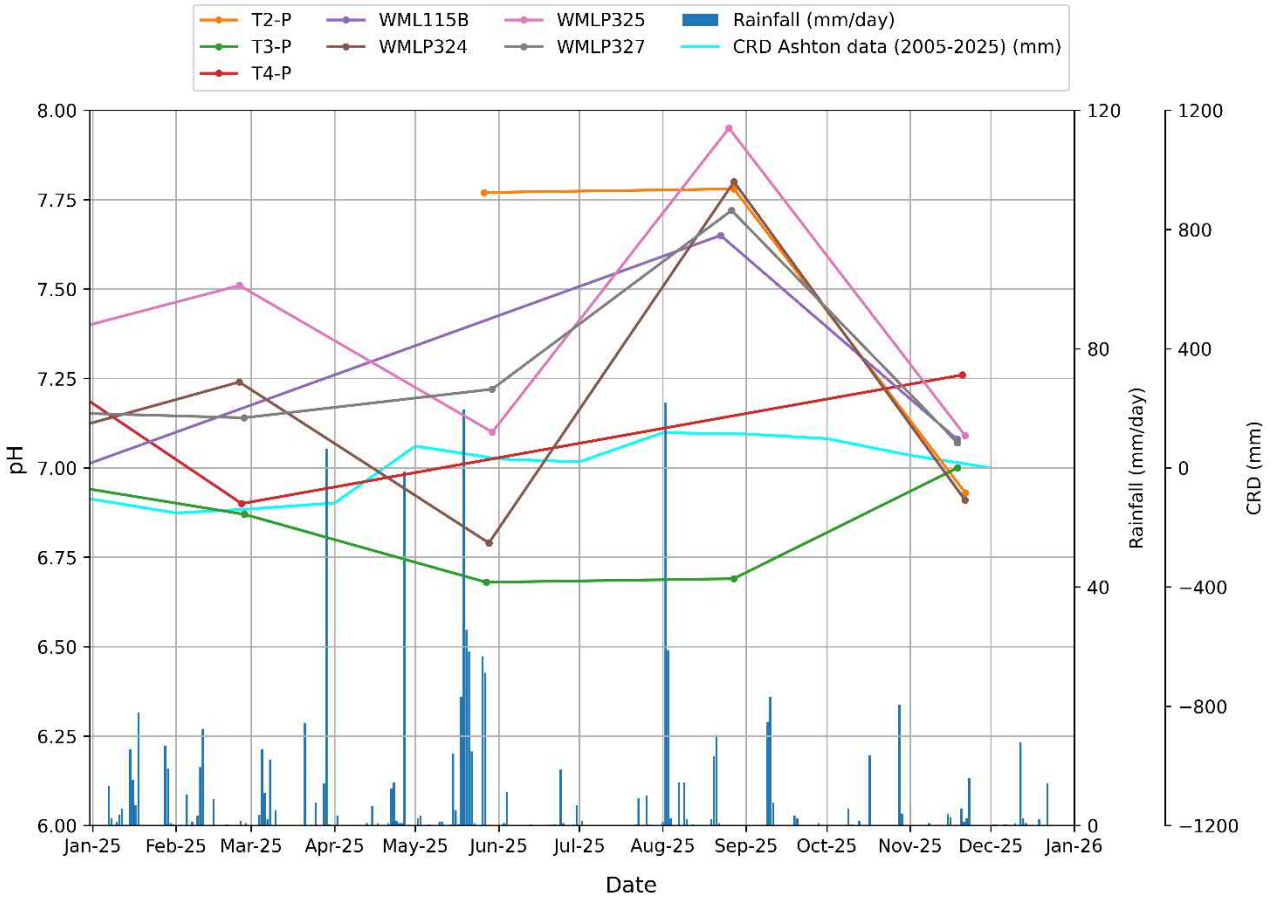

Figure 4.29 Coal measure overburden bore pH trends

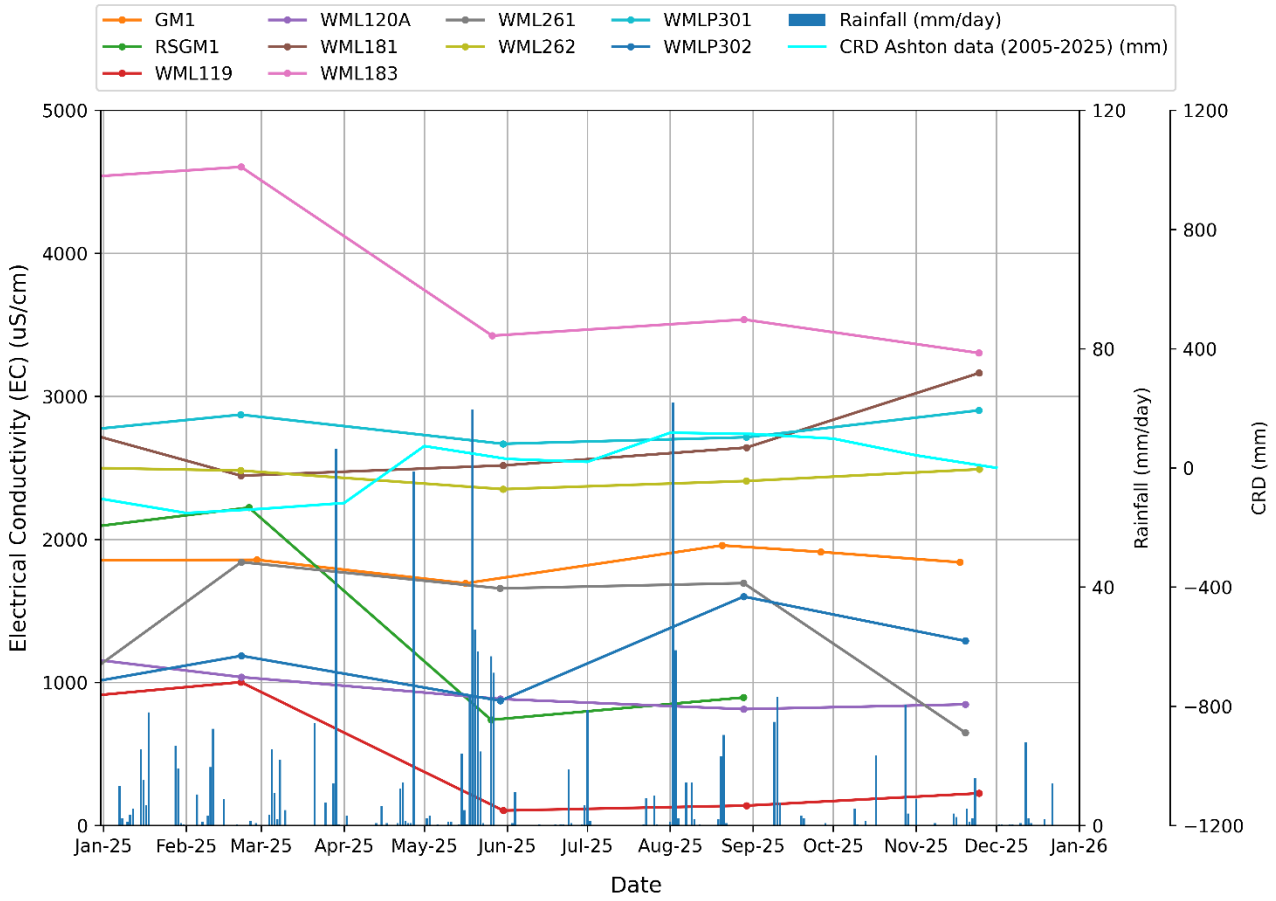

Figure 4.30 Coal measure bore EC trends

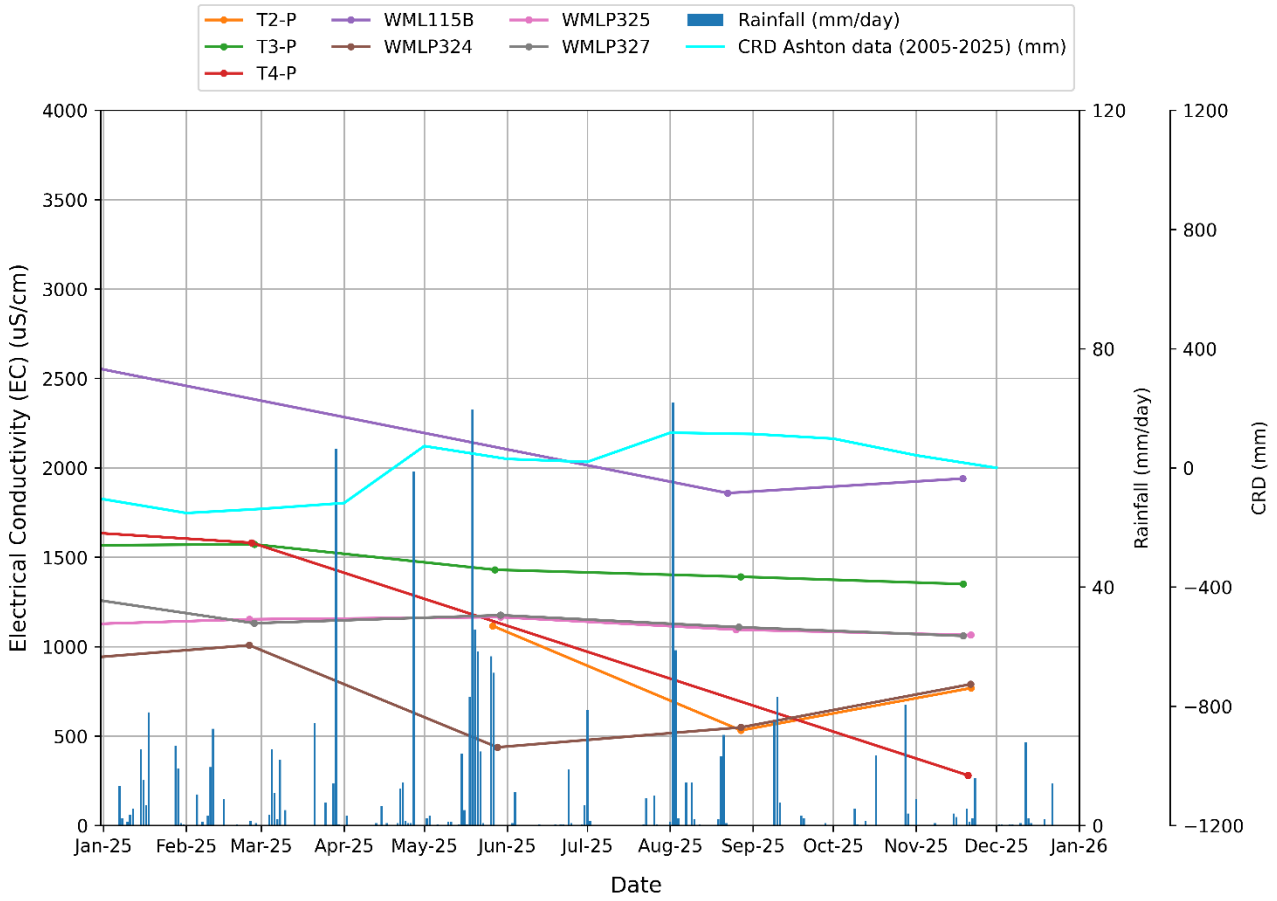

Figure 4.31 Coal measure overburden bore EC trends

4.2.3 Coal measure and CMOB - Dissolved metals, select nutrients, turbidity and cyanide

Comprehensive laboratory analysis conducted in August 2025 included the measurement of select dissolved metals, nutrients, turbidity, and cyanide, as detailed in the tables provided in Appendix D.

Dissolved metal concentrations were evaluated against the ANZECC|ARMCANZ livestock water quality guidelines (ANZECC & ARMCANZ, 2000), with no exceedances detected for any assessed metals, including arsenic, cadmium, chromium, copper, lead, nickel, selenium, and zinc. While manganese and iron were detected at very low concentrations, these metals are not considered toxic at such levels, and no ANZECC|ARMCANZ livestock water quality limits are defined for them.

The nutrient analysis encompassed nitrite and nitrate as N, total Kjeldahl nitrogen as N, total nitrogen as N, and total phosphorus as P. All nitrogen-related concentrations were low, with nitrate levels well below the ANZECC|ARMCANZ livestock guideline of 400 mg/L and nitrite levels far below the 30 mg/L threshold. Total nitrogen concentrations were consistently below the short-term trigger range of 25 to 125 mg/L. Phosphorus concentration values ranged from 0.02 mg/L (WML261) to 0.75 mg/L (RSGM1), well below the guideline value of 12 mg/L, as detailed in Appendix D. Turbidity, which lacks a defined livestock guideline, showed higher values in bores that were hand-bailed rather than pumped. Cyanide concentrations across all samples were below the limit of reporting (LOR), with no exceedances of applicable standards.

5 EPL 11879 monitoring bores

Monitoring results for 2025 from EPL 11879 bores (as specified in the Licence Variation of November 2022) are summarised in Table 5.1 (water levels) and Table 5.2 (EC).

Table 5.1 EPL 11879 monitoring bore groundwater levels (2025)

Bore ID	Feb-25	May-25	Aug-25	Nov-25
	Groundwater levels (m TOC)			
YAP016	3.88	3.63	3.31	3.67
WMLP320	-	5.98	5.92	7.33
WMLP279	13.17	11.17	11.02	12.37
WMLP280	11.64	9.64	9.31	10.78
WML120B	8.03	6.03	7.4	8.11
WML129	4.44	3.02	3.72	4.31
WMLP336	6.96	12.38	11.51	12.22
GM1	9.52	9.12	5.7	6.86
WML120A	8.64	7	7.94	8.62
WML262	32.32	31.35	31.74	33.57
WML181	17.3	16.52	17.19	17.42
WML183	33.33	26.67	27.75	28.21

Note: m TOC = metres top of casing.

Table 5.2 EPL 11879 monitoring bore groundwater EC measurements (2025)

Bore ID	Feb-25	May-25	Aug-25	Nov-25
	Groundwater EC (µS/cm)			
YAP016	1141	1023	1520	997.2
WMLP320	-	503.5	887.3	767.3
WMLP279	988.6	463.4	457.4	675.1
WMLP280	1009	538.7	883	684.9
WML120B	668.4	748.7	715.5	714.3
WML129	563.2	230.1	376.1	368.7
WMLP336	921.5	657.1	691.5	647.1
GM1	1857	1693	1958	1840
WML120A	1037	884	813.1	846
WML262	2481	2351	2408	2490
WML181	2445	2517	2642	3163
WML183	4604	3424	3537	3303

6 Mine inflow

Ashton Underground Mine inflows are estimated through an evaluation of dewatering abstraction volumes and a water balance assessment. The water balance approach is considered the most suitable method for assessing mine inflows, as the abstracted water comprises contributions from various sources, including groundwater, surface water, incidental take, and groundwater transitioning from its entry point to the abstraction point. This "stored" water is assumed to have a transition time on the order of years and is typically not classified as inflow from the past year. It is understood that this stored water primarily originates from groundwater sources, predominantly hard rock, rather than surface water. A portion of the abstracted water is believed to have infiltrated the mine prior to 2025, where it was temporarily stored in the goaf. Additionally, some of the incidental take from 2025 remains stored underground or has been lost as coal moisture or water vapor through outgoing air.

The assessment incorporates the following data sources:

- metered water volumes pumped into the mine from various sources;
- metered water volumes abstracted from the mine;
- Partitioned water contributions, derived from groundwater modelling, distinguishing between surface water and groundwater sources; and
- estimates of stored water volumes pumped from the mine.

The volumes are summarised in Table 6.1. In 2025, Ashton abstracted a total of 1701.99 ML of water through Borehole 8a (BH8a), Borehole 8b (BH8b), and the underground portal. Of the total volume, 215.99 ML was introduced into the mine as operational water, while the remaining 1486.00 ML was classified as incidental water take. The rest of the predicted incidental water is believed to have either been stored in the underground workings or lost through coal moisture and water vapor via out-by air. In 2025, the estimated abstracted inflow exceeded the total predicted water take for the year, resulting in a negative balance of -851.8 ML. This discrepancy is attributed to unexpected inflows encountered during the mining of LW207B, which required the abstraction of higher water volumes.

In 2023, ACOL engaged AGE to assess the potential sources of anomalously high-water inflow rates into the underground workings (AGE, 2023a). To evaluate the volume of groundwater potentially lost from the alluvium above LW206B, BCA groundwater elevation trends from late 2022 to June 2023 were analysed to identify the most impacted areas. The analysis suggested that the northern extent of the BCA above LW206B and LW207B was likely the most affected. The potential volumetric contribution from the BCA was then estimated using a range of specific yield values (1% - 15%), resulting in an impacted volume of between 5 ML and 81 ML, or approximately 543,000 m³. Water chemistry analysis further supported the conclusion that the majority of the anomalous inflow was sourced from deep groundwater, including that from seams below and including the Pikes Gully coal seam.

Table 6.1 Breakdown of abstracted water volumes (2025)

Total water abstracted from mine via BH6, BH7, BH8a BH8b and Portal	1701.99 ML	Mine water input (metered)	215.99 ML		
		Estimate of abstracted water considered inflow water	1486.00 ML	634.20 ML	Total predicted incidental water-take for 2025 (from 2023 GW)
		Portion of incidental water take considered stored in underground and/or lost via coal moisture and water vapour in out-by air	-851.8 ML		

7 Summary

Groundwater monitoring during the 2025 reporting period was conducted in accordance with the requirements outlined in the WMP. A summary of the key findings from this report is provided below:

- Throughout 2025, groundwater levels in the regulatory BCA monitoring bores were generally stable or declining, except in May and August when heavy rainfall temporarily increased groundwater elevations in all bores. Borehole T2A remained dry until August, at which point water levels recovered. All bores stayed above their trigger values during the year. Unlike the GCA and HRA, the BCA is not a regulated stream, and ACP has approval to intercept BCA groundwater under DA 309-11-2011-i MOD 5.
- Groundwater levels in other BCA alluvial bores (WML115C, WMLP308, RA18, WMLP320) stayed mostly steady but followed similar patterns as regulatory bores: water levels rose from early 2025 to August, then declined for the rest of the year, matching increased rainfall trends.
- Groundwater elevations in regulatory GCA bores remained largely consistent during the reporting period. Sampling from WMLP343 was not possible between August 2024 and August 2025 due to sediment accumulation within the screened interval. Increased precipitation in 2025 recharged water levels in the bore, enabling sampling to occur above the blockage. Airlift development is scheduled to address the sediment obstruction. Throughout 2025, no GCA groundwater elevations exceeded established trigger thresholds.
- HRA regulatory bore groundwater elevations were stable during the beginning of 2025,increased during the middle of the year, and decreased during the end of the year. Groundwater level in these bores can be partly attributed to rainfall and controlled releases upstream of the HR section crossing the ACP. All HRA elevations remained above trigger levels in 2025.
- Other non-regulatory HRA bores showed groundwater changes matching yearly rainfall, with marked rises in May and August. No mining impacts beyond earlier predictions were observed.
- Surface water elevations in Bowmans Creek, Glennies Creek, and the Hunter River were stable overall, with occasional spikes after heavy rainfall.
- Groundwater levels remained generally steady in coal measure bores over the year. A steady increase in groundwater elevation was seen in CMOB bores early in 2025, but levels started to drop around October, coinciding with below-average rainfall.
- Closer to active mining panels, groundwater elevations generally followed similar rainfall patterns with slight spikes in groundwater level during May and August and a declining trend from the end of August to the remainder of 2025 occurring in all bores.
- Pressure head at VWP bores WML113 and WMLP361 (near LW208 and LW403) showed varied trends in 2025. WML113's sensors at 40 m, 65 m, and 95 m functioned, but there was no data from 124 m. WMLP361 had working sensors at 51 m, 161 m, and 191 m; sensors at 28 m and 109.5 m stopped returning data in February 2023 and October 2020, respectively. The WMLP361 logging unit was offline from July and was repaired in November.
- Groundwater pH in alluvial bores remained mostly stable in 2025, generally between 6.5–7.5. A few bores, including WMLP349 and WMLP358, exceeded pH trigger values multiple times. This was attributed to the period in which triggers were derived not being representative of long term climatic conditions at Ashton. The 2025 pH ranges were: BCA (6.42–8.06), GCA (6.48–8.32), and HRA (6.31–8.51).
- In 2025, groundwater electrical conductivity (EC) across the BCA, GCA, and HRA monitoring networks ranged from fresh to slightly brackish, consistent with previous years' observations. Most bores exhibited stable to slightly declining EC levels throughout 2025. However, bore WMLP358 consistently recorded EC values exceeding trigger level criteria, registering four trigger level exceedances during the year. Investigations into these exceedances, particularly at WMLP349 and WMLP358, recommended revising trigger thresholds to better account for natural variability. HRA bores WMLP279 and WMLP337 exceeded EC triggers in April, but no other significant exceedances were recorded. Observed EC ranges were 213.4–3,878 µS/cm (BCA), 230.1–1,049 µS/cm (GCA), and 378.2–3,169 µS/cm (HRA).
- Electrical conductivity in surface water of rivers and creeks stayed consistent overall, showing brief variations following rainfall that returned to normal quickly.

- The major ion content of alluvial systems was assessed, with the cation water type dominated by Na or Ca, and Cl being the dominant anion, followed by lower concentrations of HCO3 and SO4. The BCA and HRA water types were similar but differed from the GCA water types due to variations in water sources and recharge/discharge mechanisms.
- No exceedances were observed for metals in alluvial bores, with levels of manganese and iron considered non-toxic. Nutrient analysis showed low nitrogen, turbidity was higher in hand-bailed bores, and cyanide levels were below detection limits.
- In 2025, groundwater pH levels in coal measure and CMOB monitoring bores stayed mostly stable and slightly alkaline, typically ranging from 6.5 to 7.5, which was similar to previous years. Only minimal deviations outside this range occurred, all within natural variation. For coal measure bores, the pH ranged from 6.46 to 8.64, while CMOB bores showed a pH range of 6.79 to 7.95.
- In 2025, groundwater EC readings in coal measure and CMOB bores ranged from fresh to brackish, with most bores showing an overall decrease. However, WML181 differed from prevailing trends by recording a general increase in groundwater EC. The EC values varied from 104.1 µS/cm to 4604.0 µS/cm in coal measure bores, and from 437.2 µS/cm to 1940.0 µS/cm in CMOB bores.
- Both coal measure and CMOB bores had Na or Ca as the main cations and Cl as the primary anion. However, coal measure bores were higher in Mg, while CMOB bores had greater amounts of Ca. These differences help distinguish the water types from each source.
- Dissolved metal concentrations in coal measure and CMOB bores were found to comply with ANZECC|ARMCANZ guidelines, with no exceedances observed for metals such as arsenic, cadmium, and zinc. Manganese and iron were present at low, non-toxic levels. Nutrient analysis indicated low nitrogen content, with nitrate and nitrite concentrations well below guideline thresholds, and no bores exceeded trigger ranges for phosphorus. Turbidity was elevated in hand-bailed bores, while cyanide levels remained below detection limits and no exceedances were recorded.
- During the 2025 monitoring period, the monitoring bores specified under EPL 11879 showed varying groundwater levels and electrical conductivity (EC) readings.
- Actual inflows into the underground mine surpassed initial forecasts. Previous investigations have determined that most of the groundwater entering the mine is probably originating from deep Permian strata, rather than from surface water sources.

Overall, the site's impacts match predictions, with minimal impacts on the GCA and HRA alluvial aquifers, and coal measure impacts remaining within expected levels.

8 References

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Appendix A

Summary of WMP monitoring locations

Table A 1 GWMP monitoring locations summary

ID	Type	Easting (GDA94 Z56)	Northing (GDA94 Z56)	Top of casing (m AHD)	Depth (m BGL)
Ashton Well	Monitoring bore	318355	6406029	62	-
GM1	EPL Monitoring bore*	318431	6407214	67	203
GM3A	Monitoring bore	320246.5	6405976.9	59	7.5
GM3B	Monitoring bore	320250.9	6405976.7	59	16.2
PB1	Monitoring bore	317545	6405301	61.1	7.8
RA02	Monitoring bore	317712.8	6405233	55.2	11.3
RA18	Monitoring bore	317821.8	6405434.2	62.6	8.5
RA27	Monitoring bore	317952.1	6403738	61.6	10.7
RM01	Monitoring bore	318041	6404109.5	69.4	9.8
RM02	Monitoring bore	317942	6404506	61.1	12.9
RM03	Monitoring bore	317667	6404844.5	62.1	9.5
RM10	Monitoring bore	317589	6405292	61.6	10.5
RSGM1	Monitoring bore	317655	6406302	65.6	8.5
T2-A	Monitoring bore	317583.3	6405217.4	60.8	7.9
T2-P	Monitoring bore	317587	6405222	60.7	14.5
T3-A	Monitoring bore	317654.2	6404708	59.9	10.8
T3-P	Monitoring bore	317650	6404702	59.8	22.8
T4-A	Monitoring bore	317685.8	6404323.1	58.6	10.7
T4-P	Monitoring bore	317683	6404319	58.5	17.5
T5	Monitoring bore	317946.1	6406549.4	65.3	8.3
WML113A	Vibrating wire piezometer	317369	6404529	60.2	125
WML113C	Monitoring bore	317377	6404526	60.2	11.2
WML115B	Monitoring bore	317881	6406704	66.4	13
WML115C	Monitoring bore	317888	6406710	66.2	6.2
WML119	Monitoring bore	319255.3	6403930.1	61.5	25.8
WML120A	EPL Monitoring bore*	319292	6404579.6	60.4	15
WML120B	EPL Monitoring bore*	319293.6	6404587.5	60.1	9
WML129	EPL Monitoring bore*	319468.4	6403527.8	55.3	4.6
WML181	EPL Monitoring bore*	319215	6403958.3	64.3	36.7
WML183	EPL Monitoring bore*	319188.2	6404325.2	76.7	45.5
WML213	Vibrating wire piezometer	317210	6404154	61.5	316
WML239	Monitoring bore	319345	6404044.8	58.8	12.2
WML245	Vibrating wire piezometer	320035	6404835	64.9	110
WML261	Monitoring bore	319320.2	6404705.9	58.7	43
WML262	EPL Monitoring bore*	319220.1	6403927.7	63.2	60.3
WMLP269	Vibrating wire piezometer	317850	6404073	65.5	147

ID	Type	Easting (GDA94 Z56)	Northing (GDA94 Z56)	Top of casing (m AHD)	Depth (m BGL)
WMLC144	Vibrating wire piezometer	319500	6404170	59.3	132
WMLC248	Vibrating wire piezometer	319326	6404721	58.5	144.6
WMLC334	Vibrating wire piezometer	318589	6403088	75.9	218.5
WMLC335	Vibrating wire piezometer	318892	6402936	64.5	200.5
WMLP277	Monitoring bore	317643.2	6403958.5	59	13.3
WMLP278	Monitoring bore	317626.3	6403894.2	62.3	11.5
WMLP279	EPL Monitoring bore*	317298.9	6403991.8	62.7	17.2
WMLP280	EPL Monitoring bore*	317797.6	6403793.4	62.5	14.9
WMLP301	Monitoring bore	319235	6403858	60.2	41.5
WMLP302	Monitoring bore	319299.6	6404600.2	59.7	25.2
WMLP308	Monitoring bore	318222.7	6406373	65.7	8.9
WMLP311	Monitoring bore	318178.9	6406047.9	63.6	7.6
WMLP320	EPL Monitoring bore*	317457.2	6405388	61.5	8.5
WMLP323	Monitoring bore	318242.2	6406594.7	64.5	7.3
WMLP324	Monitoring bore	318240	6406594	64.5	14.1
WMLP325	Monitoring bore	318181	6406050	63.7	14.6
WMLP326	Monitoring bore	317571	6404103.2	59.3	11.9
WMLP327	Monitoring bore	317573	6404103	59.4	18.3
WMLP328	Monitoring bore	317927.3	6405611.6	62.8	11.5
WMLP336	EPL Monitoring bore*	318965.4	6402841.9	60.6	15.5
WMLP337	Monitoring bore	318418	6403129	59.9	13.5
WMLP338	Monitoring bore	318624.7	6402794	58.8	12.9
WMLP343	Monitoring bore	319623	6404606	61	9.6
WMLP346	Monitoring bore	319366.5	6404457.2	60.68	11.5
WMLP349	Monitoring bore	319516	6404198	58.3	8.7
WMLP358	Monitoring bore	319560	6403704	59.49	9.3
WMLP361	Vibrating wire piezometer	317722	6405962	62.9	191
WMLP363	Vibrating wire piezometer	317963	6406634	66	164
YAP016	EPL Monitoring bore*	318438	6407195	66.8	7.3

Note: * Per EPL 11879 (Licence version date: 3 November 2022).

Appendix B

Summary of GWMP Plan – parameters and frequency

Table B 1 GWMP plan summary

ID	Type	Data recording method	Targets	Monthly	Quarterly	Annually
Ashton Well	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
GM1	EPL Monitoring bore*	-	Coal measure	Water level only	Monthly plus field EC only	Quarterly plus field parameters and **comprehensive** analysis
GM3A	Monitoring bore	-	GCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
GM3B	Monitoring bore	-	GCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
PB1	Monitoring bore	-	BCA	Water level only	Monthly plus field EC only	Quarterly plus minor lab analysis
RA02	Monitoring bore	-	BCA + CMOB	Water level only	Monthly plus field EC only	Quarterly plus field parameters and **comprehensive** analysis
RA18	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
RA27	Monitoring bore	-	HRA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
RM01	Monitoring bore	-	BCA	Water level only	Monthly plus field EC only	Quarterly plus minor lab analysis
RM02	Monitoring bore	-	BCA + CMOB	Water level only	Monthly plus field EC only	Water level and field EC only
RM03	Monitoring bore	-	BCA + CMOB	Water level only	Monthly plus field EC only	Quarterly plus minor lab analysis
RM10	Monitoring bore	-	BCA + CMOB	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus minor lab analysis
RSGM1	Monitoring bore	-	Coal measure (BWS)	Water level only	Monthly plus field EC only	Quarterly plus field parameters and **comprehensive** analysis
T2-A	Monitoring bore	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
T2-P	Monitoring bore	Pressure transducer	CMOB	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
T3-A	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
T3-P	Monitoring bore	-	CMOB	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis

ID	Type	Data recording method	Targets	Monthly	Quarterly	Annually
T4-A	Monitoring bore	-	BCA + BWS	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
T4-P	Monitoring bore	-	CMOB	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
T5	Monitoring bore	Pressure transducer	BCA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WML113A	Vibrating wire piezometer	-	BW 2, Lem 4, Lem 9, Lem 11-12, Lem 15	Pressure head	Pressure head	Pressure head
WML113C	Monitoring bore	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WML115B	Monitoring bore	-	CMOB & Lem 3-4	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
WML115C	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
WML119	Monitoring bore	-	PG	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WML120A	EPL Monitoring bore*	-	PG	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WML120B	EPL Monitoring bore*	-	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WML129	EPL Monitoring bore*	Pressure transducer	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WML181	EPL Monitoring bore*	-	PG	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WML183	EPL Monitoring bore*	-	PG	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WML213	Vibrating wire piezometer	-	BWS, Lem 8-9, Lem 15, Lem 19, PG, ULD, ULLD, LB	Pressure head	Pressure head	Pressure head
WML239	Monitoring bore	Pressure transducer	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis

ID	Type	Data recording method	Targets	Monthly	Quarterly	Annually
WML245	Vibrating wire piezometer	-	ULD, MLD, LB, LB-HEB int	Pressure head	Pressure head	Pressure head
WML261	Monitoring bore	-	ULD	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WML262	EPL Monitoring bore*	-	ULD	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP269	Vibrating wire piezometer	-	Lem 5, Lem 7, Lem 8-9, Lem 11-12, Lem 15, Lem 19	Pressure head	Pressure head	Pressure head
WMLC144	Vibrating wire piezometer	-	ULD, MLD1, MLD2, ULLD, LLLD, UBS, LB	Pressure head	Pressure head	Pressure head
WMLC248	Vibrating wire piezometer	-	ULD, ULLD, LB, HEB	Pressure head	Pressure head	Pressure head
WMLC334	Vibrating wire piezometer	-	Lem 13, Lem 15, Lem 18/19, Art, ULD, ULLD, UB, LB	Pressure head	Pressure head	Pressure head
WMLC335	Vibrating wire piezometer	-	Lem 15B, Lem 17, PG Upper, Art, ULD, LLLD, UB, LB	Pressure head	Pressure head	Pressure head
WMLP277	Monitoring bore	Pressure transducer	HRA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WMLP278	Monitoring bore	-	HRA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WMLP279	EPL Monitoring bore*	-	HRA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP280	EPL Monitoring bore*	-	HRA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP301	Monitoring bore	-	Arties Seam	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP302	Monitoring bore	-	Arties Seam	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis

ID	Type	Data recording method	Targets	Monthly	Quarterly	Annually
WMLP308	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WMLP311	Monitoring bore	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP320	EPL Monitoring bore*	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
WMLP323	Monitoring bore	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP324	Monitoring bore	Pressure transducer	CMOB	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP325	Monitoring bore	Pressure transducer	CMOB	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WMLP326	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
WMLP327	Monitoring bore	-	CMOB	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
WMLP328	Monitoring bore	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP336	EPL Monitoring bore*	-	HRA + CMOB	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP337	Monitoring bore	-	HRA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP338	Monitoring bore	-	HRA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WMLP343	Monitoring bore	Pressure transducer	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP346	Monitoring bore	Pressure transducer	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP349	Monitoring bore	-	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP358	Monitoring bore	-	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis

ID	Type	Data recording method	Targets	Monthly	Quarterly	Annually
WMLP361	Vibrating wire piezometer	VWP datalogger	Lem 5, Lem 8, Lem 15A, Art, ULD	Pressure head	Pressure head	Pressure head
WMLP363	Vibrating wire piezometer	VWP datalogger	CMOB, Lem 8, Lem 9-10 int, Lem 12, Lem 14, Lem 15, PG roof, ULD	Pressure head	Pressure head	Pressure head
YAP016	EPL Monitoring bore*	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis

Note: * Per EPL 11879 (Licence version date: 3 November 2022).

Appendix C

Extract from GWMP protocol for exceedance of groundwater trigger values (Yancoal, 2025)

In the event of a groundwater assessment criterion (Table 21 and Section 7.2) being exceeded, the following protocol will be followed:

1. Check and validate the data which indicates an exceedance of the criterion, including whether the exceedance is ongoing.
2. A preliminary investigation will be undertaken to establish the cause(s) and determine whether changes to the water management system or operations are required. This will involve the consideration of the monitoring results in conjunction with:
   a) site activities being undertaken at the time;
   b) activities at nearby operations (cumulative affects);
   c) groundwater extraction by others;
   d) baseline monitoring results and natural fluctuations;
   e) predictive modelling;
   f) groundwater monitoring at nearby locations;
   g) the prevailing and preceding meteorological and streamflow conditions; and
   h) changes to the land use/activities being undertaken nearby.
3. If the preliminary investigation shows that the impact is linked to activities undertaken by ACOL, a report will be emailed to the DPHI and any other relevant department. Causal factors will be addressed and rectified if possible. Contingency measures will be developed in consultation with the DPHI and any other relevant department and implemented in response to the outcomes of the investigation.
4. Remedial/compensatory measures will be developed in consultation with DPHI and any other relevant department and implemented in response to the outcomes of the investigations.
5. Monitoring would be implemented as required to confirm the effectiveness of remedial measures.
6. Where required, an independent hydrogeologist will be engaged to conduct investigations. ACOL will seek the Secretary of DPHI's approval in selecting a hydrogeologist.

Where a groundwater performance trigger continues to be exceeded for six sampling events, ACOL will:

- Notify DCCEEW-Water that the groundwater performance trigger has been exceeded for six sampling events.
- Conduct further analysis to understand the cause of the continued exceedance.
- Any exceedances and responses taken to ameliorate these exceedances will be reported in the Annual Review.

Appendix D

Annual groundwater quality laboratory results 2025

Bore ID	Geology	Laboratory ID	Date	pH Value (Field)	pH Value (Lab)	pH RPD	EC (Field)	EC (Lab)	EC RPD	Total Dissolved Solids (TDS)
Units				**pH**	**pH**	**%**	**µS/cm**	**µS/cm**	**%**	**mg/L**
Limit of Reporting (LOR)				**-**	**0.01**	**-**	**-**	**1**	**-**	**10**
ANZECC livestock limits				**-**	**-**	**-**	**5970**	**5970**	**-**	**4000**
Ashton Well	BCA	ES2526126004	22-Aug-25	7.44	7.20	3.28	404.6	402	0.64	-
GM1	Coal	ES2525820002	20-Aug-25	7.44	7.36	1.08	1958	1900	3.01	1110
GM3A	GCA	ES2525820003	20-Aug-25	7.44	7.85	-5.36	5971	5990	-0.32	-
PB1	BCA	ES2526126006	22-Aug-25	7.81	7.06	10.09	261.9	260	0.73	-
RA18	BCA	ES2526855010	29-Aug-25	7.08	7.00	1.14	984.8	997	-1.23	-
RA27	HRA	ES2526262002	25-Aug-25	7.07	7.09	-0.28	1518	1540	-1.44	890
RM01	BCA	ES2526855008	28-Aug-25	8.65	6.52	28.08	2536	2570	-1.33	-
RM10	BCA + CMOB	ES2526126005	22-Aug-25	7.88	7.76	1.53	330.4	326	1.34	-
RSGM1	Coal	ES2526855002	28-Aug-25	7.56	7.52	0.53	894.5	901	-0.72	976
T2-A	BCA	ES2526559010	27-Aug-25	7.34	7.18	2.20	970.9	978	-0.73	557
T2-P	CMOB	ES2526559011	27-Aug-25	7.78	6.99	10.70	531.8	535	-0.60	358
T3-A	BCA	ES2526559008	26-Aug-25	7.46	6.99	6.51	2389	2410	-0.88	1600
T3-P	CMOB	ES2526559009	27-Aug-25	6.69	7.20	-7.34	1391	1390	0.07	807
T5	BCA	ES2526855001	28-Aug-25	7.15	6.96	2.69	267.1	265	0.79	393
WML113C	BCA	ES2526262001	25-Aug-25	6.65	7.01	-5.27	815.7	816	-0.04	491
WML115B	CMOB	ES2526126002	22-Aug-25	7.65	7.06	8.02	1859	1870	-0.59	-
WML115C	BCA	ES2526126003	22-Aug-25	7.49	7.02	6.48	213.4	213	0.19	-
WML119	Coal	ES2526855014	29-Aug-25	8.64	6.60	26.77	138.6	125	10.32	346
WML120A	Coal	ES2526855005	28-Aug-25	7.70	7.24	6.16	813.1	822	-1.09	492
WML120B	GCA	ES2526855006	28-Aug-25	7.56	6.80	10.58	715.5	727	-1.59	464
WML129	GCA	ES2526855016	29-Aug-25	8.32	7.29	13.20	376.1	373	0.83	236
WML181	Coal	ES2526855015	29-Aug-25	7.32	7.27	0.69	2642	2670	-1.05	1540
WML183	Coal	ES2526855007	28-Aug-25	7.33	7.17	2.21	3537	3590	-1.49	2080

Bore ID	Geology	Laboratory ID	Date	pH Value (Field)	pH Value (Lab)	pH RPD	EC (Field)	EC (Lab)	EC RPD	Total Dissolved Solids (TDS)
Units				**pH**	**pH**	**%**	**µS/cm**	**µS/cm**	**%**	**mg/L**
Limit of Reporting (LOR)				**-**	**0.01**	**-**	**-**	**1**	**-**	**10**
ANZECC livestock limits				**-**	**-**	**-**	**5970**	**5970**	**-**	**4000**
WML239	GCA	ES2525820007	20-Aug-25	7.58	7.02	7.67	573.3	556	3.06	336
WML261	Coal	ES2526855003	28-Aug-25	7.33	7.14	2.63	1694	1710	-0.94	932
WML262	Coal	ES2526855013	29-Aug-25	8.03	8.02	0.12	2408	2430	-0.91	1460
WMLP277	HRA	ES2526559004	26-Aug-25	8.51	7.28	15.58	710.5	723	-1.74	420
WMLP278	HRA	ES2526262004	25-Aug-25	7.95	7.22	9.62	378.2	379	-0.21	240
WMLP279	HRA	ES2526559005	26-Aug-25	7.69	7.06	8.54	457.4	468	-2.29	310
WMLP280	HRA	ES2526262003	25-Aug-25	7.82	7.06	10.22	883	892	-1.01	499
WMLP301	Coal	ES2526855012	29-Aug-25	7.91	7.95	-0.50	2714	2750	-1.32	1980
WMLP302	Coal	ES2526855004	28-Aug-25	6.88	7.32	-6.20	1600	6010	-115.90	3640
WMLP308	BCA	ES2526559014	27-Aug-25	7.94	7.04	12.02	653.3	681	-4.15	430
WMLP311	BCA	ES2526262005	25-Aug-25	7.61	6.88	10.08	927.7	941	-1.42	542
WMLP320	BCA	ES2526855009	29-Aug-25	6.58	6.91	-4.89	887.3	895	-0.86	535
WMLP323	BCA	ES2526559013	27-Aug-25	7.96	7.04	12.27	478.3	484	-1.18	322
WMLP324	CMOB	ES2526559012	27-Aug-25	7.80	7.18	8.28	548.5	551	-0.45	326
WMLP325	CMOB	ES2526262006	25-Aug-25	7.95	7.47	6.23	1095	1110	-1.36	632
WMLP326	BCA	ES2526559006	26-Aug-25	8.06	7.32	9.62	761.3	769	-1.01	-
WMLP327	CMOB	ES2526559007	26-Aug-25	7.72	7.18	7.25	1109	1120	-0.99	-
WMLP328	BCA	ES2526855011	29-Aug-25	7.48	7.14	4.65	700.8	705	-0.60	519
WMLP336	HRA + CMOB	ES2526559001	26-Aug-25	6.41	6.62	-3.22	691.5	695	-0.50	424
WMLP337	HRA	ES2526559003	26-Aug-25	7.11	7.17	-0.84	3169	3210	-1.29	1840
WMLP338	HRA	ES2526559002	26-Aug-25	6.77	6.82	-0.74	2419	2430	-0.45	1500
WMLP343	GCA	ES2525820005	20-Aug-25	7.56	7.32	3.23	744.1	711	4.55	380
WMLP346	GCA	ES2525820006	20-Aug-25	7.28	6.90	5.36	650.7	631	3.07	348

Bore ID	Geology	Laboratory ID	Date	pH Value (Field)	pH Value (Lab)	pH RPD	EC (Field)	EC (Lab)	EC RPD	Total Dissolved Solids (TDS)
Units				**pH**	**pH**	**%**	**µS/cm**	**µS/cm**	**%**	**mg/L**
Limit of Reporting (LOR)				**-**	**0.01**	**-**	**-**	**1**	**-**	**10**
ANZECC livestock limits				**-**	**-**	**-**	**5970**	**5970**	**-**	**4000**
WMLP349	GCA	ES2525820004	20-Aug-25	8.21	6.86	17.92	438.5	429	2.19	264
WMLP358	GCA	ES2526126001	22-Aug-25	6.53	6.70	-2.57	433.5	424	2.22	293
YAP016	BCA	ES2525820001	20-Aug-25	6.71	7.12	-5.93	1520	1480	2.67	855

Bore ID	Geology	Laboratory ID	Date	Calcium	Magnesium	Sodium	Potassium	Chloride
Units				**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
Limit of Reporting (LOR)				**1**	**1**	**1**	**1**	**1**
ANZECC livestock limits				**-**	**-**	**-**	**-**	**-**
Ashton Well	BCA	ES2526126004	22-Aug-25	30.00	10.00	38.00	4	47
GM1	Coal	ES2525820002	20-Aug-25	76.00	53.00	262.00	4	411
GM3A	GCA	ES2525820003	20-Aug-25	26.00	22.00	1360.00	5	1420
PB1	BCA	ES2526126006	22-Aug-25	9.00	4.00	41.00	<1	19
RA18	BCA	ES2526855010	29-Aug-25	35.00	21.00	138.00	1	173
RA27	HRA	ES2526262002	25-Aug-25	50.00	41.00	214.00	<1	294
RM01	BCA	ES2526855008	28-Aug-25	10.00	22.00	460.00	7	815
RM10	BCA + CMOB	ES2526126005	22-Aug-25	9.00	5.00	55.00	6	17
RSGM1	Coal	ES2526855002	28-Aug-25	4.00	5.00	176.00	2	181
T2-A	BCA	ES2526559010	27-Aug-25	45.00	23.00	137.00	1	167
T2-P	CMOB	ES2526559011	27-Aug-25	31.00	12.00	61.00	2	55
T3-A	BCA	ES2526559008	26-Aug-25	61.00	54.00	384.00	<1	631
T3-P	CMOB	ES2526559009	27-Aug-25	44.00	34.00	215.00	3	250
T5	BCA	ES2526855001	28-Aug-25	8.00	4.00	44.00	<1	21

Bore ID	Geology	Laboratory ID	Date	Calcium	Magnesium	Sodium	Potassium	Chloride
Units				mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				1	1	1	1	1
ANZECC livestock limits				-	-	-	-	-
WML113C	BCA	ES2526262001	25-Aug-25	46.00	20.00	100.00	1	128
WML115B	CMOB	ES2526126002	22-Aug-25	45.00	23.00	344.00	2	235
WML115C	BCA	ES2526126003	22-Aug-25	10.00	4.00	28.00	4	22
WML119	Coal	ES2526855014	29-Aug-25	6.00	2.00	17.00	1	17
WML120A	Coal	ES2526855005	28-Aug-25	42.00	29.00	84.00	1	131
WML120B	GCA	ES2526855006	28-Aug-25	36.00	24.00	74.00	<1	134
WML129	GCA	ES2526855016	29-Aug-25	17.00	10.00	46.00	2	52
WML181	Coal	ES2526855015	29-Aug-25	11.00	12.00	580.00	3	560
WML183	Coal	ES2526855007	28-Aug-25	98.00	138.00	513.00	7	671
WML239	GCA	ES2525820007	20-Aug-25	32.00	14.00	66.00	1	81
WML261	Coal	ES2526855003	28-Aug-25	40.00	46.00	251.00	3	377
WML262	Coal	ES2526855013	29-Aug-25	9.00	10.00	545.00	3	378
WMLP277	HRA	ES2526559004	26-Aug-25	20.00	12.00	129.00	<1	90
WMLP278	HRA	ES2526262004	25-Aug-25	11.00	5.00	66.00	<1	30
WMLP279	HRA	ES2526559005	26-Aug-25	31.00	13.00	50.00	<1	45
WMLP280	HRA	ES2526262003	25-Aug-25	32.00	20.00	123.00	<1	140
WMLP301	Coal	ES2526855012	29-Aug-25	5.00	4.00	595.00	2	462
WMLP302	Coal	ES2526855004	28-Aug-25	103.00	161.00	961.00	8	1580
WMLP308	BCA	ES2526559014	27-Aug-25	28.00	15.00	98.00	2	99
WMLP311	BCA	ES2526262005	25-Aug-25	38.00	24.00	130.00	2	143
WMLP320	BCA	ES2526855009	29-Aug-25	52.00	24.00	92.00	2	133
WMLP323	BCA	ES2526559013	27-Aug-25	23.00	12.00	66.00	1	54
WMLP324	CMOB	ES2526559012	27-Aug-25	27.00	13.00	75.00	2	61

Bore ID	Geology	Laboratory ID	Date	Calcium	Magnesium	Sodium	Potassium	Chloride
Units				mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				1	1	1	1	1
ANZECC livestock limits				-	-	-	-	-
WMLP325	CMOB	ES2526262006	25-Aug-25	52.00	24.00	154.00	2	194
WMLP326	BCA	ES2526559006	26-Aug-25	20.00	10.00	135.00	<1	89
WMLP327	CMOB	ES2526559007	26-Aug-25	35.00	20.00	181.00	2	182
WMLP328	BCA	ES2526855011	29-Aug-25	31.00	17.00	87.00	2	98
WMLP336	HRA + CMOB	ES2526559001	26-Aug-25	49.00	23.00	64.00	2	92
WMLP337	HRA	ES2526559003	26-Aug-25	121.00	136.00	423.00	5	672
WMLP338	HRA	ES2526559002	26-Aug-25	123.00	79.00	293.00	1	602
WMLP343	GCA	ES2525820005	20-Aug-25	41.00	20.00	79.00	4	114
WMLP346	GCA	ES2525820006	20-Aug-25	36.00	19.00	70.00	<1	126
WMLP349	GCA	ES2525820004	20-Aug-25	14.00	7.00	76.00	<1	51
WMLP358	GCA	ES2526126001	22-Aug-25	36.00	14.00	29.00	<1	62
YAP016	BCA	ES2525820001	20-Aug-25	36.00	25.00	275.00	4	272

Bore ID	Geology	Laboratory ID	Date	Hydroxide Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Total Alkalinity	Sulfate as SO4
Units				mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				1	1	1	1	1
ANZECC livestock limits				-	-	-	-	1000
Ashton Well	BCA	ES2526126004	22-Aug-25	<1	<1	127.00	127	16
GM1	Coal	ES2525820002	20-Aug-25	<1	<1	273.00	273	264
GM3A	GCA	ES2525820003	20-Aug-25	<1	<1	1200.00	1200	<10
PB1	BCA	ES2526126006	22-Aug-25	<1	<1	75.00	75	32
RA18	BCA	ES2526855010	29-Aug-25	<1	<1	176.00	176	116

Bore ID	Geology	Laboratory ID	Date	Hydroxide Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Total Alkalinity	Sulfate as SO4
Units				mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				1	1	1	1	1
ANZECC livestock limits				-	-	-	-	1000
RA27	HRA	ES2526262002	25-Aug-25	<1	<1	341.00	341	90
RM01	BCA	ES2526855008	28-Aug-25	<1	<1	65.00	65	32
RM10	BCA + CMOB	ES2526126005	22-Aug-25	<1	<1	147.00	147	12
RSGM1	Coal	ES2526855002	28-Aug-25	<1	<1	167.00	167	39
T2-A	BCA	ES2526559010	27-Aug-25	<1	<1	190.00	190	100
T2-P	CMOB	ES2526559011	27-Aug-25	<1	<1	118.00	118	89
T3-A	BCA	ES2526559008	26-Aug-25	<1	<1	218.00	218	180
T3-P	CMOB	ES2526559009	27-Aug-25	<1	<1	275.00	275	136
T5	BCA	ES2526855001	28-Aug-25	<1	<1	86.00	86	22
WML113C	BCA	ES2526262001	25-Aug-25	<1	<1	179.00	179	70
WML115B	CMOB	ES2526126002	22-Aug-25	<1	<1	519.00	519	213
WML115C	BCA	ES2526126003	22-Aug-25	<1	<1	59.00	59	19
WML119	Coal	ES2526855014	29-Aug-25	<1	<1	31.00	31	<1
WML120A	Coal	ES2526855005	28-Aug-25	<1	<1	217.00	217	38
WML120B	GCA	ES2526855006	28-Aug-25	<1	<1	148.00	148	41
WML129	GCA	ES2526855016	29-Aug-25	<1	<1	106.00	106	13
WML181	Coal	ES2526855015	29-Aug-25	<1	<1	657.00	657	3
WML183	Coal	ES2526855007	28-Aug-25	<1	<1	800.00	800	327
WML239	GCA	ES2525820007	20-Aug-25	<1	<1	131.00	131	24
WML261	Coal	ES2526855003	28-Aug-25	<1	<1	323.00	323	57
WML262	Coal	ES2526855013	29-Aug-25	<1	32.00	815.00	848	<1
WMLP277	HRA	ES2526559004	26-Aug-25	<1	<1	220.00	220	33

Bore ID	Geology	Laboratory ID	Date	Hydroxide Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Total Alkalinity	Sulfate as SO4
Units				mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				1	1	1	1	1
ANZECC livestock limits				-	-	-	-	1000
WMLP278	HRA	ES2526262004	25-Aug-25	<1	<1	138.00	138	21
WMLP279	HRA	ES2526559005	26-Aug-25	<1	<1	152.00	152	28
WMLP280	HRA	ES2526262003	25-Aug-25	<1	<1	222.00	222	52
WMLP301	Coal	ES2526855012	29-Aug-25	<1	19.00	867.00	886	2
WMLP302	Coal	ES2526855004	28-Aug-25	<1	<1	767.00	767	101
WMLP308	BCA	ES2526559014	27-Aug-25	<1	<1	150.00	150	61
WMLP311	BCA	ES2526262005	25-Aug-25	<1	<1	193.00	193	104
WMLP320	BCA	ES2526855009	29-Aug-25	<1	<1	156.00	156	131
WMLP323	BCA	ES2526559013	27-Aug-25	<1	<1	145.00	145	28
WMLP324	CMOB	ES2526559012	27-Aug-25	<1	<1	164.00	164	54
WMLP325	CMOB	ES2526262006	25-Aug-25	<1	<1	233.00	233	86
WMLP326	BCA	ES2526559006	26-Aug-25	<1	<1	232.00	232	44
WMLP327	CMOB	ES2526559007	26-Aug-25	<1	<1	268.00	268	88
WMLP328	BCA	ES2526855011	29-Aug-25	<1	<1	153.00	153	66
WMLP336	HRA + CMOB	ES2526559001	26-Aug-25	<1	<1	168.00	168	42
WMLP337	HRA	ES2526559003	26-Aug-25	<1	<1	737.00	737	154
WMLP338	HRA	ES2526559002	26-Aug-25	<1	<1	349.00	349	113
WMLP343	GCA	ES2525820005	20-Aug-25	<1	<1	201.00	201	8
WMLP346	GCA	ES2525820006	20-Aug-25	<1	<1	138.00	138	13
WMLP349	GCA	ES2525820004	20-Aug-25	<1	<1	117.00	117	20
WMLP358	GCA	ES2526126001	22-Aug-25	<1	<1	112.00	112	20
YAP016	BCA	ES2525820001	20-Aug-25	<1	<1	245.00	245	232

Bore ID	Geology	Laboratory ID	Date	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Selenium	Zinc
Units				**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
Limit of Reporting (LOR)				**0.001**	**0.0001**	**0.001**	**0.001**	**0.05**	**0.001**	**0.001**	**0.001**	**0.01**	**0.005**
ANZECC livestock limits				**0.5**	**0.1**	**1**	**0.4**	**-**	**0.1**	**-**	**1**	**0.02**	**20**
Ashton Well	BCA	ES2526126004	22-Aug-25	-	-	-	-		-	-	-	-	-
GM1	Coal	ES2525820002	20-Aug-25	0.002	<0.0001	<0.001	<0.001	1.94	<0.001	0.414	<0.001	<0.01	0.022
GM3A	GCA	ES2525820003	20-Aug-25	-	-	-	-	-	-	-	-	-	-
PB1	BCA	ES2526126006	22-Aug-25	-	-	-	-	-	-	-	-	-	-
RA18	BCA	ES2526855010	29-Aug-25	-	-	-	-	-	-	-	-	-	-
RA27	HRA	ES2526262002	25-Aug-25	<0.001	<0.0001	0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	<0.005
RM01	BCA	ES2526855008	28-Aug-25	-	-	-	-	-	-	-	-	-	-
RM10	BCA + CMOB	ES2526126005	22-Aug-25	-	-	-	-	-	-	-	-	-	-
RSGM1	Coal	ES2526855002	28-Aug-25	0.004	<0.0001	<0.001	0.005	0.27	<0.001	0.002	0.002	<0.01	0.01
T2-A	BCA	ES2526559010	27-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	0.025
T2-P	CMOB	ES2526559011	27-Aug-25	<0.001	<0.0001	<0.001	0.001	<0.05	<0.001	0.204	0.01	<0.01	0.055
T3-A	BCA	ES2526559008	26-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.001	<0.001	<0.01	0.009
T3-P	CMOB	ES2526559009	27-Aug-25	<0.001	<0.0001	<0.001	<0.001	3.45	<0.001	0.145	<0.001	<0.01	<0.005
T5	BCA	ES2526855001	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.08	<0.001	<0.001	<0.001	<0.01	0.035
WML113C	BCA	ES2526262001	25-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.002	<0.001	<0.01	0.114
WML115B	CMOB	ES2526126002	22-Aug-25	-	-	-	-	-	-	-	-	-	-
WML115C	BCA	ES2526126003	22-Aug-25	-	-	-	-	-	-	-	-	-	-
WML119	Coal	ES2526855014	29-Aug-25	<0.001	<0.0001	<0.001	0.002	0.4	<0.001	0.039	0.002	<0.01	0.028
WML120A	Coal	ES2526855005	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.91	<0.001	0.163	<0.001	<0.01	<0.005
WML120B	GCA	ES2526855006	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.039	<0.001	<0.01	0.02
WML129	GCA	ES2526855016	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.137	<0.001	<0.01	<0.005

Bore ID	Geology	Laboratory ID	Date	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Selenium	Zinc
Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				0.001	0.0001	0.001	0.001	0.05	0.001	0.001	0.001	0.01	0.005
ANZECC livestock limits				0.5	0.1	1	0.4	-	0.1	-	1	0.02	20
WML181	Coal	ES2526855015	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.09	<0.001	0.03	<0.001	<0.01	<0.005
WML183	Coal	ES2526855007	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.22	<0.001	0.198	<0.001	<0.01	0.008
WML239	GCA	ES2525820007	20-Aug-25	<0.001	<0.0001	0.004	0.003	3.98	0.002	0.028	0.002	<0.01	0.078
WML261	Coal	ES2526855003	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	1.14	<0.001	0.036	<0.001	<0.01	<0.005
WML262	Coal	ES2526855013	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.06	<0.001	0.03	<0.001	<0.01	<0.005
WMLP277	HRA	ES2526559004	26-Aug-25	<0.001	<0.0001	<0.001	0.003	<0.05	<0.001	0.004	0.001	<0.01	0.016
WMLP278	HRA	ES2526262004	25-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	0.008
WMLP279	HRA	ES2526559005	26-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	0.011
WMLP280	HRA	ES2526262003	25-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	0.001	<0.01	<0.005
WMLP301	Coal	ES2526855012	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.08	<0.001	0.018	<0.001	<0.01	<0.005
WMLP302	Coal	ES2526855004	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.056	0.002	<0.01	<0.005
WMLP308	BCA	ES2526559014	27-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.001	<0.001	<0.01	0.007
WMLP311	BCA	ES2526262005	25-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.001	<0.001	<0.01	0.032
WMLP320	BCA	ES2526855009	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.14	<0.001	0.002	<0.001	<0.01	0.05
WMLP323	BCA	ES2526559013	27-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.001	<0.001	<0.01	0.007
WMLP324	CMOB	ES2526559012	27-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.014	0.001	<0.01	0.015
WMLP325	CMOB	ES2526262006	25-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.27	<0.001	0.322	<0.001	<0.01	<0.005
WMLP326	BCA	ES2526559006	26-Aug-25	-	-	-	-	-	-	-	-	-	-
WMLP327	CMOB	ES2526559007	26-Aug-25	-	-	-	-	-	-	-	-	-	-
WMLP328	BCA	ES2526855011	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	0.015
WMLP336	HRA + CMOB	ES2526559001	26-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.004	0.001	<0.01	0.072
WMLP337	HRA	ES2526559003	26-Aug-25	<0.001	0.0001	<0.001	<0.001	0.36	<0.001	0.292	0.004	<0.01	0.042

Bore ID	Geology	Laboratory ID	Date	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Selenium	Zinc
Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				0.001	0.0001	0.001	0.001	0.05	0.001	0.001	0.001	0.01	0.005
ANZECC livestock limits				0.5	0.1	1	0.4	-	0.1	-	1	0.02	20
WMLP338	HRA	ES2526559002	26-Aug-25	0.001	<0.0001	<0.001	<0.001	1.2	<0.001	0.478	0.004	<0.01	0.034
WMLP343	GCA	ES2525820005	20-Aug-25	<0.001	<0.0001	0.001	<0.001	2.82	<0.001	0.671	0.004	<0.01	0.061
WMLP346	GCA	ES2525820006	20-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.48	<0.001	0.108	0.001	<0.01	0.086
WMLP349	GCA	ES2525820004	20-Aug-25	<0.001	<0.0001	<0.001	0.003	0.44	<0.001	0.016	0.001	<0.01	0.14
WMLP358	GCA	ES2526126001	22-Aug-25	<0.001	<0.0001	<0.001	<0.001	-	<0.001	-	<0.001	-	0.05
YAP016	BCA	ES2525820001	20-Aug-25	<0.001	<0.0001	0.003	0.001	1.14	0.001	0.044	0.001	<0.01	0.266

Bore ID	Geology	Laboratory ID	Date	Turbidity	Total Cyanide	Nitrite + Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Total Phosphorous as P	Total Anions	Total Cations	Ionic Balance
Units				NTU	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%
Limit of Reporting (LOR)				0.1	0.004	0.01	0.1	0.1	0.01	0.01	0.01	0.01
ANZECC livestock limits				-	-	-	-	-	-	-	-	-
Ashton Well	BCA	ES2526126004	22-Aug-25	-	-	-	-	-	-	4.2	4.08	1.46
GM1	Coal	ES2525820002	20-Aug-25	49	<0.004	<0.01	0.6	0.6	0.07	22.5	19.6	6.85
GM3A	GCA	ES2525820003	20-Aug-25	-	-	-	-	-	-	64	62.4	1.3
PB1	BCA	ES2526126006	22-Aug-25	-	-	-	-	-	-	2.7	2.56	-
RA18	BCA	ES2526855010	29-Aug-25	-	-	-	-	-	-	10.8	9.5	6.44
RA27	HRA	ES2526262002	25-Aug-25	480	<0.004	1.57	<1.0	1.6	1.4	17	15.2	5.6
RM01	BCA	ES2526855008	28-Aug-25	-	-	-	-	-	-	25	22.5	5.18
RM10	BCA + CMOB	ES2526126005	22-Aug-25	-	-	-	-	-	-	3.67	3.41	3.68

Bore ID	Geology	Laboratory ID	Date	Turbidity	Total Cyanide	Nitrite + Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Total Phosphorous as P	Total Anions	Total Cations	Ionic Balance
Units				**NTU**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**meq/L**	**meq/L**	**%**
Limit of Reporting (LOR)				**0.1**	**0.004**	**0.01**	**0.1**	**0.1**	**0.01**	**0.01**	**0.01**	**0.01**
ANZECC livestock limits				**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
RSGM1	Coal	ES2526855002	28-Aug-25	1450	<0.004	0.27	3	3.3	0.75	9.25	8.32	5.33
T2-A	BCA	ES2526559010	27-Aug-25	10.7	<0.004	1.12	0.4	1.5	0.04	10.6	10.1	2.25
T2-P	CMOB	ES2526559011	27-Aug-25	38.2	<0.004	1.56	2.6	4.2	0.51	5.76	5.24	4.75
T3-A	BCA	ES2526559008	26-Aug-25	77.7	<0.004	0.86	0.3	1.2	0.13	25.9	24.2	3.42
T3-P	CMOB	ES2526559009	27-Aug-25	41.4	<0.004	0.03	0.6	0.6	0.1	15.4	14.4	3.21
T5	BCA	ES2526855001	28-Aug-25	315	<0.004	0.89	1.2	2.1	0.22	2.77	2.64	2.34
WML113C	BCA	ES2526262001	25-Aug-25	192	<0.004	1.02	<0.5	1	0.36	8.64	8.32	1.93
WML115B	CMOB	ES2526126002	22-Aug-25	-	-	-	-	-	-	21.4	19.2	5.62
WML115C	BCA	ES2526126003	22-Aug-25	-	-	-	-	-	-	2.19	2.15	-
WML119	Coal	ES2526855014	29-Aug-25	261	<0.004	0.18	3.9	4.1	0.48	1.1	1.23	5.59
WML120A	Coal	ES2526855005	28-Aug-25	36	<0.004	0.08	0.3	0.4	0.09	8.82	8.16	3.89
WML120B	GCA	ES2526855006	28-Aug-25	218	<0.004	0.49	0.8	1.3	0.36	7.59	6.99	4.12
WML129	GCA	ES2526855016	29-Aug-25	41.3	<0.004	<0.01	0.4	0.4	0.12	3.86	3.72	1.74
WML181	Coal	ES2526855015	29-Aug-25	9.3	<0.004	<0.01	1.5	1.5	0.03	29	26.8	3.84
WML183	Coal	ES2526855007	28-Aug-25	67.8	<0.004	0.02	1.1	1.1	0.03	41.7	38.7	3.7
WML239	GCA	ES2525820007	20-Aug-25	94.6	<0.004	0.58	0.5	1.1	0.12	5.4	5.64	2.2
WML261	Coal	ES2526855003	28-Aug-25	6.9	<0.004	<0.01	0.5	0.5	0.02	18.3	16.8	4.28
WML262	Coal	ES2526855013	29-Aug-25	5.7	<0.004	<0.01	1.4	1.4	0.17	27.6	25	4.84
WMLP277	HRA	ES2526559004	26-Aug-25	24.9	<0.004	0.38	0.2	0.6	0.21	7.62	7.6	0.16
WMLP278	HRA	ES2526262004	25-Aug-25	50.5	<0.004	0.25	0.2	0.4	0.19	4.04	3.83	2.66
WMLP279	HRA	ES2526559005	26-Aug-25	46.3	<0.004	0.27	0.3	0.6	0.28	4.89	4.79	1.01
WMLP280	HRA	ES2526262003	25-Aug-25	22.7	<0.004	0.37	0.1	0.5	0.22	9.47	8.59	4.84

Bore ID	Geology	Laboratory ID	Date	Turbidity	Total Cyanide	Nitrite + Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Total Phosphorous as P	Total Anions	Total Cations	Ionic Balance
Units				**NTU**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**meq/L**	**meq/L**	**%**
Limit of Reporting (LOR)				**0.1**	**0.004**	**0.01**	**0.1**	**0.1**	**0.01**	**0.01**	**0.01**	**0.01**
ANZECC livestock limits				**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
WMLP301	Coal	ES2526855012	29-Aug-25	16.8	<0.004	<0.01	1	1	0.06	30.8	26.5	7.45
WMLP302	Coal	ES2526855004	28-Aug-25	55.8	<0.004	<0.01	4.4	4.4	0.31	62	60.4	1.31
WMLP308	BCA	ES2526559014	27-Aug-25	47.6	<0.004	0.35	<0.5	<0.5	0.06	7.06	6.94	0.81
WMLP311	BCA	ES2526262005	25-Aug-25	26.3	<0.004	1.62	0.3	1.9	0.05	10	9.58	2.43
WMLP320	BCA	ES2526855009	29-Aug-25	80.4	<0.004	1.61	0.6	2.2	0.15	9.6	8.62	5.34
WMLP323	BCA	ES2526559013	27-Aug-25	200	<0.004	0.49	<2.0	<2.0	0.26	5	5.03	0.28
WMLP324	CMOB	ES2526559012	27-Aug-25	55.4	<0.004	0.23	0.6	0.8	0.12	6.12	5.73	3.3
WMLP325	CMOB	ES2526262006	25-Aug-25	84.8	<0.004	<0.01	0.5	0.5	0.17	11.9	11.3	2.58
WMLP326	BCA	ES2526559006	26-Aug-25	-	-	-	-	-	-	8.06	7.69	2.34
WMLP327	CMOB	ES2526559007	26-Aug-25	-	-	-	-	-	-	12.3	11.3	4.25
WMLP328	BCA	ES2526855011	29-Aug-25	235	<0.004	0.38	0.7	1.1	0.18	7.2	6.78	2.96
WMLP336	HRA + CMOB	ES2526559001	26-Aug-25	16.4	<0.004	5.14	1	6.1	0.18	6.83	7.17	2.48
WMLP337	HRA	ES2526559003	26-Aug-25	44.7	<0.004	0.05	0.4	0.4	0.11	36.9	35.8	1.55
WMLP338	HRA	ES2526559002	26-Aug-25	56.7	<0.004	0.46	0.3	0.8	0.1	26.3	25.4	1.74
WMLP343	GCA	ES2525820005	20-Aug-25	24.3	<0.004	0.06	7.1	7.2	0.96	7.4	7.23	1.15
WMLP346	GCA	ES2525820006	20-Aug-25	16.3	<0.004	0.03	0.2	0.2	0.05	6.58	6.4	1.36
WMLP349	GCA	ES2525820004	20-Aug-25	21.5	<0.004	0.63	0.3	0.9	0.08	4.19	4.58	4.42
WMLP358	GCA	ES2526126001	22-Aug-25	4.6	<0.004	0.78	0.2	1	0.07	4.4	4.21	2.24
YAP016	BCA	ES2525820001	20-Aug-25	32	<0.004	0.95	0.6	1.6	0.06	17.4	15.9	4.44

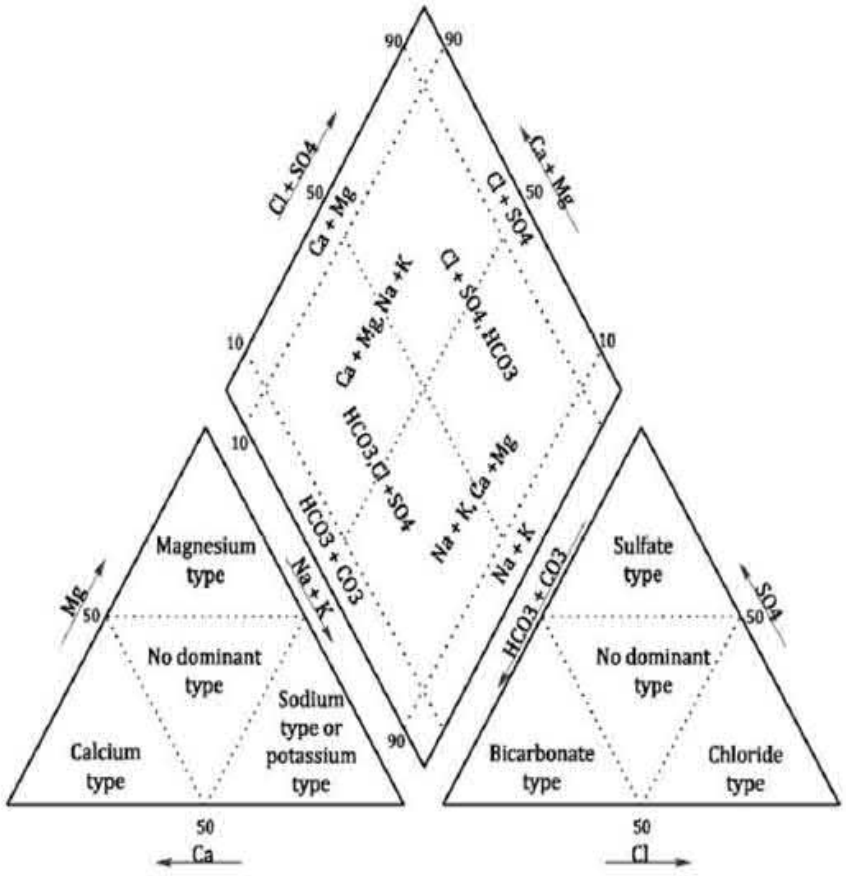
Appendix E

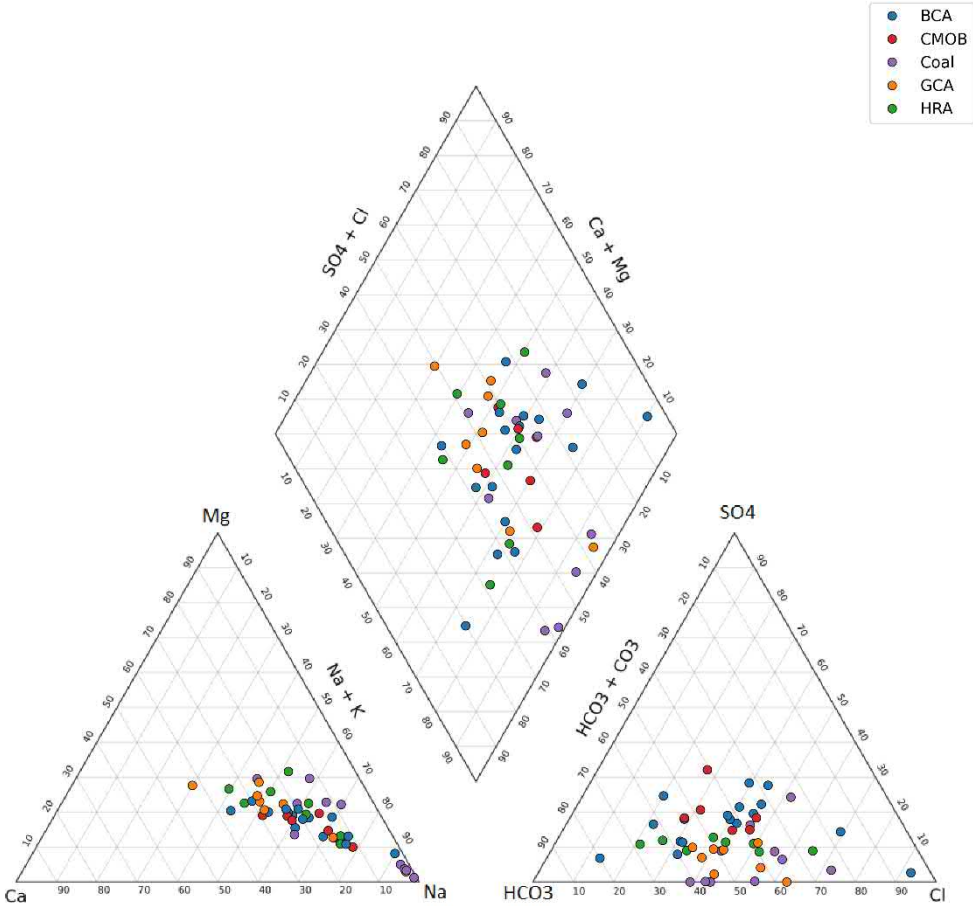
Groundwater chemistry – aquifer speciation

Table E1 Ashton August 2025 key monitoring bore water types

Station ID	Geology	Water Type	General Water Type
WMLP358	GCA	Ca-Na-Mg-HCO3-Cl	
WMLP325	CMOB	Na-Ca-Cl-HCO3	
WML113C	BCA	Na-Ca-Cl-HCO3-SO4	
WML120A	Coal	Na-Ca-HCO3-Cl	
WML239	GCA	Na-Ca-Mg-Cl-HCO3	
WMLP343	GCA	Na-Ca-Mg-Cl-HCO3	
WMLP279	HRA	Na-Ca-Mg-HCO3-Cl	
WMLP336	HRA	Na-Ca-Mg-HCO3-Cl	
T5	BCA	Na-Ca-Mg-SO4-Cl-HCO3	
WMLP320	BCA	Na-Ca-Mg-SO4-Cl-HCO3	
T2P	CMOB	Na-Ca-Mg-SO4-Cl-HCO3	
PB1	BCA	Na-Cl-HCO3	
RA18	BCA	Na-Cl-HCO3	
RM01	BCA	Na-Cl-HCO3	Na-Ca
T2A	BCA	Na-Cl-HCO3	
T3A	BCA	Na-Cl-HCO3	
WML115C	BCA	Na-Cl-HCO3	
WMLP308	BCA	Na-Cl-HCO3	
WMLP328	BCA	Na-Cl-HCO3	
T3P	CMOB	Na-Cl-HCO3	
WMLP327	CMOB	Na-Cl-HCO3	
WML181	Coal	Na-Cl-HCO3	
WML183	Coal	Na-Cl-HCO3	
RA27	HRA	Na-Cl-HCO3	
YAP016	BCA	Na-Cl-SO4-HCO3	
WMLP311	BCA	Na-HCO3-Cl	
WMLP323	BCA	Na-HCO3-Cl	
WMLP326	BCA	Na-HCO3-Cl	
WML115B	CMOB	Na-HCO3-Cl	
WML262	Coal	Na-HCO3-Cl	
WMLP301	Coal	Na-HCO3-Cl	
WML129	GCA	Na-HCO3-Cl	
WMLP349	GCA	Na-HCO3-Cl	

Station ID	Geology	Water Type	General Water Type
WMLP280	HRA	Na-HCO3-Cl	
RM10	BCA	Na-HCO3-SO4	
WML120B	GCA	Na-Mg-Ca-Cl-HCO3	Na-Mg
GM3A	Coal	Na-Mg-Cl-HCO3	
RSGM1	Coal	Na-Mg-Cl-HCO3	
WML119	Coal	Na-Mg-Cl-HCO3	
WML261	Coal	Na-Mg-Cl-HCO3	
WMLP302	Coal	Na-Mg-Cl-HCO3	
WMLP346	GCA	Na-Mg-Cl-HCO3	
WMLP277	HRA	Na-Mg-Cl-HCO3	
WMLP337	HRA	Na-Mg-Cl-HCO3	
WMLP338	HRA	Na-Mg-Cl-HCO3	
GM1	Coal	Na-Mg-Cl-HCO3-SO4	
Ashton Well	BCA	Na-Mg-HCO3	
WMLP324	Coal	Na-Mg-HCO3-Cl	
WMLP278	HRA	Na-Mg-HCO3-Cl	


Cl + SO4
Ca + Mg
Ca + Mg, Na + K
Cl + SO4, HCO3
HCO3, Cl + SO4
Na + K, Ca + Mg
Na + K
HCO3 + CO3
Magnesium type
No dominant type
Calcium type
Sodium type or potassium type
Sulfate type
No dominant type
Bicarbonate type
Chloride type
Mg
SO4
Ca
Cl


BCA
CMOB
Coal
GCA
HRA
SO4 + Cl
Ca + Mg
Mg
Na + K
Ca
Na
SO4
HCO3 + CO3
HCO3
Cl

Appendix F

Laboratory certificate of analysis and chain of custody documents (August 2025)

CERTIFICATE OF ANALYSIS

Work Order	: **ES2525820**	Page	: 1 of 6
Client	: **AUSTRALASIAN GROUNDWATER AND ENVIRONMENTAL CONSULTANTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: BYRCE MCKAY	Contact	: Customer Services ES
Address	: 4 HUDSON STREET HAMILTON NSW 2303	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Ashton Coal Mine GW Sampling	Date Samples Received	: 21-Aug-2025 08:05
Order number	: ASH5027	Date Analysis Commenced	: 22-Aug-2025
C-O-C number	: ----	Issue Date	: 27-Aug-2025 18:08
Sampler	: Danjel Djukic		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 7		
No. of samples analysed	: 7		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EK041G: LOR raised for sulfate due to sample matrix.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	YAP016	GM1	GM3A	WMLP349	WMLP343
			Sampling date / time	20-Aug-2025 08:20	20-Aug-2025 09:25	20-Aug-2025 11:25	20-Aug-2025 12:07	20-Aug-2025 13:16
Compound	CAS Number	LOR	Unit	ES2525820-001	ES2525820-002	ES2525820-003	ES2525820-004	ES2525820-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.12**	**7.36**	**7.85**	**6.86**	**7.32**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1480**	**1900**	**5990**	**429**	**711**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**855**	**1110**	**----**	**264**	**380**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**32.0**	**49.0**	**----**	**21.5**	**24.3**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**245**	**273**	**1200**	**117**	**201**
Total Alkalinity as CaCO3	----	1	mg/L	**245**	**273**	**1200**	**117**	**201**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**232**	**264**	<10	**20**	**8**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**272**	**411**	**1420**	**51**	**114**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**36**	**76**	**26**	**14**	**41**
Magnesium	7439-95-4	1	mg/L	**25**	**53**	**22**	**7**	**20**
Sodium	7440-23-5	1	mg/L	**275**	**262**	**1360**	**76**	**79**
Potassium	7440-09-7	1	mg/L	**4**	**4**	**5**	<1	**4**
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.002**	**----**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	**----**	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	**0.003**	<0.001	**----**	<0.001	**0.001**
Copper	7440-50-8	0.001	mg/L	**0.001**	<0.001	**----**	**0.003**	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.001**	<0.001	**----**	**0.001**	**0.004**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	YAP016	GM1	GM3A	WMLP349	WMLP343
				Sampling date / time	20-Aug-2025 08:20	20-Aug-2025 09:25	20-Aug-2025 11:25	20-Aug-2025 12:07	20-Aug-2025 13:16
Compound	CAS Number	LOR	Unit		ES2525820-001	ES2525820-002	ES2525820-003	ES2525820-004	ES2525820-005
					Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		**0.001**	<0.001	----	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.266**	**0.022**	----	**0.140**	**0.061**
Manganese	7439-96-5	0.001	mg/L		**0.044**	**0.414**	----	**0.016**	**0.671**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		**1.14**	**1.94**	----	**0.44**	**2.82**
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	----	<0.004	<0.004
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	<0.01	**0.01**
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.95**	<0.01	----	**0.63**	**0.05**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.95**	<0.01	----	**0.63**	**0.06**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.6**	**0.6**	----	**0.3**	**7.1**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.6**	**0.6**	----	**0.9**	**7.2**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.06**	**0.07**	----	**0.08**	**0.96**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**17.4**	**22.5**	**64.0**	**4.19**	**7.40**
ø Total Cations	----	0.01	meq/L		**15.9**	**19.6**	**62.4**	**4.58**	**7.23**
ø Ionic Balance	----	0.01	%		**4.44**	**6.85**	**1.30**	**4.42**	**1.15**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP346	WMLP239	----	----	----
				Sampling date / time	20-Aug-2025 13:50	20-Aug-2025 14:50	----	----	----
Compound	CAS Number	LOR	Unit		ES2525820-006	ES2525820-007	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.90**	**7.02**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**631**	**556**	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**348**	**336**	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**16.3**	**94.6**	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**138**	**131**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**138**	**131**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**13**	**24**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**126**	**81**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**36**	**32**	----	----	----
Magnesium	7439-95-4	1	mg/L		**19**	**14**	----	----	----
Sodium	7440-23-5	1	mg/L		**70**	**66**	----	----	----
Potassium	7440-09-7	1	mg/L		<1	**1**	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.004**	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	**0.003**	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.002**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP346	WMLP239	----	----	----
				Sampling date / time	20-Aug-2025 13:50	20-Aug-2025 14:50	----	----	----
Compound	CAS Number	LOR	Unit		ES2525820-006	ES2525820-007	--------	--------	--------
					Result	Result	----	----	----
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	**0.002**	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.086**	**0.078**	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.108**	**0.028**	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.48**	**3.98**	----	----	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.03**	**0.58**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.03**	**0.58**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**0.5**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**0.2**	**1.1**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.05**	**0.12**	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**6.58**	**5.40**	----	----	----
ø **Total Cations**	----	0.01	meq/L		**6.40**	**5.64**	----	----	----
ø **Ionic Balance**	----	0.01	%		**1.36**	**2.20**	----	----	----

client

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 48 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
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PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
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TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: AGE Consultants	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT **(List due date):**	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: Newcastle		☐ Non Standard or urgent TAT **(List due date):**	Custody Seal Intact? Yes / No / N/A
PROJECT: Ashton Coal Mine GW Sampling	**ALS QUOTE NO.:** EN/222/21		Free ice / frozen ice bricks present upon receipt? Yes / No / N/A
PROJECT ID: ASH5027		**COC SEQUENCE NUMBER (Circle)**	Random Sample Temperature on Receipt: 2.5 °C
PROJECT MANAGER: Bryce McKay	**CONTACT PH:** 0414 324 504	COC: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Danijel Djukic	**SAMPLER MOBILE:** 0423 266 442	OF: 1 2 3 4 5 6 7	
COC Emailed to ALS? YES	**EDD FORMAT (or default):** XTAB, ENMRG, ESDAT, PDF, MonPro		
Email Reports to: Danijel@ageconsultants.com.au, MonitorProData@yancoal.com.au, Brycem@ageconsultants.com.au			
Email Invoice to: As above + accounts@ageconsultants.com.au			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
	SC	SA	L.D
DATE/TIME:	DATE/TIME: 21/8/25 1920	DATE/TIME: 21/8 1700	DATE/TIME: 21.8.25 8:05

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS	pH & EC	NT-1 & NT-2	W-1 (7 metals)	EG020 - Fe, Mn, Se	EA015H - TDS	EA045 - turdidity	NT-11 - Total P, Total N	EK058G - NO3	ED035 - HCO3	EK02SF	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	YAP016	20/08/2025 8:20	W	P	4	X	X	X	X	X	X	X	X	X	X	
2	GM1	20/08/2025 9:25	W	P	4	X	X	X	X	X	X	X	X	X	X	
3	GM3A	20/08/2025 11:25	W	P	1	X	X									
4	WMLP349	20/08/2025 12:07	W	P	4	X	X	X	X	X	X	X	X	X	X	
5	WMLP343	20/08/2025 13:16	W	P	4	X	X	X	X	X	X	X	X	X	X	
6	WMLP346	20/08/2025 13:50	W	P	4	X	X	X	X	X	X	X	X	X	X	
7	WML239	20/08/2025 14:50	W	P	4	X	X	X	X	X	X	X	X	X	X	
8			W	P		X	X	X	X	X	X	X	X	X	X	
9			W	P		X	X	X	X	X	X	X	X	X	X	
10			W	P		X	X	X	X	X	X	X	X	X	X	
11			W	P		X	X	X	X	X	X	X	X	X	X	
12			W	P		X	X	X	X	X	X	X	X	X	X	
				TOTAL	25											

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Division Sydney
Work Order Reference
ES2525820

Telephone : +61-2-8784 8555

E-MAILED

LAB OF ORIGIN: NEWCASTLE

CERTIFICATE OF ANALYSIS

Work Order	: **ES2526126**	Page	: 1 of 5
Client	: **AUSTRALASIAN GROUNDWATER AND ENVIRONMENTAL CONSULTANTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: BYRCE MCKAY	Contact	: Customer Services ES
Address	: 4 HUDSON STREET HAMILTON NSW 2303	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: ASH5027 Ashton Coal Mine GW Sampling	Date Samples Received	: 22-Aug-2025 16:44
Order number	: ----	Date Analysis Commenced	: 22-Aug-2025
C-O-C number	: ----	Issue Date	: 28-Aug-2025 17:34
Sampler	: Danijel Djukic		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Gregory Towers	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WMLP358	WML115B	WML115C	Ashton Well	RM10
			Sampling date / time	22-Aug-2025 08:15	22-Aug-2025 12:05	22-Aug-2025 12:20	22-Aug-2025 12:58	22-Aug-2025 13:40
Compound	CAS Number	LOR	Unit	ES2526126-001	ES2526126-002	ES2526126-003	ES2526126-004	ES2526126-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.70	7.06	7.02	7.20	7.76
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	424	1870	213	402	326
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	293	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	4.6	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	112	519	59	127	147
Total Alkalinity as CaCO3	----	1	mg/L	112	519	59	127	147
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	20	213	19	16	12
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	62	235	22	47	17
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	36	45	10	30	9
Magnesium	7439-95-4	1	mg/L	14	23	4	10	5
Sodium	7440-23-5	1	mg/L	29	344	28	38	55
Potassium	7440-09-7	1	mg/L	<1	2	4	4	6
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP358	WML115B	WML115C	Ashton Well	RM10
				Sampling date / time	22-Aug-2025 08:15	22-Aug-2025 12:05	22-Aug-2025 12:20	22-Aug-2025 12:58	22-Aug-2025 13:40
Compound	CAS Number	LOR	Unit		ES2526126-001	ES2526126-002	ES2526126-003	ES2526126-004	ES2526126-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.050**	----	----	----	----
EG020T: Total Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L		**0.007**	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.17**	----	----	----	----
EK025SF: Free CN by Segmented Flow Analyser									
Free Cyanide	----	0.004	mg/L		<0.004	----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.78**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.78**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.0**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.07**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**4.40**	**21.4**	**2.19**	**4.20**	**3.67**
ø Total Cations	----	0.01	meq/L		**4.21**	**19.2**	**2.15**	**4.08**	**3.41**
ø Ionic Balance	----	0.01	%		**2.24**	**5.62**	----	**1.46**	**3.68**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	PB01	----	----	----	----
				Sampling date / time	22-Aug-2025 14:05	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2526126-006	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.06	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		260	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		75	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		75	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		32	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		9	----	----	----	----
Magnesium	7439-95-4	1	mg/L		4	----	----	----	----
Sodium	7440-23-5	1	mg/L		41	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		2.70	----	----	----	----
ø Total Cations	----	0.01	meq/L		2.56	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(WATER) EA005P: pH by PC Titrator

(WATER) EA010P: Conductivity by PC Titrator

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5630 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Weber Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee mail@alsglobal.com
NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7555 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: AGE Consultants	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: Newcastle		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: Ashton Coal Mine GW Sampling	**ALS QUOTE NO.:** EN/222/21	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes No N/A
PROJECT ID: ASH5027		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 4.0 °C
PROJECT MANAGER: Bryce McKay	**CONTACT PH:** 0414 324 504	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Danijel Djukic	**SAMPLER MOBILE:** 0423 266 442	**RELINQUISHED BY:**	**RECEIVED BY:** Cassie
COC Emailed to ALS? YES	**EDD FORMAT (or default):** XTAB, ENMRG, ESDAT, PDF, MonPro	DATE/TIME:	DATE/TIME: 22/08 1649
Email Reports to: Danijel@ageconsultants.com.au, MonitorProData@yancoal.com.au, Brycem@ageconsultants.com.au			**RELINQUISHED BY:** IR DATE/TIME: 22-8-25 1700
Email Invoice to: As above + accounts@ageconsultants.com.au			**RECEIVED BY:** C.C DATE/TIME: 22/8 19:30

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: PH/EC ONLY

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	pH & EC	NT-1 & NT-2	W-1 (7 metals)	EG020 - Fe, Mn, Se	EA015H - TDS	EA045 - turdidity	NT-11 - Total P, Total N	EK058G - NO3	ED035 - HCO3	EK02SF	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	WMLP358	22/08/2025 8:15	W	P	4	X	X	X	X	X	X	X	X	X	X	LAB OF ORIGIN: NEWCASTLE
2	WML115B	22/08/2025 12:05	W	P	1	X	X									
3	WML115C	22/08/2025 12:20	W	P	1	X	X									E-MAILED
4	Ashton Well	22/08/2025 12:58	W	P	1	X	X									
5	RM10	22/08/2025 13:40	W	P	1	X	X									
6	PB01	22/08/2025 14:05	W	P	1	X	X									
7			W	P		X	X	X	X	X	X	X	X	X	X	
8			W	P		X	X	X	X	X	X	X	X	X	X	
9			W	P		X	X	X	X	X	X	X	X	X	X	
10			W	P		X	X	X	X	X	X	X	X	X	X	
11			W	P		X	X	X	X	X	X	X	X	X	X	
12			W	P		X	X	X	X	X	X	X	X	X	X	
				TOTAL	9											

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formalc
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Division Sydney
Work Order Reference
ES2526126

Telephone : +61-2-8784 8555

CERTIFICATE OF ANALYSIS

Work Order	: **ES2526262**	Page	: 1 of 6
Client	: **AUSTRALASIAN GROUNDWATER AND ENVIRONMENTAL CONSULTANTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: BYRCE MCKAY	Contact	: Customer Services ES
Address	: 4 HUDSON STREET HAMILTON NSW 2303	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: ASH5027 Ashton Coal Mine GW Sampling	Date Samples Received	: 25-Aug-2025 17:00
Order number	: ----	Date Analysis Commenced	: 25-Aug-2025
C-O-C number	: ----	Issue Date	: 28-Aug-2025 18:11
Sampler	: Danijel Djukic		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Gregory Towers	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Zoran Grozdanovski	Team Leader - Chemistry	Newcastle - Inorganics, Mayfield West, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EK061G: LOR raised for TKN due to sample matrix.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WML113C	RA27	WMLP280	WMLP278	WMLP311
			Sampling date / time	25-Aug-2025 08:06	25-Aug-2025 08:50	25-Aug-2025 10:20	25-Aug-2025 10:55	25-Aug-2025 13:20
Compound	CAS Number	LOR	Unit	ES2526262-001	ES2526262-002	ES2526262-003	ES2526262-004	ES2526262-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.01	7.09	7.06	7.22	6.88
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	816	1540	892	379	941
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	491	890	499	240	542
EA045: Turbidity								
Turbidity	----	0.1	NTU	192	480	22.7	50.5	26.3
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	179	341	222	138	193
Total Alkalinity as CaCO3	----	1	mg/L	179	341	222	138	193
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	70	90	52	21	104
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	128	294	140	30	143
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	46	50	32	11	38
Magnesium	7439-95-4	1	mg/L	20	41	20	5	24
Sodium	7440-23-5	1	mg/L	100	214	123	66	130
Potassium	7440-09-7	1	mg/L	1	<1	<1	<1	2
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WML113C	RA27	WMLP280	WMLP278	WMLP311
				Sampling date / time	25-Aug-2025 08:06	25-Aug-2025 08:50	25-Aug-2025 10:20	25-Aug-2025 10:55	25-Aug-2025 13:20
Compound	CAS Number	LOR	Unit		ES2526262-001	ES2526262-002	ES2526262-003	ES2526262-004	ES2526262-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.114**	<0.005	<0.005	**0.008**	**0.032**
Manganese	7439-96-5	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	<0.004	<0.004	<0.004
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**1.02**	**1.57**	**0.37**	**0.25**	**1.62**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**1.02**	**1.57**	**0.37**	**0.25**	**1.62**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.5	<1.0	**0.1**	**0.2**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.0**	**1.6**	**0.5**	**0.4**	**1.9**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.36**	**1.40**	**0.22**	**0.19**	**0.05**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**8.64**	**17.0**	**9.47**	**4.04**	**10.0**
ø Total Cations	----	0.01	meq/L		**8.32**	**15.2**	**8.59**	**3.83**	**9.58**
ø Ionic Balance	----	0.01	%		**1.93**	**5.60**	**4.84**	**2.66**	**2.43**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP325	----	----	----	----
				Sampling date / time	25-Aug-2025 14:28	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2526262-006	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.47**	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**1110**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**632**	----	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**84.8**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**233**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**233**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**86**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**194**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**52**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**24**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**154**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**2**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP325	----	----	----	----
				Sampling date / time	25-Aug-2025 14:28	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2526262-006	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.322**	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.27**	----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.5**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**0.5**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.17**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**11.9**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**11.3**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**2.58**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(WATER) EA005P: pH by PC Titrator

(WATER) EA010P: Conductivity by PC Titrator

c 010

CHAIN OF CUSTODY

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CLIENT: AGE Consultants	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Newcastle		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No
PROJECT: Ashton Coal Mine GW Sampling	ALS QUOTE NO.: EN/222/21	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No
PROJECT ID: ASH5027		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 0-8 °C
PROJECT MANAGER: Bryce McKay	CONTACT PH: 0414 324 504	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Danijel Djukic	SAMPLER MOBILE: 0423 266 442		
COC Emailed to ALS? YES	EDD FORMAT (or default): XTAB, ENMRG, ESDAT, PDF, MonPro		
Email Reports to: Danijel@ageconsultants.com.au, MonitorProData@yancoal.com.au, Brycem@ageconsultants.com.au			
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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 25/8/25 16:57	DATE/TIME: 25108 4:55	DATE/TIME: 25108 1700	DATE/TIME: 25/8 19:30

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	pH & EC	NT-1 & NT-2	W-1 (7 metals)	EG020 - Fe, Mn, Se	EA015H - TDS	EA045 - turdidity	NT-11 - Total P, Total N	EK058G - NO3	ED037 - HCO3	EK026	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	WML113C	25/08/2025 8:06	W	P	4	X	X	X	X	X	X	X	X	X	X	
2	RA27	25/08/2025 8:50	W	P	4	X	X	X	X	X	X	X	X	X	X	
3	WMLP280	25/08/2025 10:20	W	P	4	X	X	X	X	X	X	X	X	X	X	
4	WMLP278	25/08/2025 10:55	W	P	4	X	X	X	X	X	X	X	X	X	X	
5	WMLP311	25/08/2025 13:20	W	P	4	X	X	X	X	X	X	X	X	X	X	
6	WMLP325	25/08/2025 14:28	W	P	4	X	X	X	X	X	X	X	X	X	X	
7			W	P		X	X	X	X	X	X	X	X	X	X	
8			W	P		X	X	X	X	X	X	X	X	X	X	
9			W	P		X	X	X	X	X	X	X	X	X	X	
10			W	P		X	X	X	X	X	X	X	X	X	X	
11			W	P		X	X	X	X	X	X	X	X	X	X	
12			W	P		X	X	X	X	X	X	X	X	X	X	
				TOTAL	24											

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Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

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Australasian Groundwater & Environmental Consultants

Report on

Yancoal – Ashton Coal Annual Groundwater Monitoring Review 2025

Prepared for
Ashton Coal Operations Pty Ltd

Project No. 20250002.ASH5028.001
March 2026

ageconsultants.com.au

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Yancoal – Ashton Coal
Annual Groundwater Monitoring Review 2025

1 Introduction

The Ashton Coal Project (ACP) is located 14 km north-west of Singleton in the Hunter Valley region of New South Wales (NSW) (Figure 1.1). The ACP consists of decommissioned open cut and active underground mining to access a series of coal seams within the Permian Foybrook Formation. Ashton Coal Operations Ltd (ACOL) is wholly owned and operated by Yancoal Australia Limited (Yancoal).

Between 2003 and 2011, coal was recovered from eleven seams of varying thickness, down to and including the Lower Barrett Seam (LB), from an open cut mine known as the North-East Open Cut (NEOC). Between 2007 and 2016 underground longwall (LW) mining extracted coal from the Pikes Gully Seam (PG) and underlying Upper Liddell (ULD). Mining of the Upper Lower Liddell Seam (ULLD) commenced July 2017. Extraction of longwall panel LW206B (within the ULLD) commenced in mid-November 2022 and was completed in mid-March 2023. Mining in LW207A commenced in mid-June 2023 and was completed in mid-July 2024. Mining in LW207B commenced at the beginning of September 2024 and was completed in mid-December 2024. Mining in LW208 commenced in January 2025 and was completed in May 2025. ACOL commenced mining LW403 (PG) in the Ravensworth Underground Mine (RUM) during November 2025. Collectively, combined ACOL and RUM mining is referred to as 'RUMex'.

The underground mine is located south of the New England Highway and includes a diversion of Bowmans Creek via two excavated and lined channels. The channels have re-routed Bowmans Creek to minimise any potential subsidence impacts on the creek line.

1.1 Objective

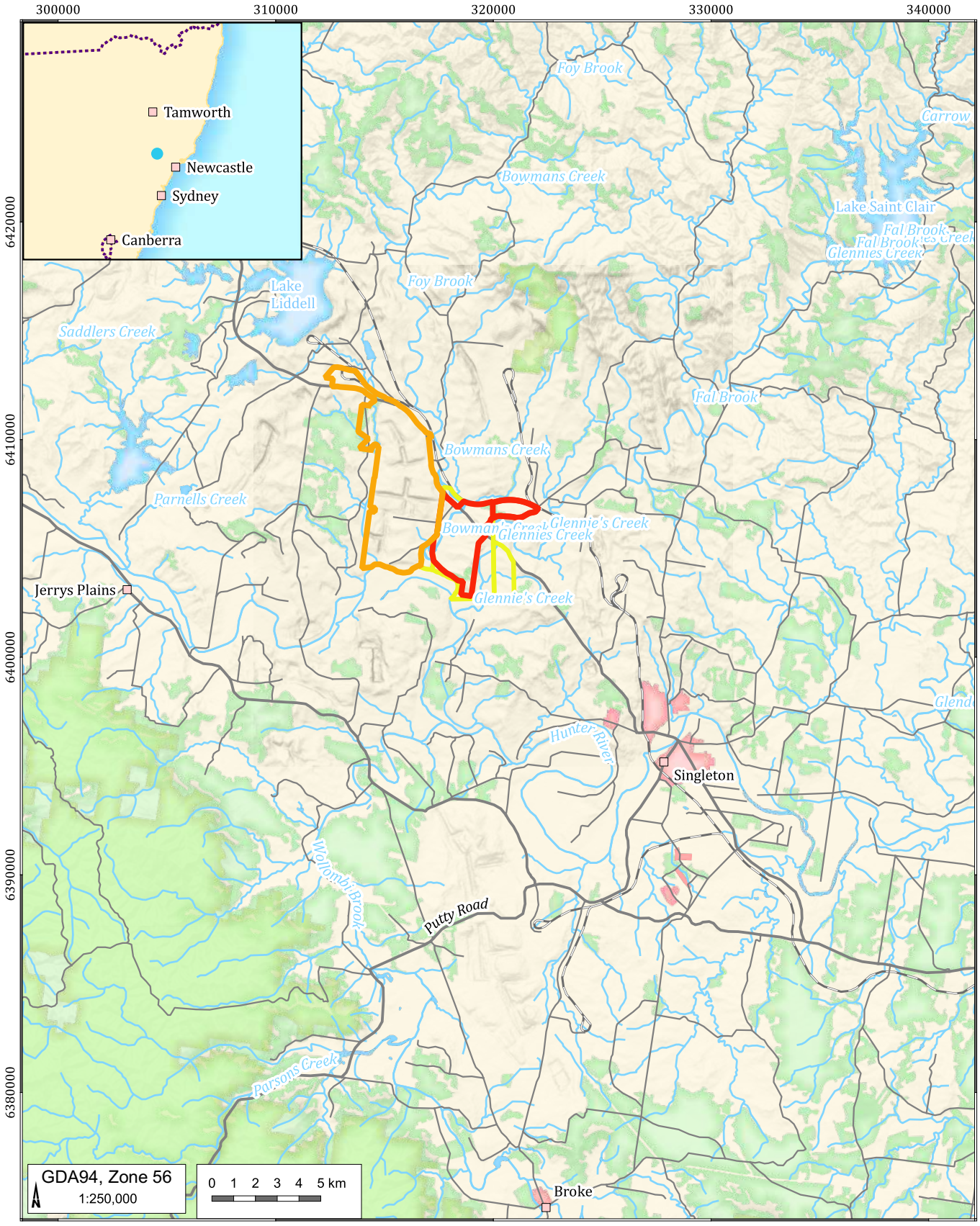
The ACOL development consent (DA 309-11-2001-i) last modified in July 2022, requires that groundwater be monitored for potential impacts from mining. In 2018, the Department of Planning and Environment (DPE) approved the current Water Management Plan (WMP - version 13, dated April 2025). The WMP outlines the groundwater monitoring program and establishes trigger values for groundwater levels and quality in the various groundwater systems located within the ACP site.

This report summarises the monthly data collected by Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) from January 2025 to December 2025. The aim of this report is to provide a consolidated summary of groundwater conditions at ACP throughout 2025.

1.2 Scope

The scope undertaken to achieve the objectives includes:

- review and assess rainfall, groundwater levels, pH, electrical conductivity (EC) and water chemistry data from groundwater monitoring campaigns;
- comparison of groundwater monitoring results against WMP triggers;
- notify ACOL of exceedances which require the enactment of the WMP groundwater response plan; and
- make recommendations regarding the groundwater monitoring network and program, where necessary, to ensure ongoing quality control/assurance of groundwater monitoring.



LEGEND

- Ashton mining lease
- Ashton exploration lease
- RUM mining lease
- Study area location
- Populated place
- Built up area
- Major road
- Minor road
- Rail
- Watercourse
- Water area
- Reserve
- Vegetation
- Land

Yancoal Ashton - Annual Groundwater Monitoring Review 2025 (ASH5028.001)

Study area location

AGE

DATE 19/01/2026

FIGURE No: **1.1**

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G:\Projects\ASH5028.001 Ashton Compliance Reporting 2025\3_GIS\Workspaces\01.01_ASH5028_study_area_location.qgs.qgz

2 Physical setting

The Ashton underground mine is located south of the New England Highway, bounded by the Hunter River to the south and two Hunter River tributaries, Glennies Creek and Bowmans Creek, to the east and west, respectively (Figure 1.1). Underground operations intend extracting four coal seams; PG, ULD, ULLD and LB, via a longwall arrangement.

Mining in LW207A commenced in May 2023 and concluded in July 2024, while mining in LW207B began in September 2024 and ended in December 2024. LW207 is centrally located within the mining lease (ML), with the Hunter River and its alluvial deposits situated to the south. The final LW panels within the ULLD seams are positioned down dip of LW207, in the western portion of the ML. In November 2025 ACOL began mining LW403 in the RUMex. Future planned panels at RUMex target the Pikes Gully and Middle Liddell seams.

2.1 Climate and rainfall

Climate monitoring data for 2025 were collected from the Ashton weather station and the Bureau of Meteorology (BOM) station at Bulga (South Wambo) (BOM station 061191), located approximately 19 km southwest of Ashton. The Ashton weather station has recorded 20 years of rainfall data, spanning from 1 July 2005, to the present. In comparison, the Bulga (South Wambo) station boasts 66 years of rainfall records, dating back to 1959. A summary of average monthly rainfall from both stations for 2025 is provided in Table 2.1. Based on Ashton weather station data, rainfall at Ashton remained consistent in 2025 compared to the previous year. Six months in the year- February, June, July, September, October, November and December - experienced below-average rainfall. Overall total rainfall throughout the year was above average, with the remaining months all recording above average rainfall, the wettest of which were March, May and August.

Similarly, rainfall at the Bulga (South Wambo) station recorded below average readings in - January, February, June, October, November, and December - while the remaining months recorded above-average rainfall.

Table 2.1 Average Monthly Rainfall 2025 – Ashton Coal and Bulga

Month	Ashton weather station			Bulga (South Wambo) BOM station		
	2025 monthly rainfall (mm)	Long-term average (mm)	% of long-term average	2025 monthly rainfall (mm)	Long-term average (mm)	% of long-term average
Jan	92.8	66.4	139.75	68.4	85.7	79.8
Feb	39.2	83.6	-	59.8	85.4	70.0
Mar	126	112.1	112.4	124.1	75.8	163.7
Apr	80.8	60.8	133.0	57.9	47.3	122.4
May	239.4	48.2	496.4	100.9	40.6	248.5
Jun	20.2	63.4	31.8	19	43.2	44.0
Jul	39.8	40.1	99.2	35.2	33.1	106.3
Aug	146	48.2	303.1	117.5	36.1	325.5
Sep	46	50.3	91.5	67.8	38.8	174.7
Oct	37.8	53.3	70.9	42.6	55.6	76.6
Nov	32.8	77.4	42.4	27	63.9	42.3
Dec	24.8	66.8	37.1	23.8	71.6	33.2

An evapotranspiration (ET) rate of 1411.4 mm/year was sourced from the Bureau of Meteorology (BOM) database from Scone Airport (61363).

Long-term rainfall trends were assessed using the Cumulative Rainfall Departure (CRD) method (Bredenkamp et al., 1995). This method illustrates rainfall trends relative to the long-term monthly average, offering a historical perspective on wetter and drier periods. In a CRD plot, an upward gradient signifies periods of above-average rainfall, whereas a downward slope indicates below-average rainfall. The CRD analysis has been applied in this study to contextualise observed variations in groundwater levels and chemistry.

The CRD trends for the Ashton weather station and Bulga (South Wambo) (BOM station 061191) are presented in Figure 2.1. Both stations exhibit periods of above-average rainfall throughout most of 2025, as indicated by an increasing CRD. Conversely, below-average rainfall, represented by a decreasing CRD, was observed in February, September, October, November, and December.

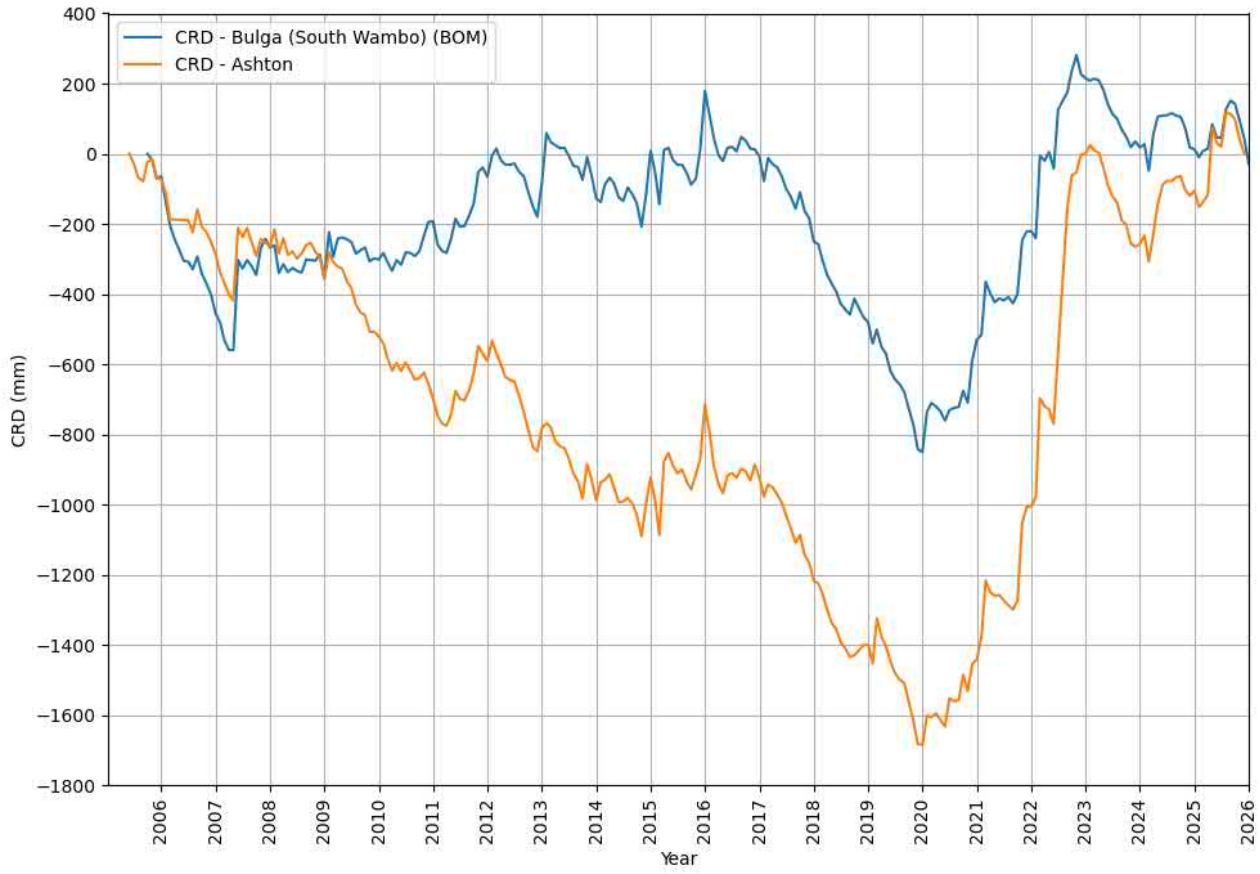


Figure 2.1 Cumulative Rainfall Departure – Ashton Coal and Bulga

2.2 Surface water

The Ashton Mine lease is bordered by Bowmans Creek to the west, Bettys Creek (a tributary of Bowmans Creek) to the north, Glennies Creek to the east, and the Hunter River to the south. Both Bowmans and Glennies Creeks flow into the Hunter River. Below is a description of the three main watercourses:

- The Hunter River is the primary surface water body, with a catchment area of 13,590 km² at Bowmans Creek. Its flow is regulated by Glenbawn Dam, as well as by other licensed water extractions and releases.
- Glennies Creek, along with its associated alluvium, is situated to the east of the underground workings and the PG sub-crop area, with a catchment area of approximately 600 km². Up to half of the catchment drains into Lake St. Clair, located in the far northeastern section. Water from Lake St. Clair is discharged into Glennies Creek through controlled releases.

- The natural channel of Bowmans Creek lies above longwall panels LW206B and LW207A, with its associated alluvium extending over LW205 to LW208. It serves as the primary watercourse over the underground workings area. To minimise mining impacts on the creek and reduce potential inflows to the underground workings, Bowmans Creek was diverted in two locations. Construction of the eastern diversion began in March 2011, and the western diversion started in February 2012. Both diversions were commissioned in November 2012 and are situated within the Bowmans Creek Alluvium (BCA). Designed to replicate the natural creek setting, the diversions include channel cross-sectional variability, natural bed levels, and ecological features such as resting pools. A geosynthetic clay liner was installed to minimise leakage from the creek.
- Bowmans Creek flow is unregulated and monitored in accordance with the WMP. A streamflow gauging station (Station No. 210130, regulated by WaterNSW) was installed in October 1993 to serve as a baseline for Bowmans Creek flow. With a catchment area of 240 km², this station is located in the midsection of the creek within the ML, upstream of the western diversion.

2.3 Mining

The longwall panels accessing the ULLD are typically offset by 24 m to the east and 10 m to the south from the overlying ULD longwall panels. This offset is specifically designed to minimise subsidence and its associated impacts on the surrounding environment. However, the northern extent of the PG, ULD, and ULLD longwalls, as well as the main gate road, are aligned, creating a "stacked edge." This alignment results in more noticeable surface subsidence impacts in this area compared to other locations.

The start and end dates of longwall panel mining at ACP are summarised in Table 2.2.

Table 2.2 Longwall panel schedule

Longwall panel	Target seam	Start date	End date
LW1	PG	12/03/2007	15/10/2007
LW2	PG	09/11/2007	22/07/2008
LW3	PG	20/08/2008	04/03/2009
LW4	PG	02/04/2009	15/10/2009
LW5	PG	04/01/2010	04/06/2010
LW6A	PG	08/07/2010	23/11/2010
LW7A	PG	22/03/2011	08/08/2011
LW7B	PG	28/09/2011	17/01/2012
LW8	PG	27/02/2012	06/06/2012
LW101	ULD	31/07/2012	14/06/2013
LW6B	PG	14/07/2013	10/10/2013
LW102	ULD	10/11/2013	24/07/2014
LW103	ULD	21/08/2014	21/06/2015
LW104A	ULD	23/07/2015	16/01/2016
LW104B	ULD	03/02/2016	11/04/2016
LW105	ULD	17/05/2016	26/09/2016
LW106A	ULD	18/10/2016	1/06/2017

Longwall panel	Target seam	Start date	End date
LW201	ULLD	07/07/2017	06/05/2018
LW202	ULLD	07/06/2018	21/08/2019
LW203	ULLD	13/10/2019	26/05/2020
LW204	ULLD	02/07/2020	12/04/2021
LW205	ULLD	27/05/2021	3/12/2021
LW206A	ULLD	13/01/2022	12/10/2022
LW206B	ULLD	11/11/2022	5/03/2023
LW207A	ULLD	30/05/2023	20/07/2024
LW207B	ULLD	04/09/2024	13/12/2024
LW208	ULLD	7/02/2025	7/06/2025
LW403	PG	17/11/2025	In progress

2.4 Conceptual hydrogeology

2.4.1 Hydrostratigraphy

Ashton is situated in the central Hunter Valley of NSW, where the lower sequences of the Wittingham Coal Measures (Singleton Supergroup) subcrop, as shown in Figure 2.2. Within the Ashton mining lease, the Hebden seam to the Bayswater seam (inclusive) subcrop. The underground operation primarily targets the PG, ULD, ULLD, and LB seams.

The Wittingham Coal Measures dip west-southwest in the Ashton area, with this orientation being locally influenced by the Camberwell Anticline to the east of the mine and the Bayswater Syncline to the west. The uppermost target coal seam at Ashton, the PG seam, subcrops beneath the Glennies Creek Alluvium (GCA) approximately 150 m east of the mine. In contrast, the lowest target coal seam, the LB seam, subcrops beneath regolith about 2 km to the east of the mine. In the western portion of the mining area, the overburden above the PG seam varies in thickness, ranging from 100 m at the north end of LW7 to 190 m at the south end of LW7.

The stratigraphic sequence in the region consists of two distinct units: Quaternary alluvium and Permian strata. The Permian strata contain coal seams, typically 2 m to 2.5 m thick, with overburden and interburden (usually around 30 m thick between successive seams) composed of sandstone, siltstone, tuffaceous mudstone, and conglomerate. The Quaternary alluvium consists of unconsolidated silt, sand, and gravel found in the alluvial floodplains of the Hunter River (HR), Bowmans Creek (BC), and Glennies Creek (GC). This alluvium unconformably overlies the Permian within the floodplains of HR, BC, and GC. In other areas, the Permian is covered by a regolith that includes colluvium, eluvium, and completely weathered rock, which interfaces with the floodplain alluvium along the valley flanks.

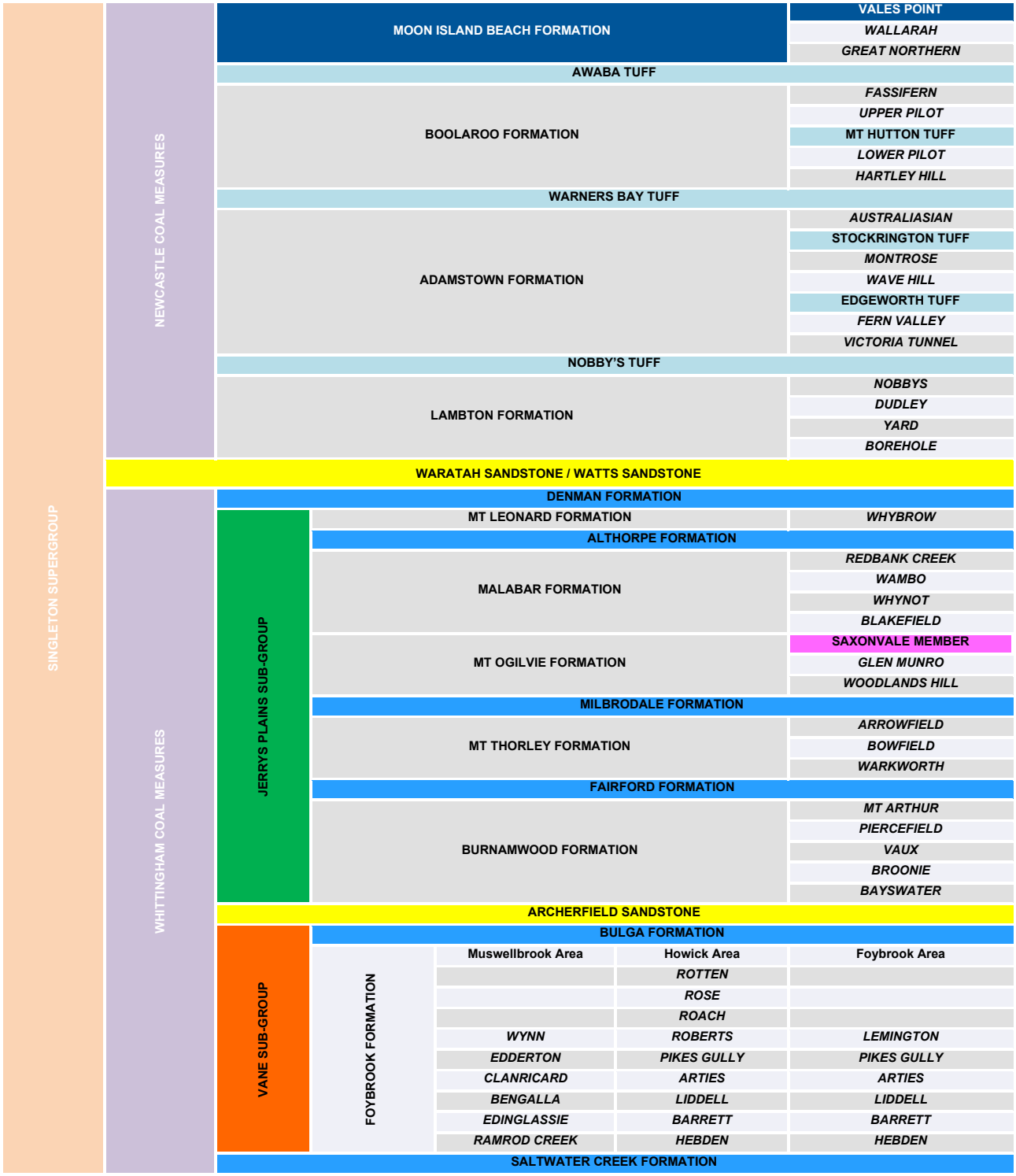


Figure 2.2 Singleton Super Group sequence stratigraphy (AGE, 2016)

2.4.1.1 Quaternary alluvium/Regolith

Ashton is covered by Quaternary alluvium associated with the Hunter River (HR), Bowmans Creek (BC), and Glennies Creek (GC). The Bowmans Creek Alluvium (BCA) and Glennies Creek Alluvium (GCA) are hydraulically connected to the Hunter River Alluvium (HRA). The Quaternary and recent alluvium, along with colluvium, found along the floodplains of the HR, GC, and BC, are composed of two primary depositional units: a surficial fine-grained sediment layer and a coarser basal material. The surficial alluvium consists of shallow sequences of clay, silty sand, and sand. Along minor drainage lines, the surficial alluvium is typically confined within 500 m of the creeks and varies in thickness from 7 m to 15 m.

Away from the floodplain areas, the Permian coal measures are overlain by a regolith layer, which consists of colluvium, eluvium, and completely weathered rock. This regolith has soil-like properties rather than rock characteristics and interfaces with the alluvium along the flanks of the floodplain areas. The thickness of the regolith layer varies but is typically between 15 m and 20 m above the underlying rock.

2.4.1.2 Permian strata

The Wittingham Coal Measures consist of Permian-aged coal seams interbedded with siltstone, sandstone, shale, and conglomerates. At Ashton, these measures reach a thickness of up to 400 m, while regionally they range from approximately 250 m to 600 m. The on-site profile at Ashton spans from above the Bayswater seam to the Hebden seam, encompassing the lower portion of the Wittingham Coal Measures (Figure 2.2).

Locally, the Wittingham Coal Measures are further subdivided into (AGE, 2016):

- four main target coal seams – PG, ULD, ULLD and LB;
- a range of additional coal seams and plies of varying thickness, including the Bayswater seam, up to 20 Lemington seam plies, the Arties seam, as well as several from the Liddell and Barrett seams, which are not proposed for mining in the Ashton underground mine; and
- interburden sediments consisting of siltstone, sandstone, conglomerate, and claystone.

The PG seam overburden contains more than 20 plies of the Lemington seam profile, along with the overlying Bayswater seam. The largest plies of the Lemington seam are of comparable thickness to the four target seams and may exhibit similar hydraulic properties.

2.4.2 Recharge

Recharge is believed to occur through direct rainfall, which infiltrates the ground surface and passes into the underlying formations via the thin soil cover and regolith. The Permian coal measures also subcrop in localised zones beneath the HRA, GCA, and BCA. In these areas, recharge is interpreted to happen through downward seepage, followed by downdip flow along the most permeable strata in the sequence, primarily the coal seams (Aquaterra, 2009; AGE, 2016).

The combined surface water catchment area potentially contributing recharge to the Ashton area is considerably larger than the mine area itself. Ashton is situated near the confluence of the Hunter River with Bowmans and Glennies Creeks. Both the surface and underground infrastructure at Ashton are entirely located within the catchments of Bowmans and Glennies Creeks, which extend approximately 30 km and 45 km to the north of Ashton, respectively.

Bowmans and Glennies Creeks are fed by tributaries up to the fourth order upstream of the site, with rainfall within these catchments flowing through the Ashton area. The catchment areas for Bowmans and Glennies Creeks cover approximately 300 km² and 600 km², respectively.

2.4.3 Groundwater flow

The Quaternary alluvium and regolith are interpreted (AGE, 2016) to form an unconfined groundwater system, recharged by rainfall infiltration, streamflow, and upward leakage from the underlying stratigraphy, particularly along GC and BC.

The water table in the alluvium/regolith reflects the topography in a subdued manner. Groundwater within the Hunter River Alluvium (HRA) generally flows eastward, while groundwater within GCA and BCA flows primarily southward towards the Hunter River, with localised flow towards the respective rivers and creeks.

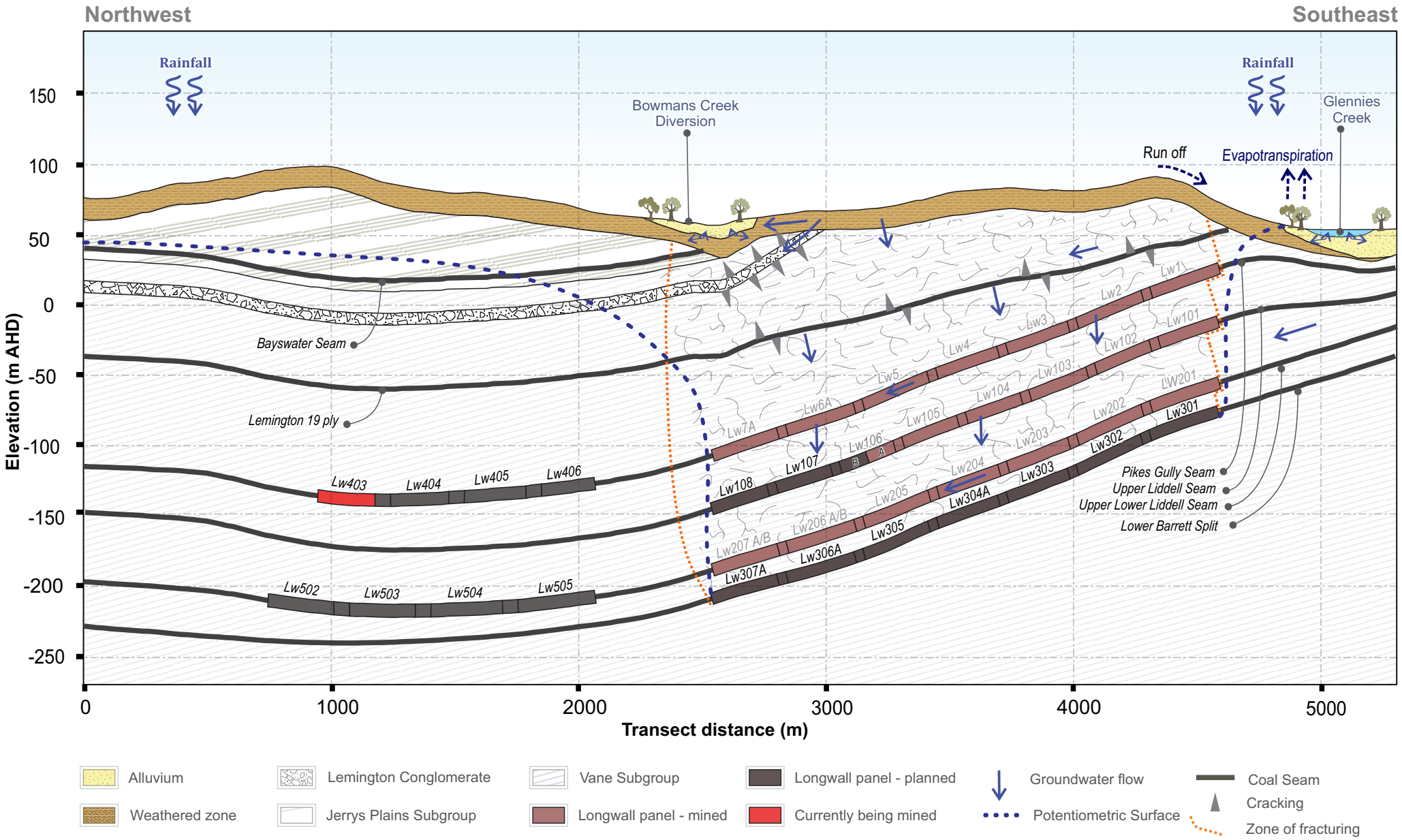
Groundwater flow within the coal seams is shaped by the local geomorphology, structural geology, and the region's extensive mining history. It is understood that groundwater in the Permian Coal Measures flows predominantly to the southwest, in alignment with the dip direction of the coal seams.

Mining of the PG and ULD seams has affected the groundwater regime at Ashton. Subsidence-induced cracking has extended to the surface in certain areas of the mine, particularly where the cover depth above the PG seam is shallower. In other areas, such as near the western side of the mine, where the cover is deeper, subsidence cracking is less pronounced. In regions with shallower cover, the cracking is likely to have affected both the PG overburden and the BCA. Surface cracking is also evident across the longwall panel areas, appearing shortly after subsidence occurs. This surface cracking is expected to be shallow, with its depth limited, and may or may not intersect with subsidence-induced cracks from the goaf, depending on the cover depth and subsidence magnitude.

Recharge from the GCA through connectivity with the PG seam is also a possibility (AGE, 2016). Hydraulic testing has shown that the PG seam is significantly more permeable near the outcrop compared to at depth (Peter Dundon and Associates, 2006). However, inflows into the workings during the mining of LW1 were not substantially greater than those during the mining of the LW1 tailgate (TG1A). This suggests that mining of LW1 did not increase the connectivity or flow from the PG seam in the subcrop beneath the GCA. While inflows were higher during the mining of TG1A compared to subsequent inflows from subsided strata during the extraction of LW1, the total inflows by the end of LW1 were below predicted levels. Additionally, the observed impacts on the GCA were less than anticipated, indicating that the proximity to Glennies Creek did not result in an unexpected increase in connectivity or inflows from the Glennies Creek floodplain.

The presence of subsidence cracking over parts of the underground mine enhances the potential connectivity between the mine and the water within the creeks and their associated alluvium. Planned LW panels within the underlying ULLD and LB seams could potentially reactivate subsidence and subsidence-related fracturing in these areas (AGE, 2016).

The conceptual hydrogeological model is depicted in Figure 2.3.



Schematic section showing conceptual hydrogeology - northwest to southeast

Figure - 2.3

Ashton Compliance Reporting 2025 (ASH5028.001)

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3 Groundwater management plan

The previous two versions of the WMP (2018 and 2020) were updated and submitted to DPI Water for approval in March 2018 and September 2020 respectively. The updated WMP (2025), hereafter referred to as the WMP, includes revised water quality triggers. A summary of the monitoring locations is provided in Appendix A, while the groundwater monitoring plan, including parameters and frequency, is outlined in Appendix B. The WMP was approved in April 2025, and as a result, groundwater monitoring has been conducted in accordance with WMP version 13 (2025) since its approval.

3.1 Groundwater monitoring network

The ACOL groundwater monitoring network includes over 100 monitoring bores, of which 64 bores and ten vibrating wire piezometer (VWP) installations are actively monitored as part of the WMP. Monitoring occurs through monthly, quarterly, and annual campaigns (Appendix A). The WMP details the monitoring plan and identifies key locations in areas potentially sensitive to mining impacts.

Monitoring of groundwater levels, VWP pressure heads, and water quality parameters at these bores effectively captures the lateral behaviour of the alluvial aquifers, interburden, and coal seam aquifers on site. The current groundwater monitoring network is deemed adequate for detecting changes in groundwater conditions across the site.

The WMP monitoring locations and their respective monitoring targets are illustrated in Figure 3.1. Detailed information on these locations is provided in Appendix A (Table A 1).

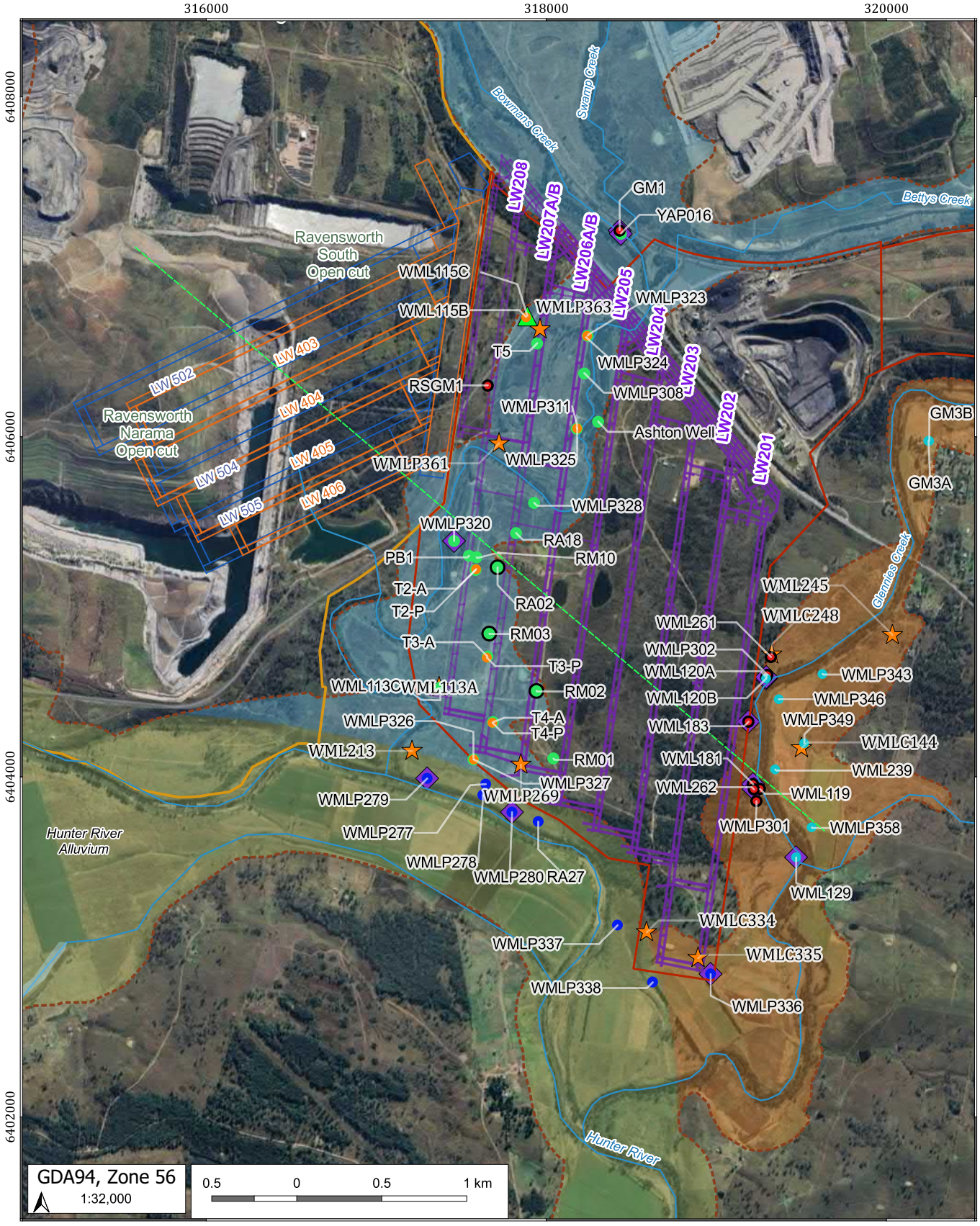
The groundwater monitoring program includes the monitoring of:

- groundwater levels;
- groundwater (piezometric) pressures;
- field water quality parameters – pH, EC, temperature and total dissolved solids (TDS);
- groundwater sampling for minor chemical lab analysis (including pH, EC, TDS, major ions (calcium, magnesium, sodium, potassium, chloride and sulfate as SO4 and alkalinity);
- groundwater sampling for comprehensive chemical lab analysis (including pH, EC, TDS, major ions, alkalinity, cations/anions, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, zinc, turbidity, cyanide, nitrate, nitrite, Kjeldahl nitrogen, total nitrogen and total phosphorous); and
- monitoring of groundwater levels and EC as required by Environmental Protection Licence (EPL) 11879.

Monitoring frequency is as follows (Appendix B):

- monthly monitoring at selected alluvial piezometers for water level and field water quality;
- monthly monitoring of water level and piezometric pressure in longwall-specific piezometers during active extraction at relevant longwalls;
- quarterly monitoring at selected piezometers for water level, field water quality and minor chemical analysis;
- biannual monitoring for bores specified by EPL 11879; and
- annual sampling at selected piezometers for minor and comprehensive chemical analysis.

The groundwater monitoring plan, including monitoring parameters and frequencies, is summarised in Appendix B (Table B 1).



LEGEND

- Bowmans Creek Alluvium
- Bowmans Creek Alluvium and Coal Measure Overburden
- Bowmans Creek Colluvium
- Coal measure
- Coal measure overburden
- EPL Bores - Updated Nov 2022
- Glennies Creek Alluvium
- Hunter River Alluvium
- VWPs
- Transect Line for Figure 2.3
- Ashton ULLD panels 2026
- Pikes Gully Seam Longwall layout
- Middle Liddell Seam Longwall layout
- Ashton leases
- RUM Development Consent Boundary

Alluvium boundaries

- Bowmans Creek Alluvium
- Glennies Creek Alluvium
- Hunter River Alluvium
- Rivers

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WMP groundwater monitoring network

AGE

DATE 18/02/2026

FIGURE **3.1**

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3.2 Trigger values

The WMP outlines trigger values for groundwater level and quality for monitoring bores in the Bowmans Creek BCA, GCA and the HRA.

A recorded water level below the defined trigger level at any monitoring bore, sustained for three consecutive months between March 2018 and the completion of mining in LW204 within the ULLD, would trigger a response under the WMP. In late 2019, AGE was requested by ACOL to validate and update the AGE (2016) groundwater model in accordance with NSW regulatory requirements, which mandate a model update every three years. ACOL is currently updating the groundwater model, and modelled drawdowns for longwall panels from LW205 onwards will be incorporated into a revised WMP, along with updated trigger criteria. In the meantime, recorded water levels (and water quality) will continue to be assessed in accordance with the approved WMP. Groundwater elevation trigger levels are summarised in Table 3.1.

Groundwater quality trigger levels are summarised in Table 3.2. Similar to groundwater elevation, three consecutive measurements outside of these trigger levels will prompt a response under the WMP. Additionally, if a recorded value at a monitoring bore significantly deviates from the preceding three readings and there are no identifiable events that could explain the difference, a response will be triggered. The WMP groundwater response plan, detailing the actions to be taken when trigger values are exceeded, is summarised in Appendix C.

Table 3.1 Groundwater elevation trigger levels for alluvial monitoring bores

Aquifer	Monitoring bore	Base of alluvium elevation (m AHD)	Assigned trigger value during of mining in LW208 (Upper Lower Liddell Seam) (m AHD)
BCA*	WMLP311	55.64	56.49
	WMLP323	59.47	57.94
	WMLP328	49.42	50.39
	T2A	49.69	52.76
GCA	WML129	45.44	49.9
	WML239	50.82	48.94
	WMLP343	50	50.03
	WMLP349	48.84	50.75
	WMLP358	50.16	50.79[$]
HRA	WMLP279	45.1	48.22
	WMLP280	44.92	48.75
	WMLP337	48.05	47.65
	WMLP336	47.87	48.1

Notes: * Bowmans Creek alluvium is approved to be dewatered in areas above the mine plan by end of mining of the Upper Liddell seam (Aquaterra, 2009). Trigger values are therefore intended as a guide representing updated, more conservative, impact predictions from the updated groundwater model (AGE, 2016).

[$] This water level trigger is based on the second lowest water level measured, as the lowest measured water level is an outlier in the dataset.

Table 3.2 Groundwater quality trigger levels for alluvial monitoring bores

Aquifer	Monitoring bore	Groundwater pH trigger - Lower (5th percentile)	Groundwater pH trigger - Upper (95th percentile)	Groundwater EC trigger (µS/cm) (95th percentile)
BCA	WMLC113C	6.6	7.4	1445
	WMLP311	6.5	8	1289
	WMLP323	6.5	8.1	1241
	WMLP326	6.6	7.5	2078
	WMLP328	6.6	8.2	1175
	T2A	6.7	7.7	1422
GCA	WML120B	6.4	7.7	1387
	WML129	6.7	8	740
	WML239	6.3	7.4	984
	WMLP343	6.7	7.2	994
	WMLP346	6.5	7.1	750
	WMLP349	6.5	6.8	983
	WMLP358	6.2	6.9	401
HRA	WMLP279	6.3	7.5	1276
	WMLP280	6.6	7.9	2034
	WMLP337	6.8	7.8	3254
	WMLP336	6.2	8.2	1708

3.3 Sampling methods

Standards and procedures:

- Fourth edition ISBN 978-0-646-81881-8.
- *Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples".* Australian/New Zealand Standard 5667.1:1998.
- Sundaram, B. (2009). *"Groundwater Sampling and Analysis – A Field Guide",* Australian Government – Geoscience Australia. GeoCat 60901.

Groundwater levels/pressure heads at Ashton in 2025 were measured as follows:

- manual measurements using a water level dipper;
- download of VWP data;
- downloadable pressure transducer (PT); and
- telemetric PT.

Groundwater quality field parameters were measured using a calibrated water quality meter. Water quality laboratory analysis is conducted by National Association of Testing Authorities (NATA) accredited group Australian Laboratory Services (ALS).

Throughout 2025, groundwater sampling was conducted by AGE Hydrogeologists Danijel Djukic and Daniel Rego.

4 Groundwater monitoring results

Groundwater monitoring and sampling was conducted at the locations and frequencies outlined in the WMP (Section 7.3). Groundwater levels and quality trends for alluvial bores are presented in Figure 4.1 through Figure 4.21. Groundwater levels and quality data for non-alluvial monitoring locations are presented in Figure 4.23 through Figure 4.31.

4.1 Alluvium monitoring

4.1.1 WMP compliance groundwater elevations

The groundwater elevation trends and trigger levels for the BCA, GCA and HRA compliance monitoring bores are presented in Figure 4.1, Figure 4.2, Figure 4.3 and Figure 4.4, respectively. Daily rainfall measurements and CRD have also been plotted and used to compare water level trends. The river and creek water levels (sourced from WaterNSW online database[1]) are presented graphically in Figure 4.5.

The following observations can be noted for 2025:

- Groundwater levels in the BCA bores were stable until May 2025, when rainfall recharge increased water levels. Water levels decreased from June to August, then increased again after heavy rain in early August. Following this, groundwater levels declined through the rest of 2025 due to below-average rainfall (Figure 4.1). T2A was dry from October 2023 but recovered in August and remained above its trigger level as water levels receded. Other BCA bores stayed above their trigger levels throughout 2025. The BCA is not a regulated stream, and ACP is approved under DA 309-11-2011-i MOD 5 to intercept the groundwater resource.
- GCA groundwater elevations remained stable throughout the year (see Figure 4.2 and Figure 4.3). Sampling at WMLP343 was not possible from August 2024 to August 2025 due to sediment accumulation in the screened interval. Water levels in the borehole recovered during 2025 as increased rainfall facilitated water sample collection, though a sediment blockage persists within the bore. Airlift development is scheduled to address the sediment obstruction. No GCA groundwater elevations exceeded established trigger levels during 2025.
- HRA regulatory bores showed rising groundwater elevations in mid-2025, followed by declines in the latter half (see Figure 4.4). Controlled upstream releases helped stabilise water levels, which stayed above trigger thresholds throughout 2025.
- Surface water levels in Bowmans Creek, Glennies Creek, and the Hunter River stayed mostly steady during the year, rising sharply only after heavy rain events (Figure 4.5).

The site received above-average rainfall from May to August 2025, as shown by an increasing CRD. These rainfall events led to increased groundwater elevations in BCA, GCA, and HRA regulatory bores. No mining-related impacts beyond predictions were observed in the alluvium.

[1] WaterNSW (2021). Real-time water data. Available at: http://realtimedata.water.nsw.gov.au/water.

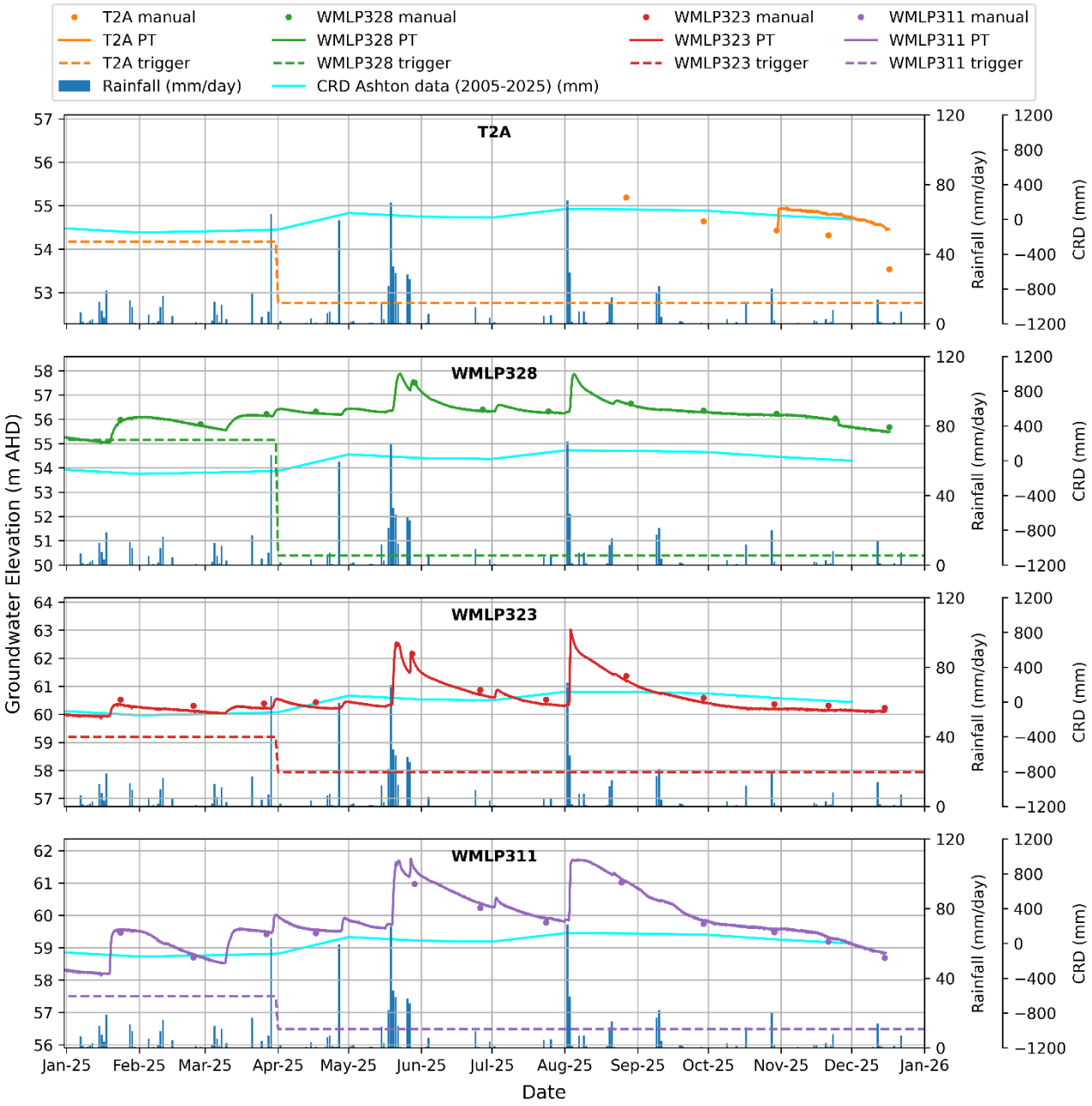

Figure 4.1 Bowmans Creek alluvium trigger bore hydrographs

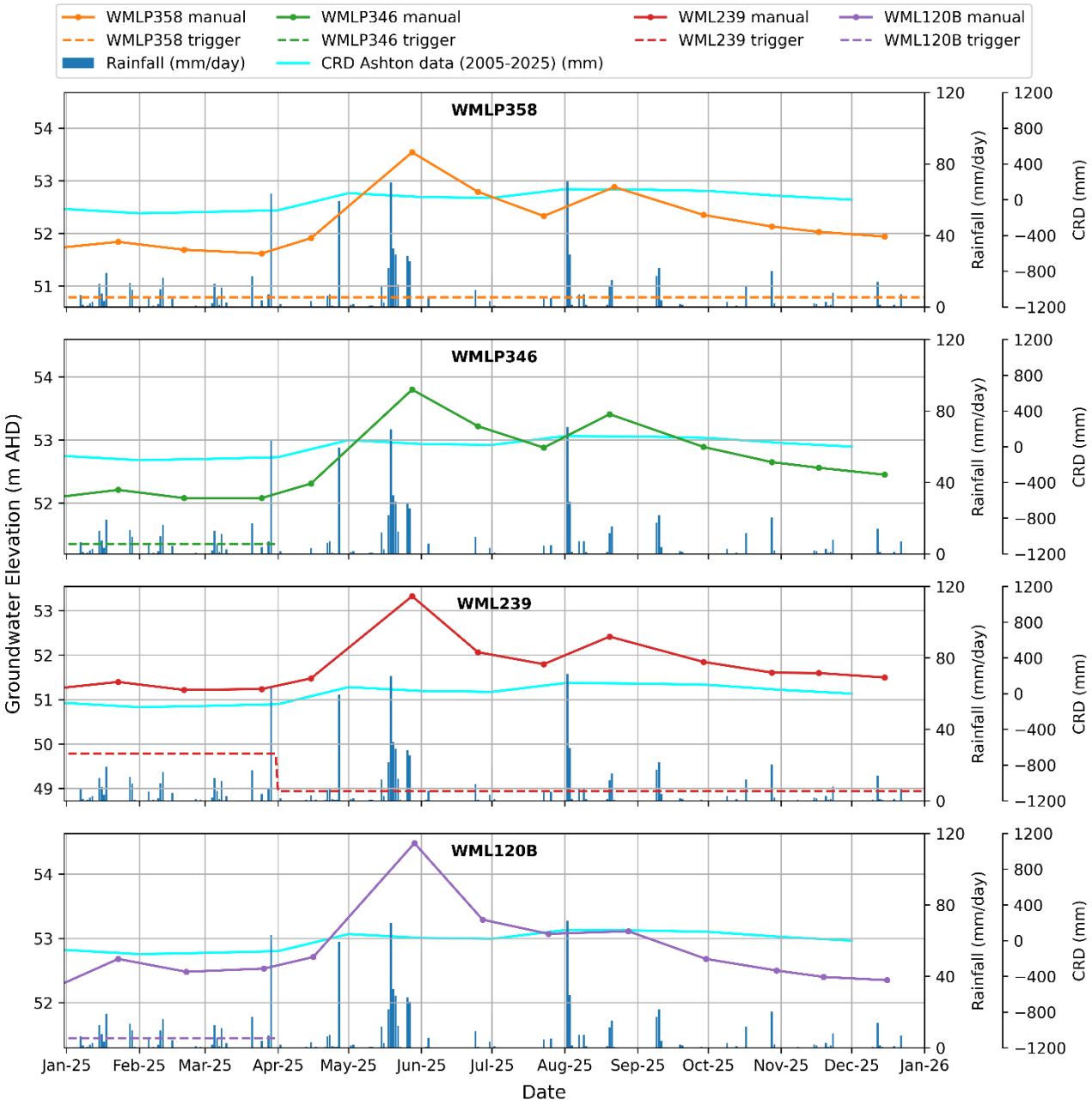

Figure 4.2 Glennies Creek alluvium trigger bore hydrographs (1)

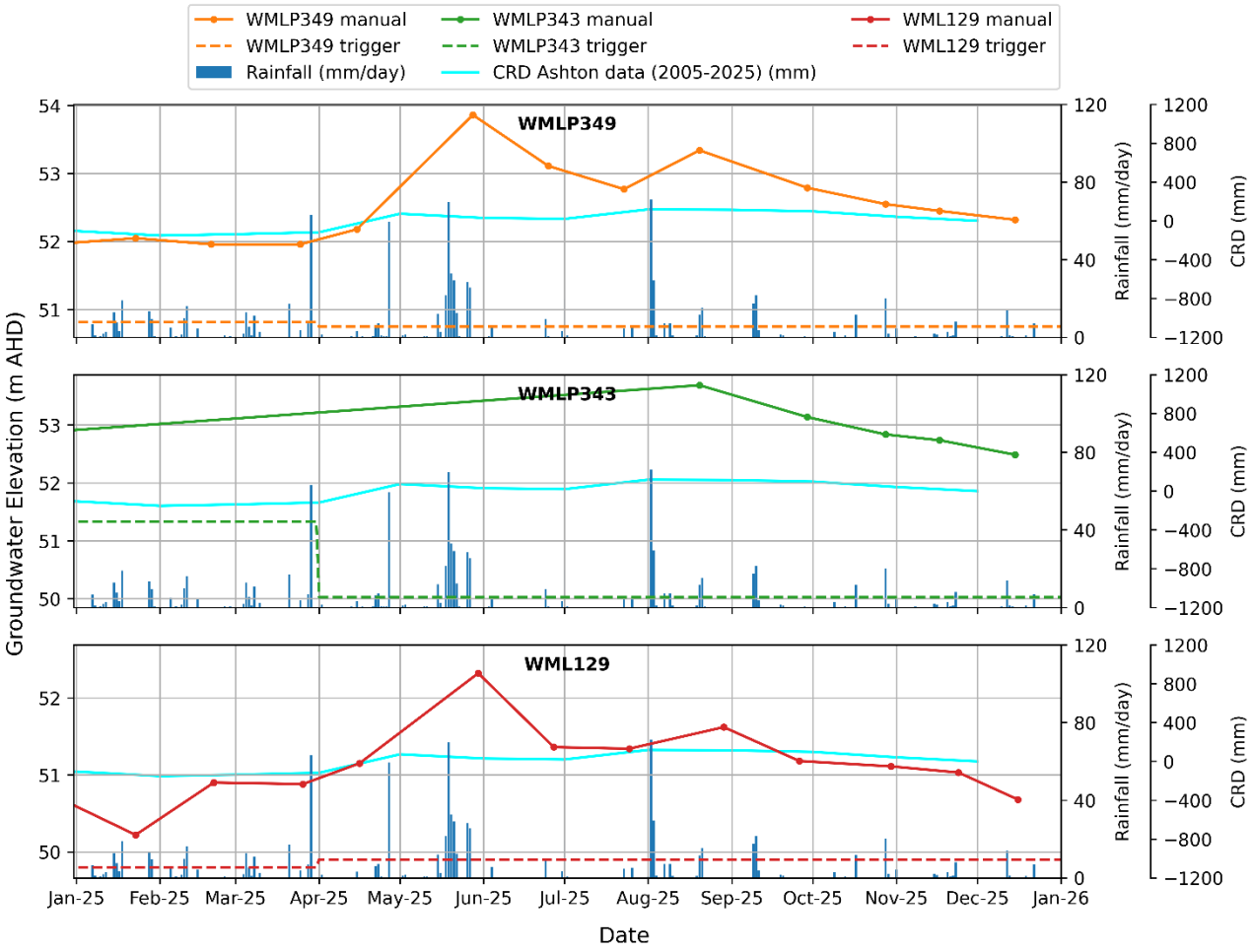

Figure 4.3 Glennies Creek alluvium trigger bore hydrographs (2)

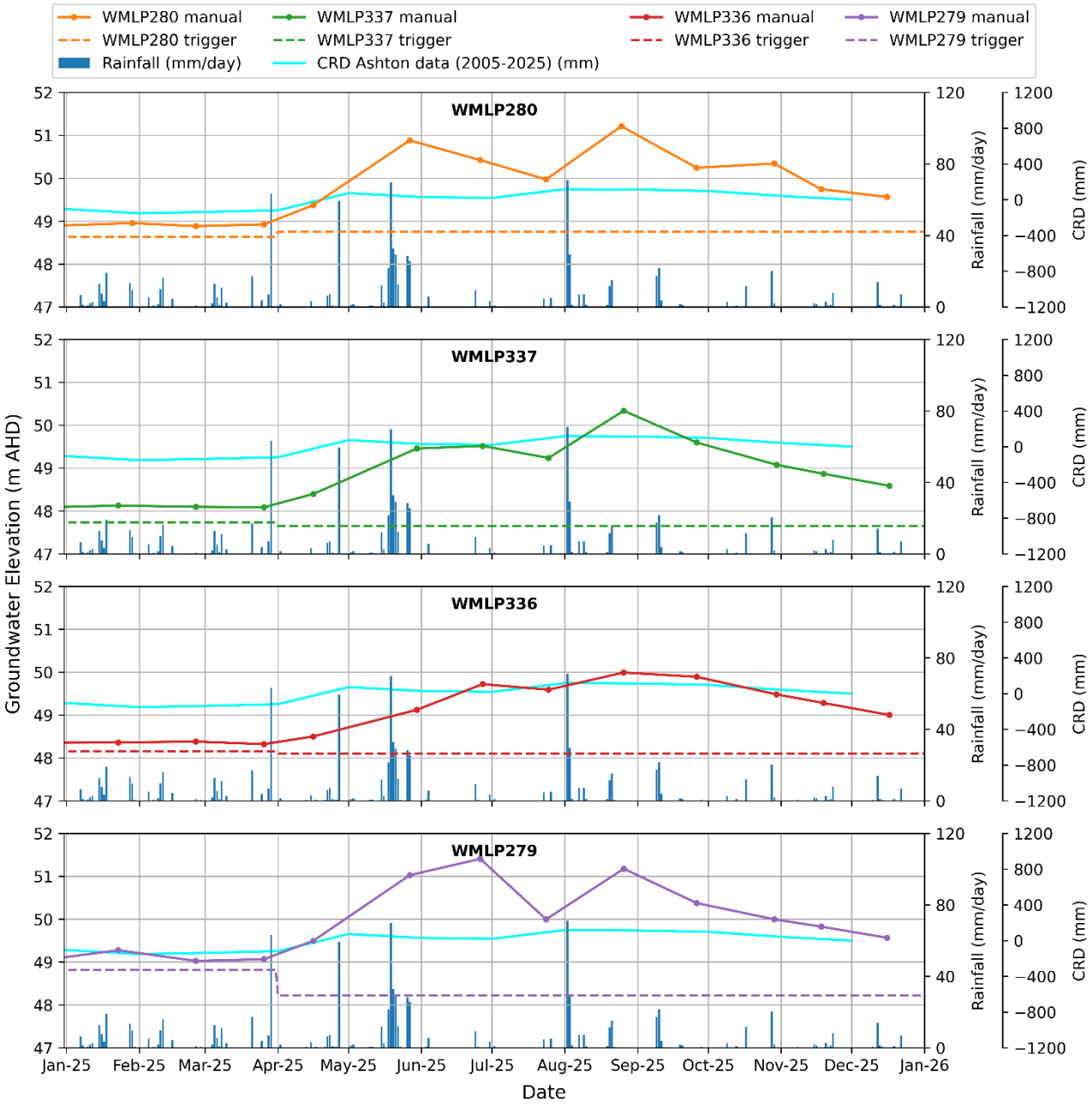

Figure 4.4 Hunter River alluvium trigger bore hydrographs

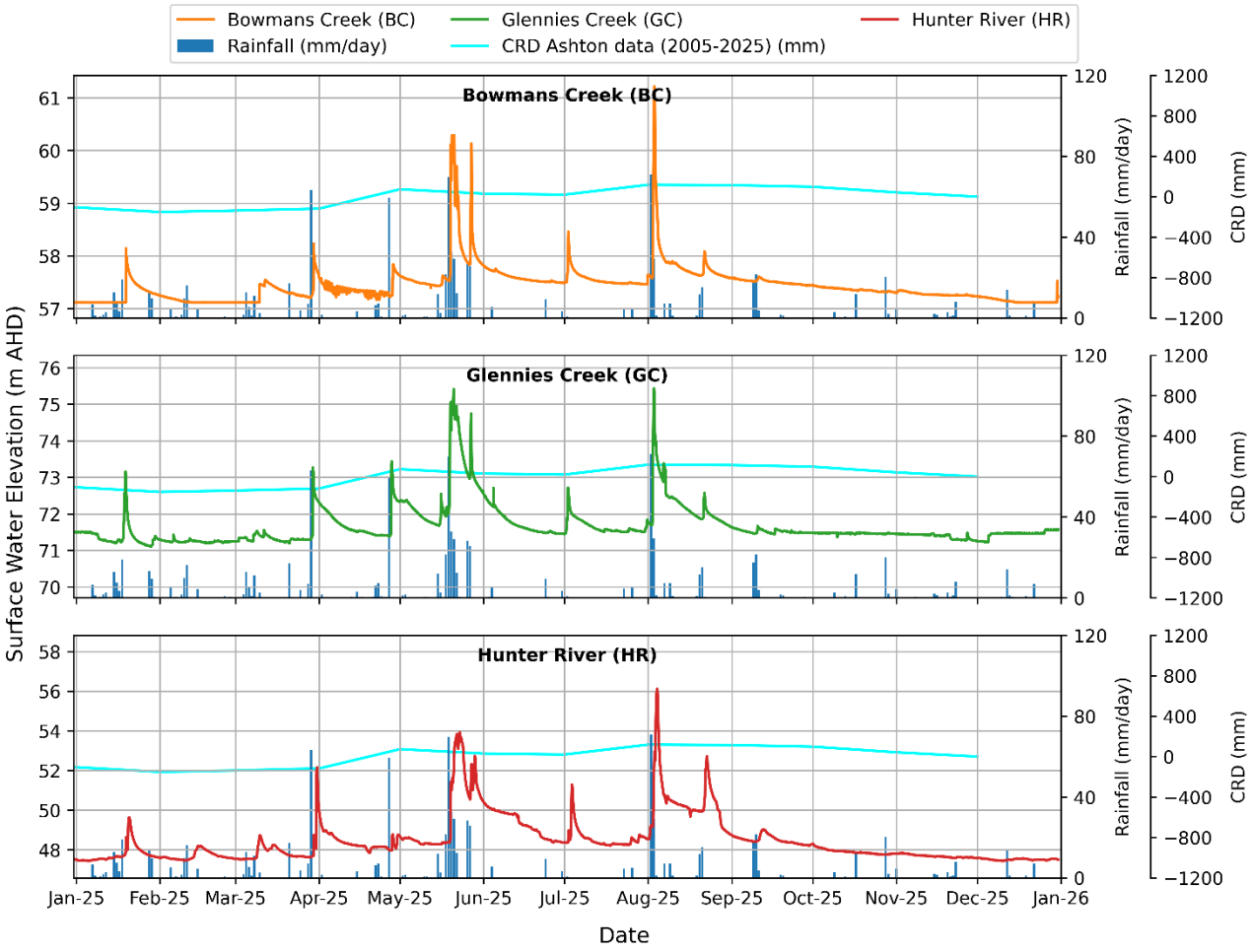

Figure 4.5 Surface water level hydrographs

4.1.2 Other alluvium groundwater levels

Groundwater elevation trends observed in 2025 for other BCA and HRA monitoring bores across the network are presented in Figure 4.6 and Figure 4.7, respectively. Daily rainfall measurements and CRD data have been plotted and analysed to assess water elevation trends. WML115C, WMLP308, RA18, and WMLP320 BCA alluvial bores remained relatively stable overall but showed similar trends to the regulatory BCA bores, with water levels generally increasing during the beginning of the year through to August and declining through the remainder of the year (commensurate with increasing rainfall trends). Non-regulatory bore T5 remained dry in all sampling events except May, August and September which all followed heavy rainfall events. Groundwater elevations in non-regulatory HRA bores also followed these rainfall trends throughout the year, with all bores recording sharp increases in groundwater level during May and August. No mining-related impacts beyond those predicted were observed.

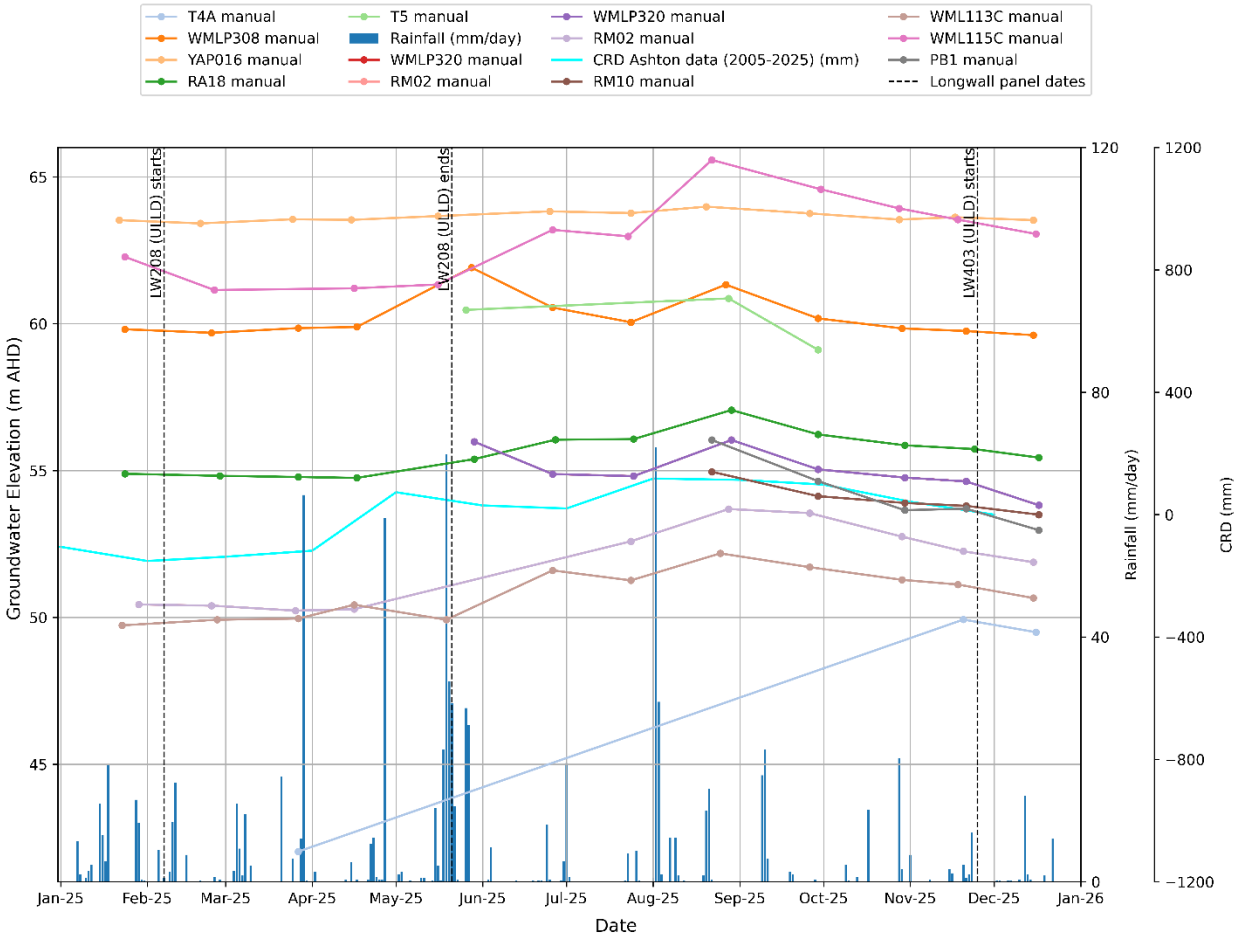

Figure 4.6 Other Bowmans Creek alluvium monitoring bore hydrographs

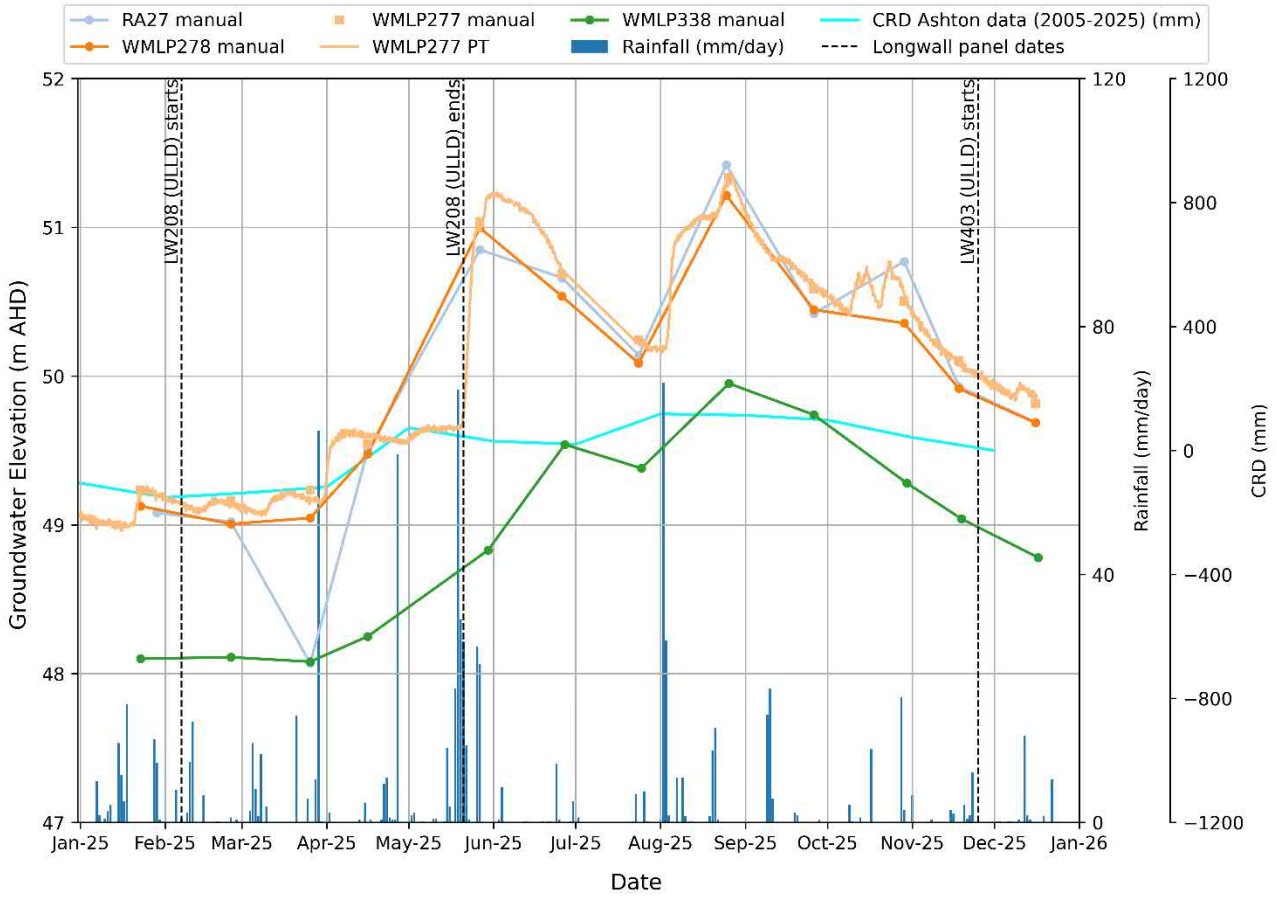

Figure 4.7 Other Hunter River alluvium monitoring bore hydrographs

4.1.3 pH, electrical conductivity and major ions

All alluvial bores across the ACP monitoring network were sampled for pH, EC, and major ions throughout 2025, with the results presented graphically in Figure 4.8 to Figure 4.21. A complete table of results for the aforementioned parameters is presented in Table D1 in Appendix D; along with a comprehensive analysis of measurements recorded during annual sampling in August 2025. All associated laboratory files can be found in Appendix F.

In contrast to the previous year, groundwater pH in alluvial bores was slightly alkaline to neutral in 2025. Two bores triggered a response due to exceedances of pH trigger values throughout the year, including:

- WLP358 in May and June; and
- WMLP349 in May and June.

WMLP349 and WMLP358 exceeded pH trigger criteria on three or more consecutive occasions, prompting an investigation into the causes of the exceedances (AGE, 2023). The investigation found no potential environmental harm or significant impact from mining operations. It was determined that the derived pH triggers were reflective of environmental conditions during a major drought between July 2017 and May 2020. Despite these exceedances, pH values remained relatively stable in 2025, generally ranging from 6.5 to 7.5, with only a few outliers outside this range which seem to correlate with heavy rainfall events. This recorded pH range is considered within the natural variation for the area.

The specific pH ranges measured within the BCA, GCA, and HRA in 2025 were as follows:

- BCA – pH 6.42 (WML113C) to pH 8.06 (WMLP326);
- GCA – pH 6.48 (WMLP129) to pH 8.32 (WMLP129); and
- HRA – pH 6.31 (WMLP336) to pH 8.51 (WMLP277).

Groundwater EC ranged from fresh to slightly brackish across the BCA, GCA, and HRA regulatory monitoring network in 2025, reflecting similar conditions to previous years. One bore (WMLP358) consistently recorded readings outside trigger level criteria in groundwater EC values during 2025, with trigger level exceedances recorded during September, October, November and December. WMLP349 exceeded trigger levels for the seventh and eighth consecutive times in January and February 2025, but groundwater EC continued to decline until mid-year, when exceedances in this bore stopped.

Investigations into the EC (and pH) trigger levels and exceedances for WMLP349 and WMLP358 were conducted (AGE, 2022a; AGE, 2023). These investigations confirmed that the dataset used to derive the GCA bore triggers had an adequate sample size, and the percentile calculations were accurate. Although the statistical methodology for trigger derivation was sound, the variability in rainfall recharge during the period used to derive the triggers did not reflect the typical long-term rainfall variation at Ashton. This suggested that the derived triggers may not fully capture natural environmental fluctuations in this bore. It was recommended that revised triggers be developed using the latest data, which better represent seasonal variability.

BCA monitoring bores recorded generally stable to declining EC values throughout 2025. Following significant rainfall events during the first half of 2025, water levels at T2-A recovered in August 2025 after an extended period of being dry (since November 2023), enabling the resumption of groundwater EC measurements at this bore.

Groundwater EC in GCA monitoring bores, except WMLP349 and WMLP358, was mainly stable in 2025. Most GCA bores showed rising EC in the latter half of the year, while WML129 and WML120B stayed steady. WMLP343 was blocked early in 2025, but water levels recovered above the blockage in August after heavy rain.

HRA monitoring bores exhibited generally stable EC trends throughout 2025 with most bores remaining stable or slightly declining. Groundwater EC in WMLP279 heavily declined during the first half of 2025 before stabilising and slightly inclining during the middle and second half of the year. No groundwater EC exceedances were recorded in HRA bores throughout 2025.

The observed EC ranges for alluvial bores in 2025 were as follows:

- BCA –213.4 µS/cm (WML115C) to 3,878 µS/cm (RM02);
- GCA – 230.1 µS/cm (WMLP358) to 1,049 µS/cm (WMLP349); and
- HRA – 378.2 µS/cm (WMLP278) to 3,169 µS/cm (WMLP337).

EC levels in rivers and creeks, sourced from the WaterNSW online database, were also analysed for 2025. Bowmans Creek remained heavily influenced by rainfall conditions, with sharp drops in EC corresponding with heavy rainfall events. Bowmans Creek ran dry between February and March and late December during 2025. Whilst EC levels in Glennies Creek remained mostly stable during 2025, there were multiple exceedances of EC trigger criteria in WMLP358 and WMLP349.

The Hunter River remained mostly stable during 2025 with small drops in EC corresponding with rainfall events. Towards the second half of 2025 the Hunter River showed an increasing EC trend.

The major ion content of each alluvial system was also assessed in 2025 as shown in the classification table and Piper diagram from August 2025 (Appendix E). The cation water type in all monitoring bores is typically Na or Ca cation dominant with a notable presence of Mg. Regarding anions, Cl is the dominant ion, with HCO3 and SO4 present in lower concentrations in the alluvial monitoring bores. The BCA and HRA water types are similar, but they can be differentiated from the GCA water types based on their respective water sources and the distinct recharge/discharge mechanisms associated with each body.

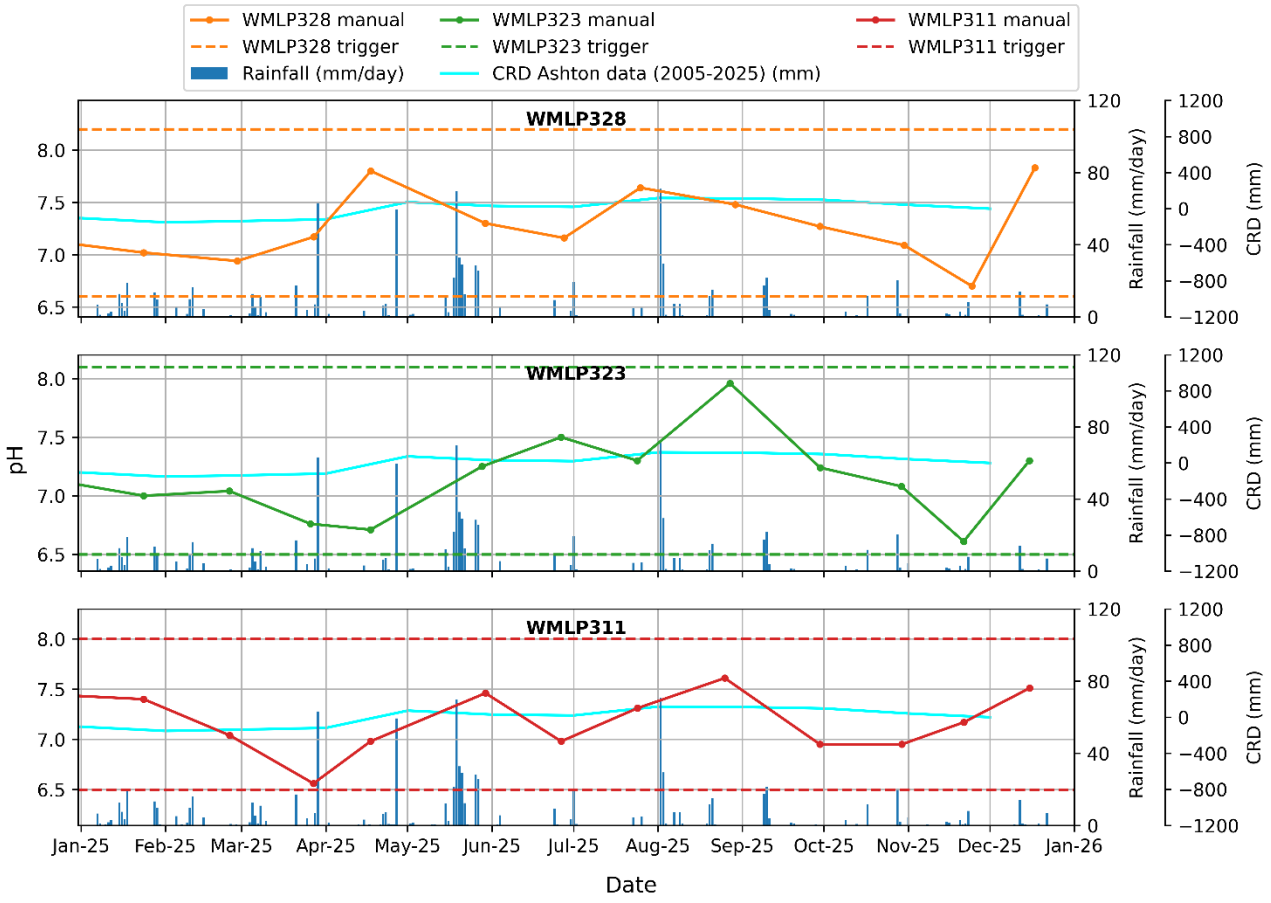

Figure 4.8 Bowmans Creek alluvium trigger bore pH trends (1)

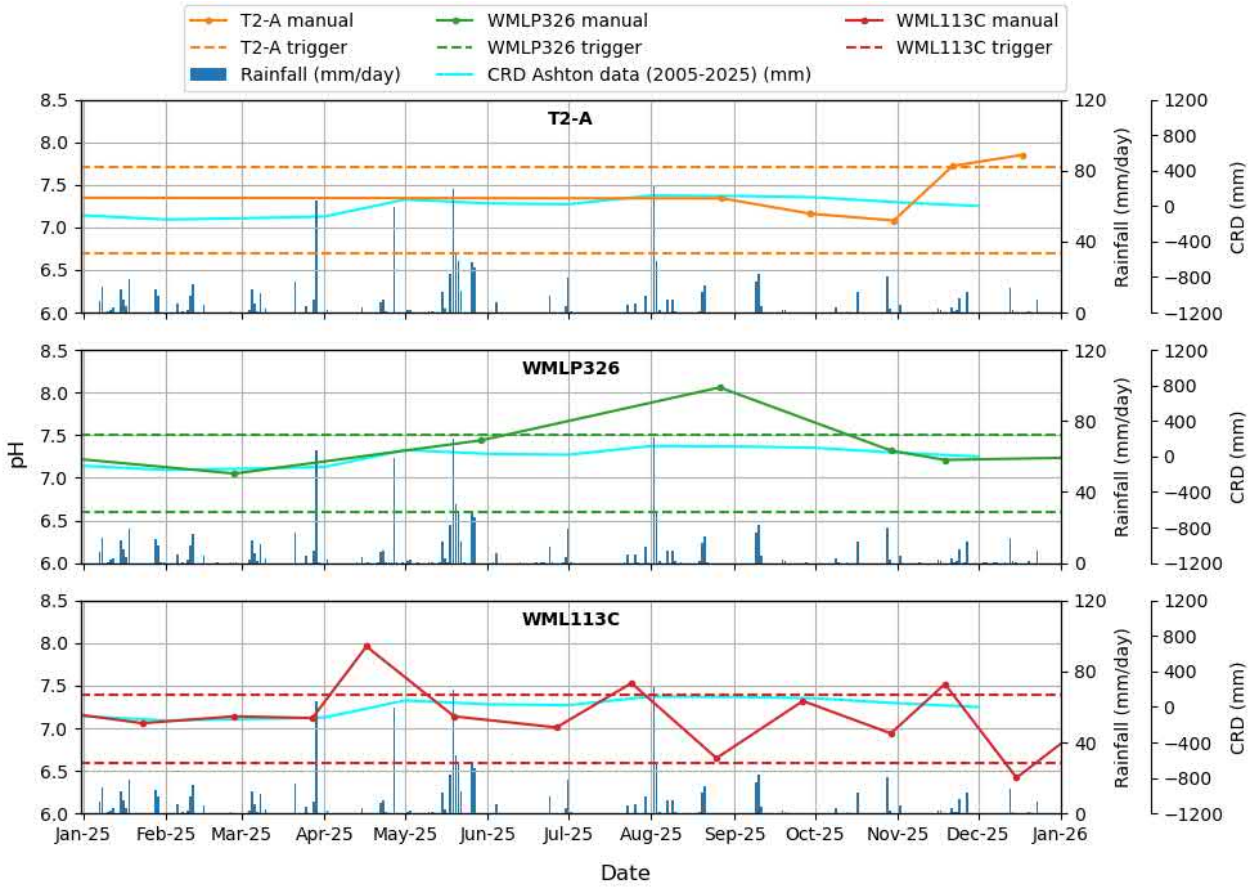

Figure 4.9 Bowmans Creek alluvium trigger bore pH trends (2)

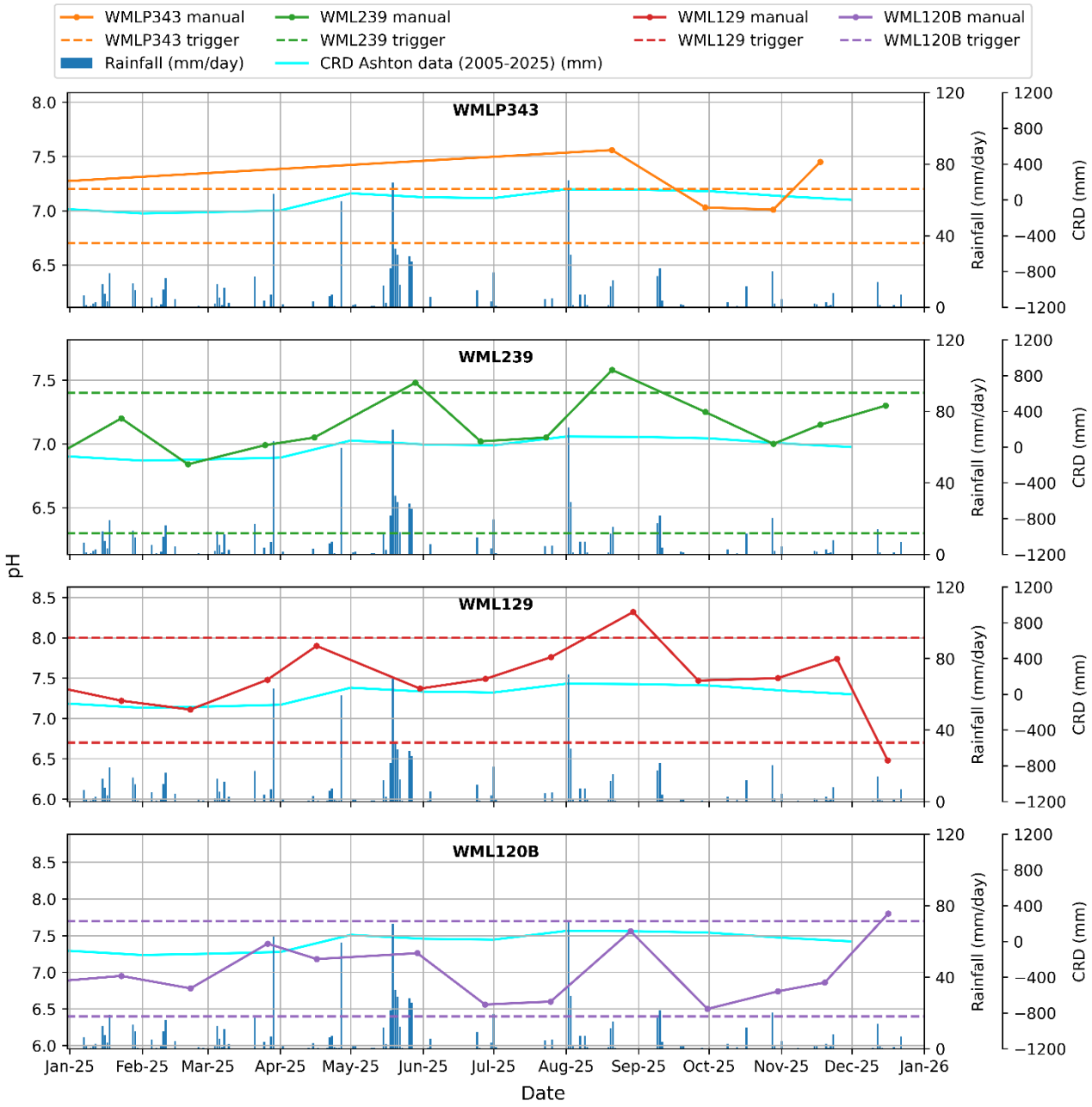

Figure 4.10 Glennies Creek alluvium trigger bore pH trends (1)

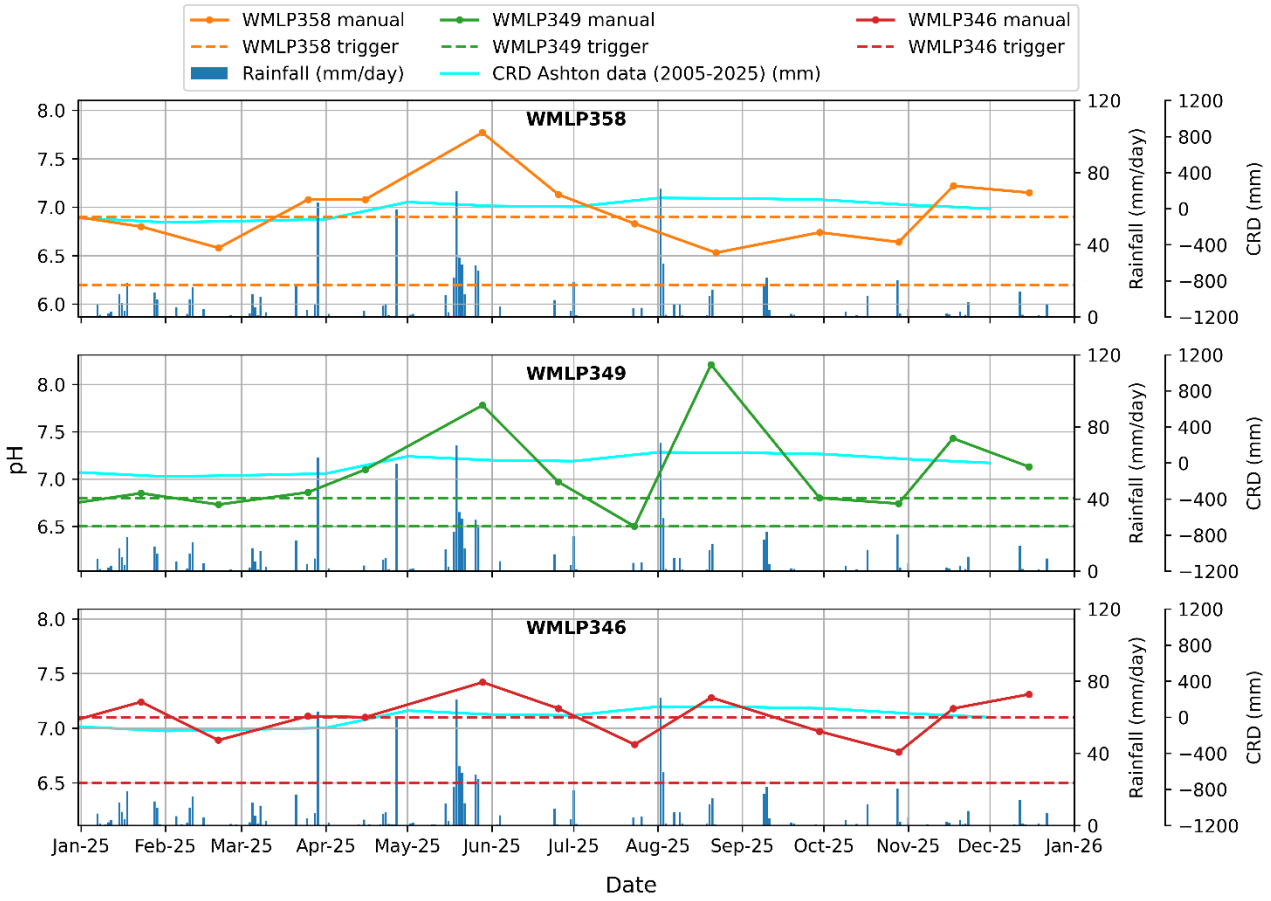

Figure 4.11 Glennies Creek alluvium trigger bore pH trends (2)

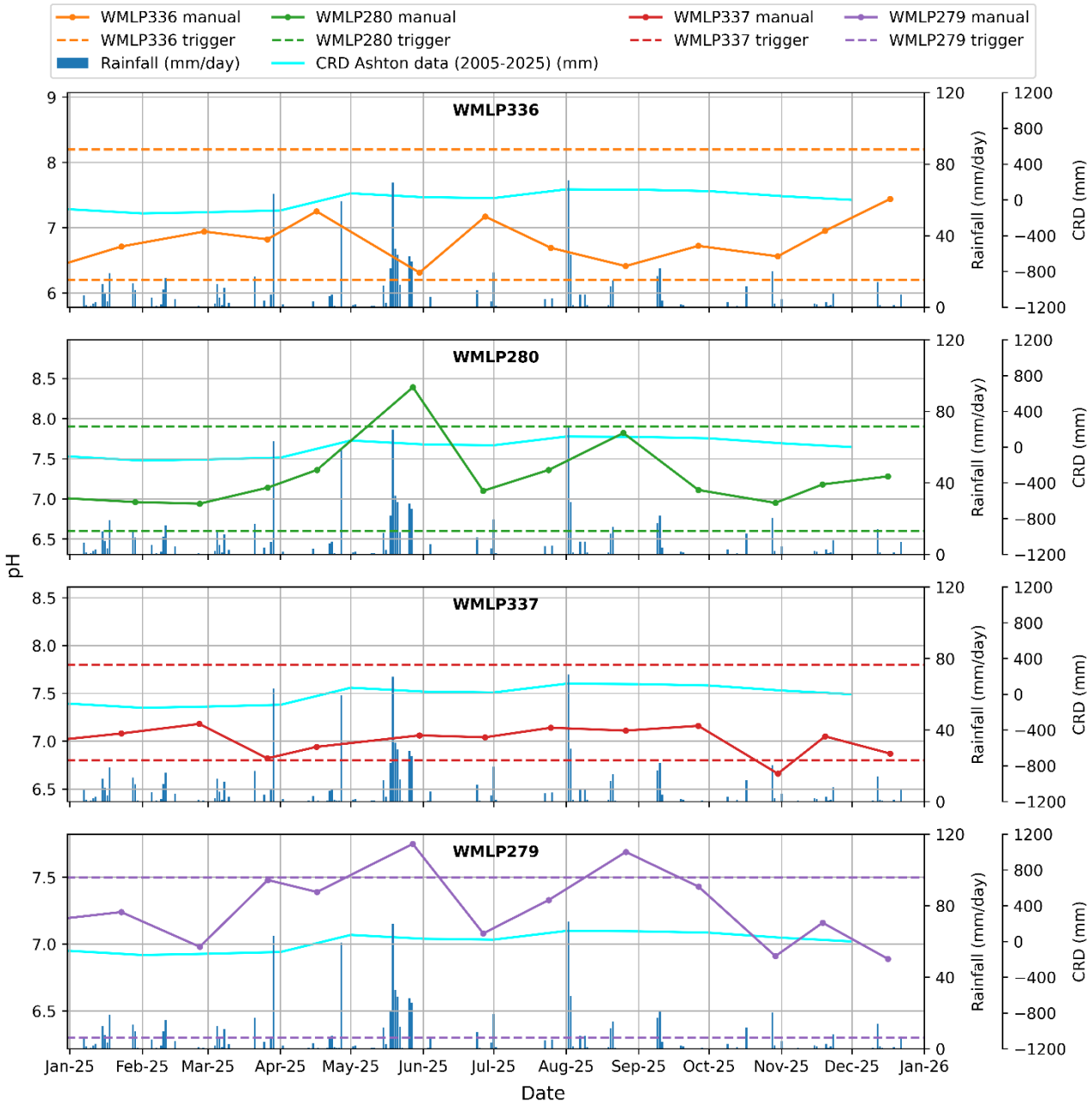

Figure 4.12 Hunter River alluvium trigger bore pH trends

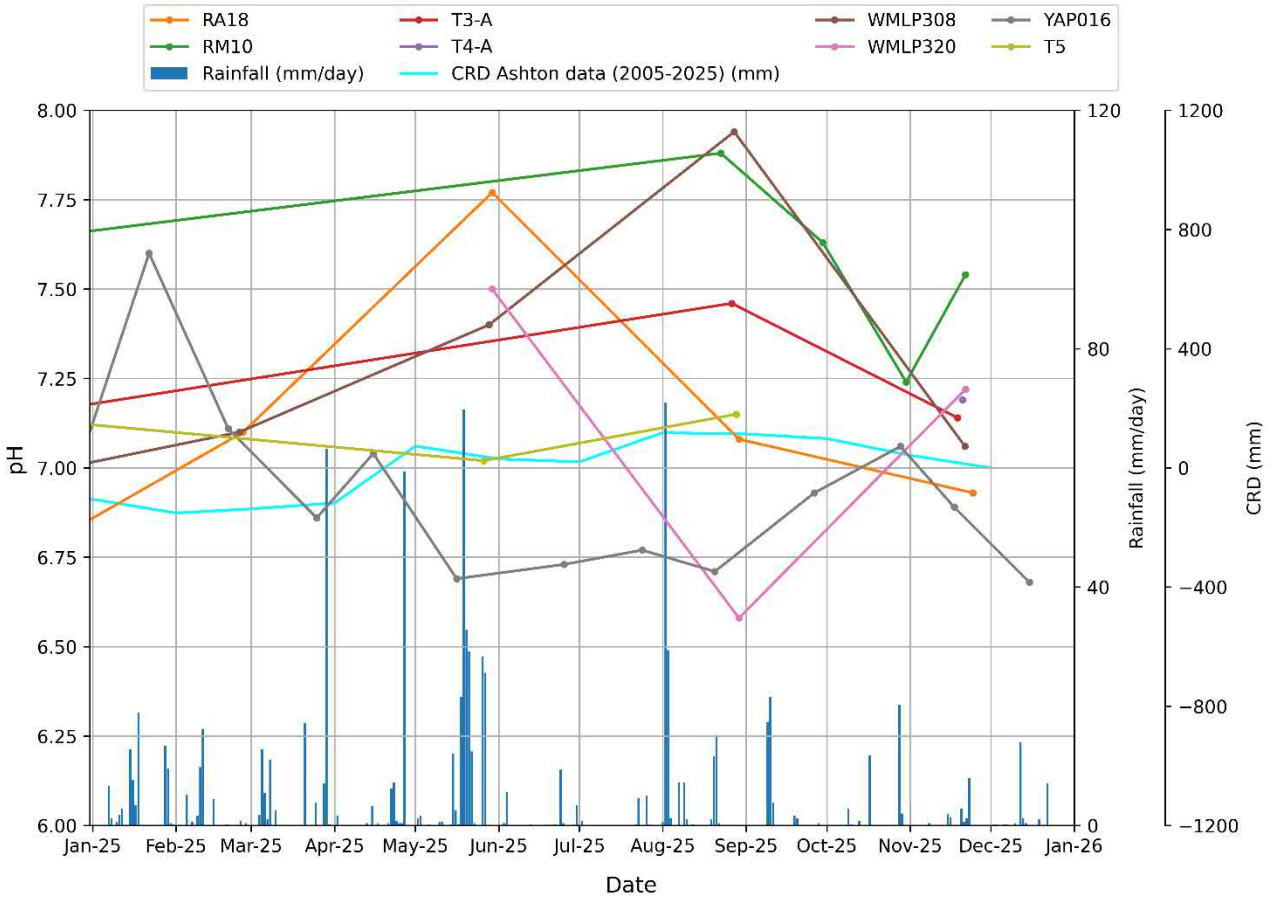

Figure 4.13 Other Bowmans Creek alluvium bore pH trends

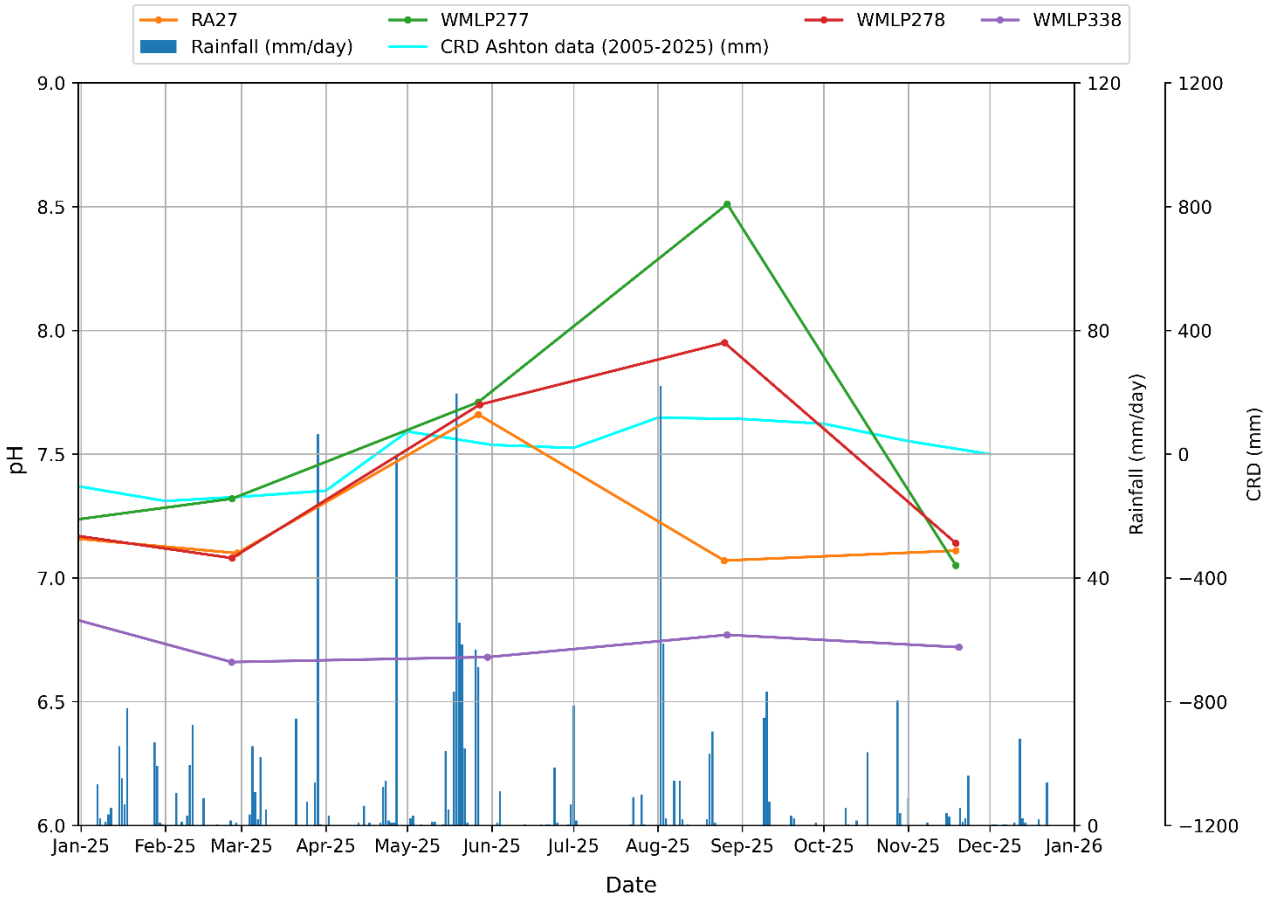

Figure 4.14 Other Hunter River alluvium bore pH trends

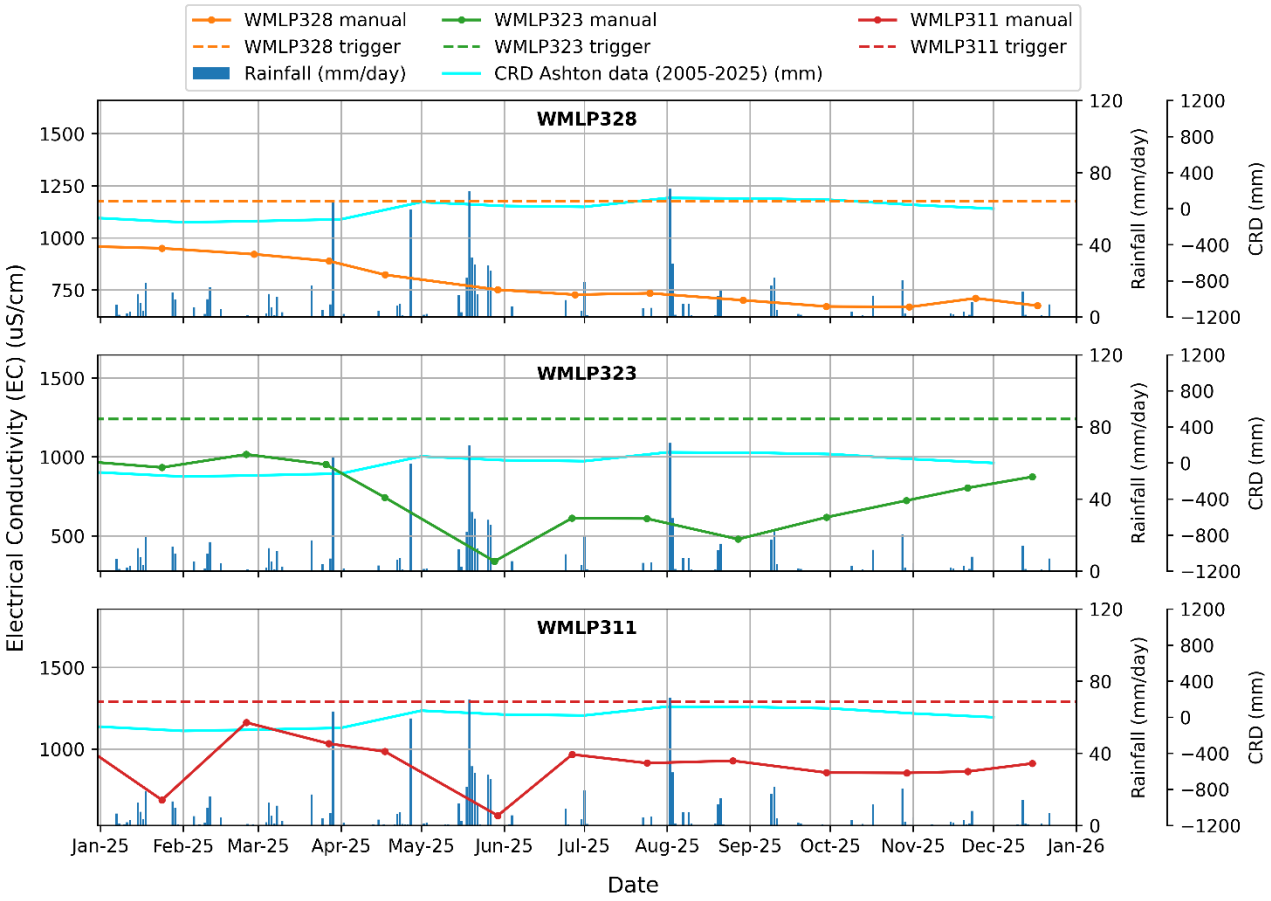

Figure 4.15 Bowmans Creek alluvium trigger bore EC trends (1)

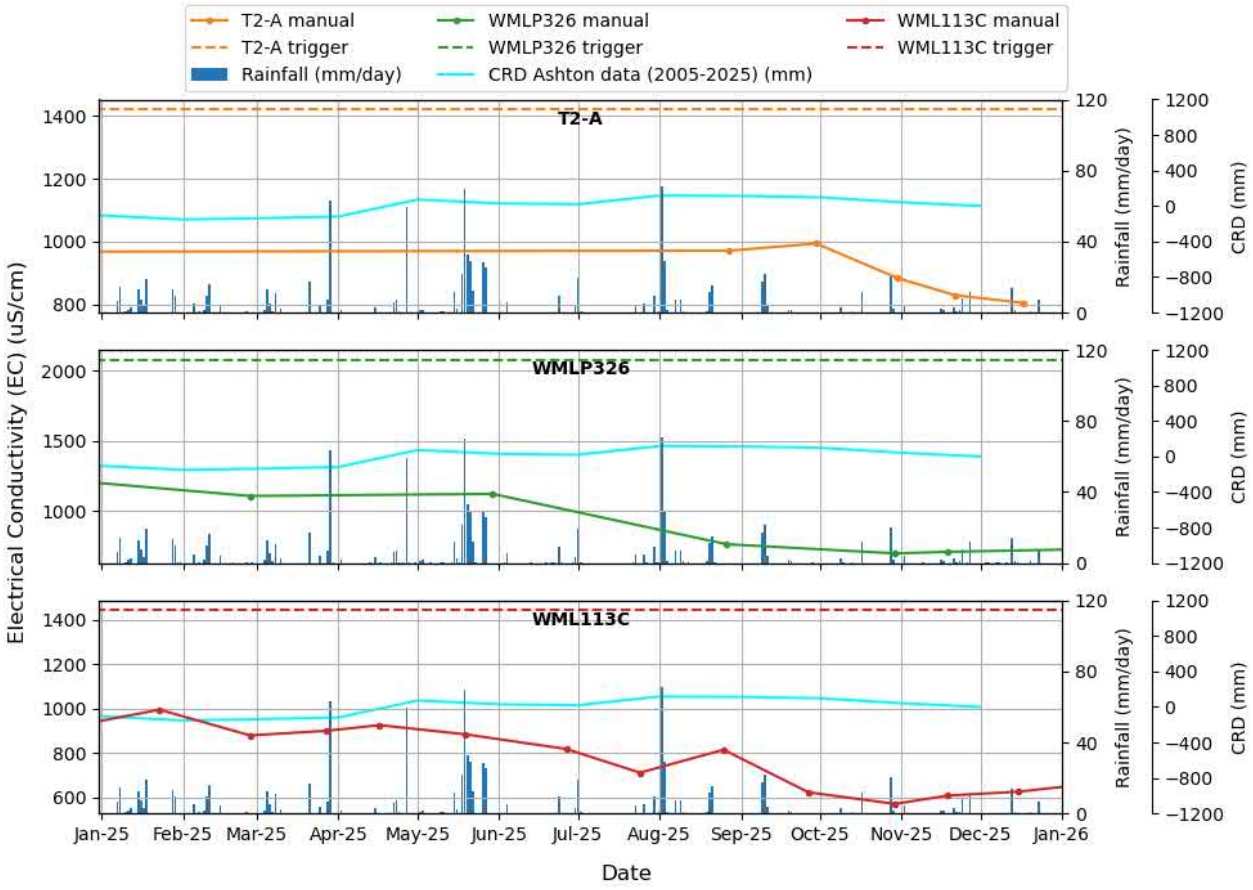

Figure 4.16 Bowmans Creek alluvium trigger bore EC trends (2)

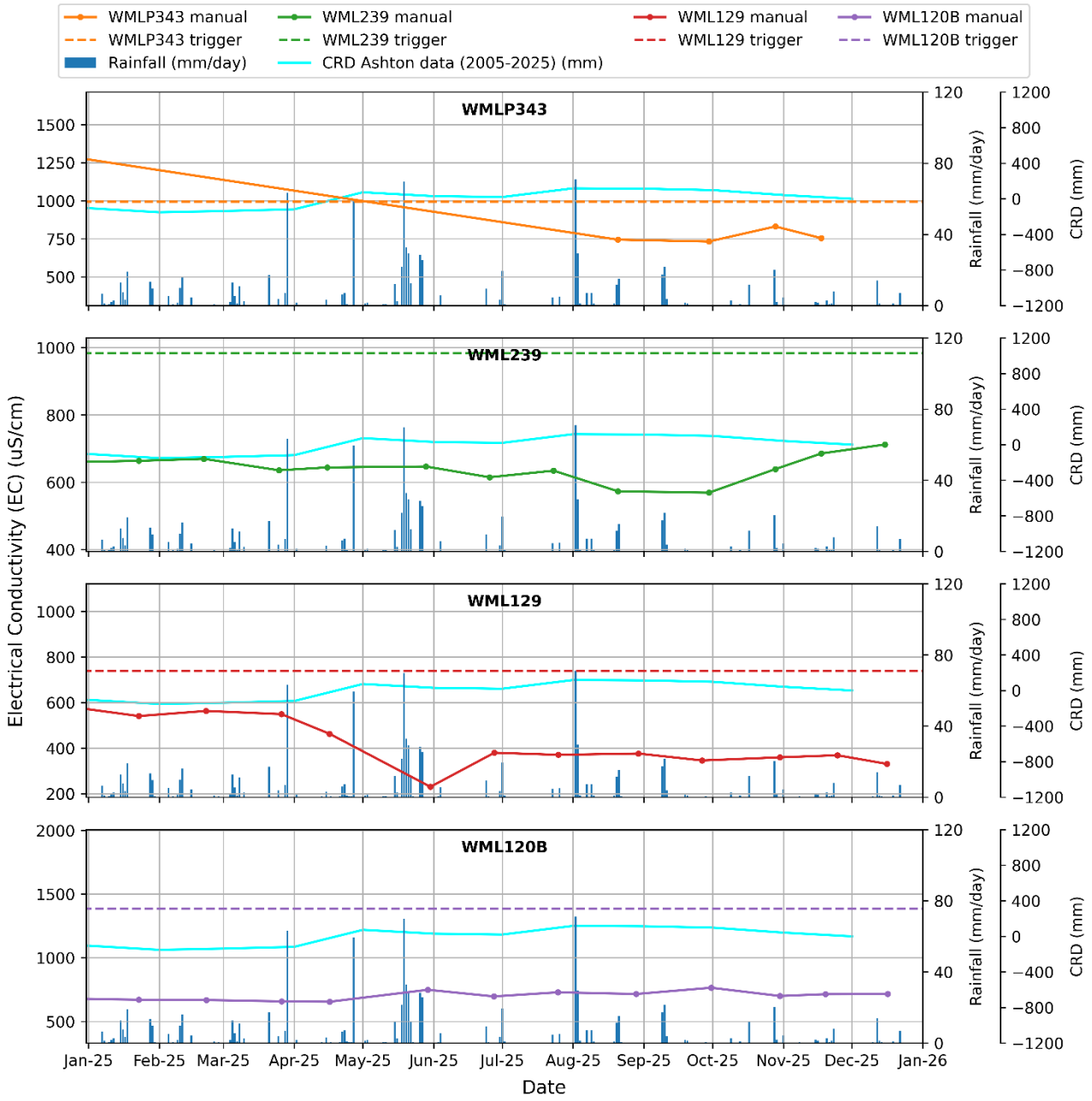

Figure 4.17 Glennies Creek alluvium trigger bore EC trends (1)

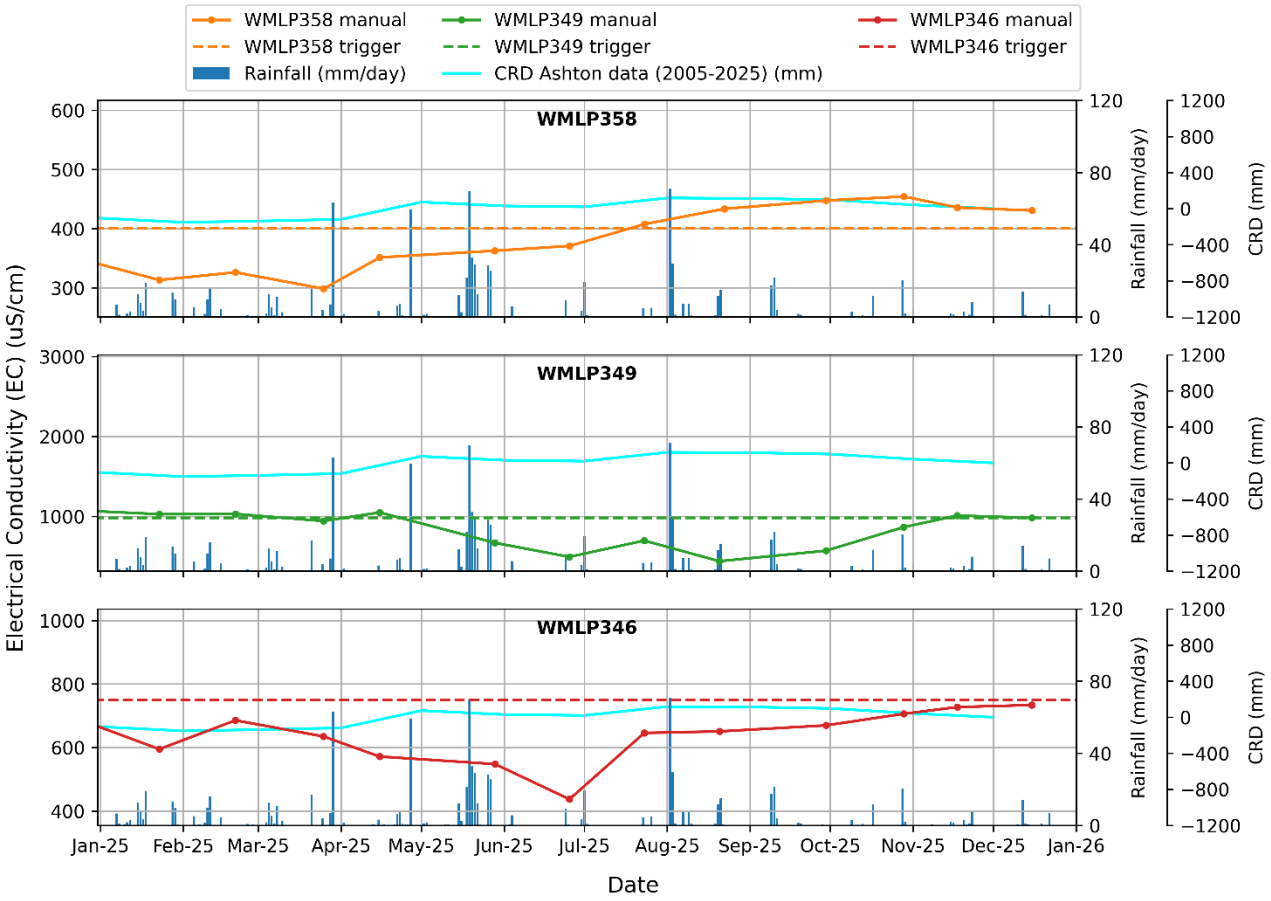

Figure 4.18 Glennies Creek alluvium trigger bore EC trends (2)

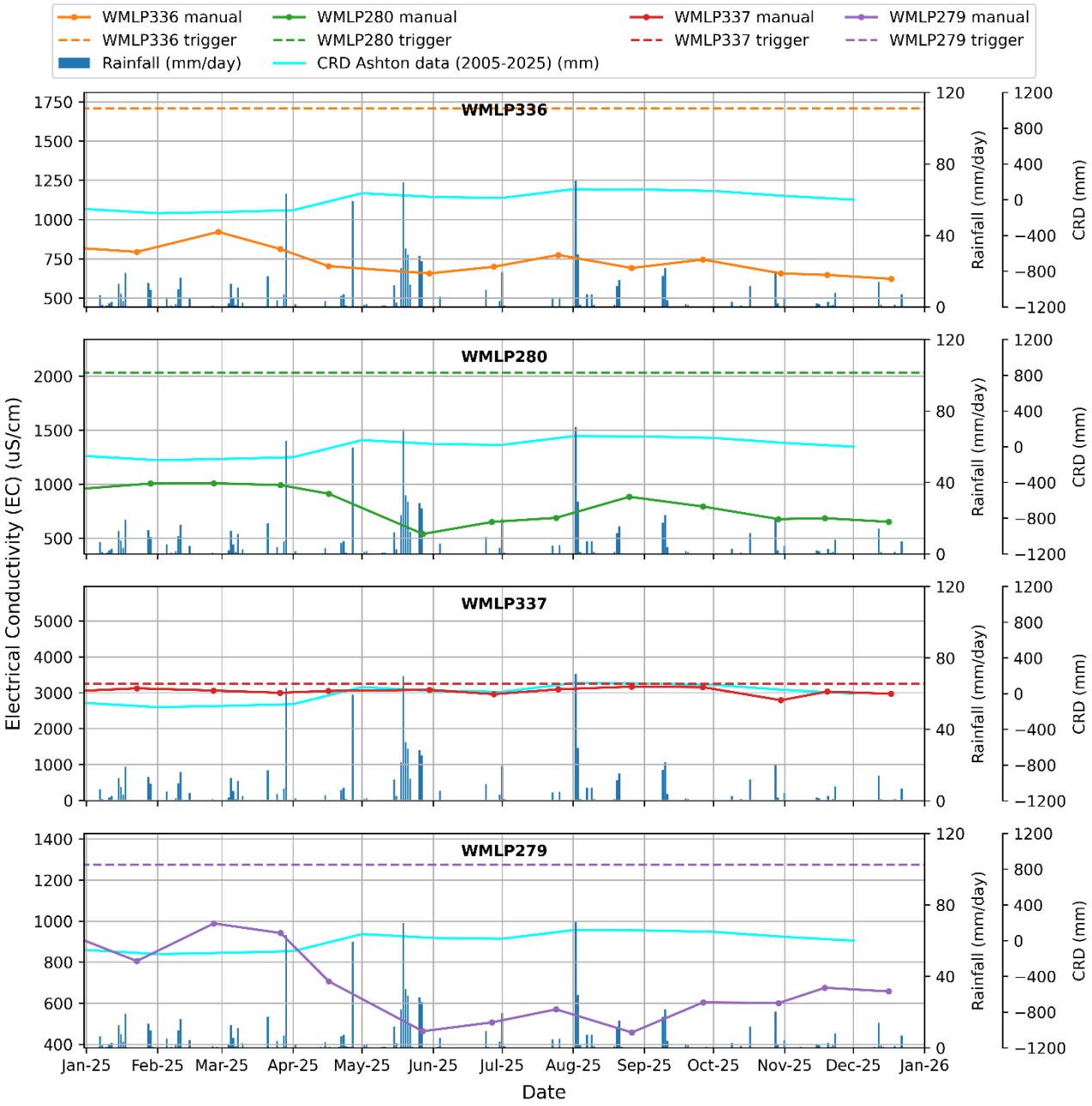

Figure 4.19 Hunter River alluvium trigger bore EC trends

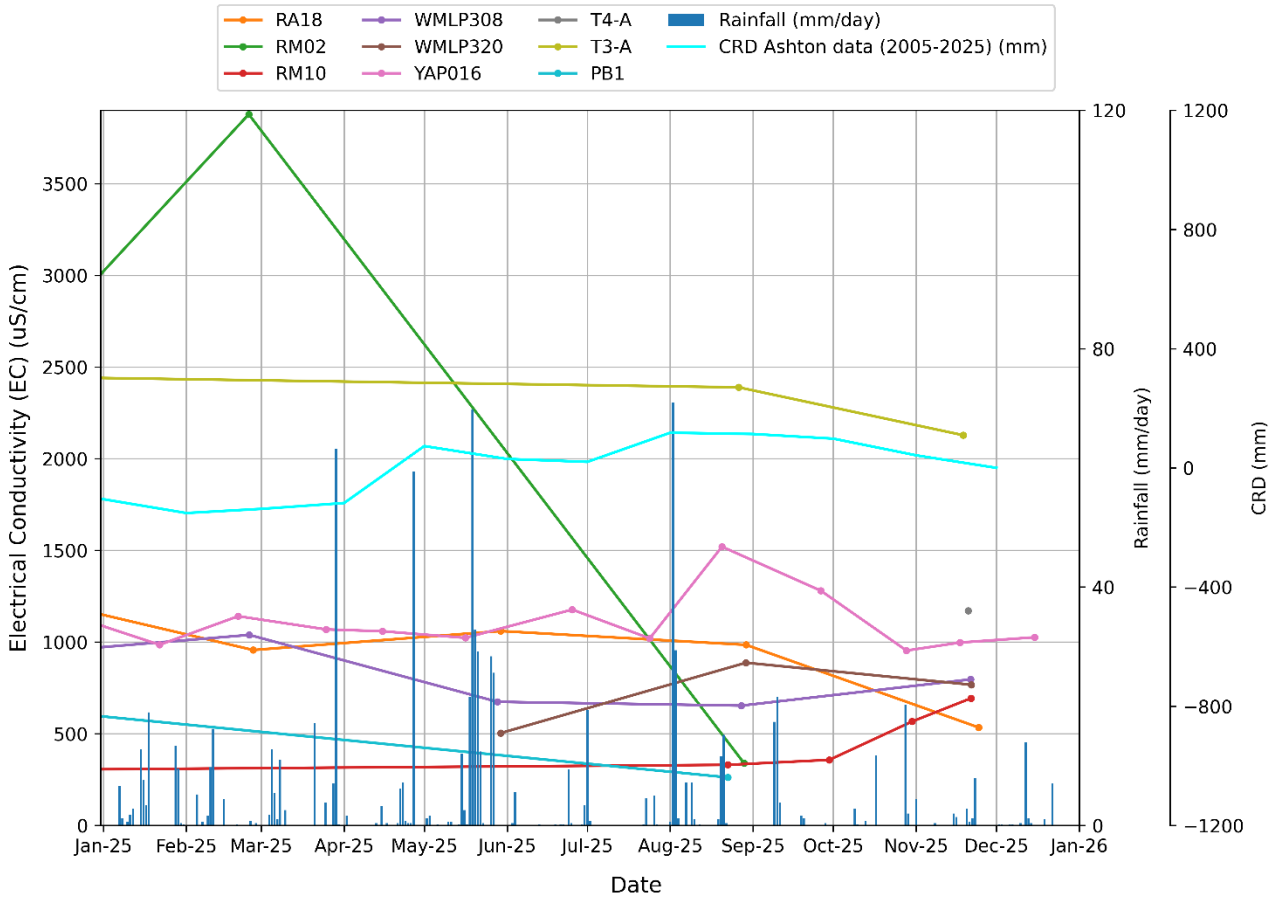

Figure 4.20 Other Bowmans Creek alluvium bore EC trends

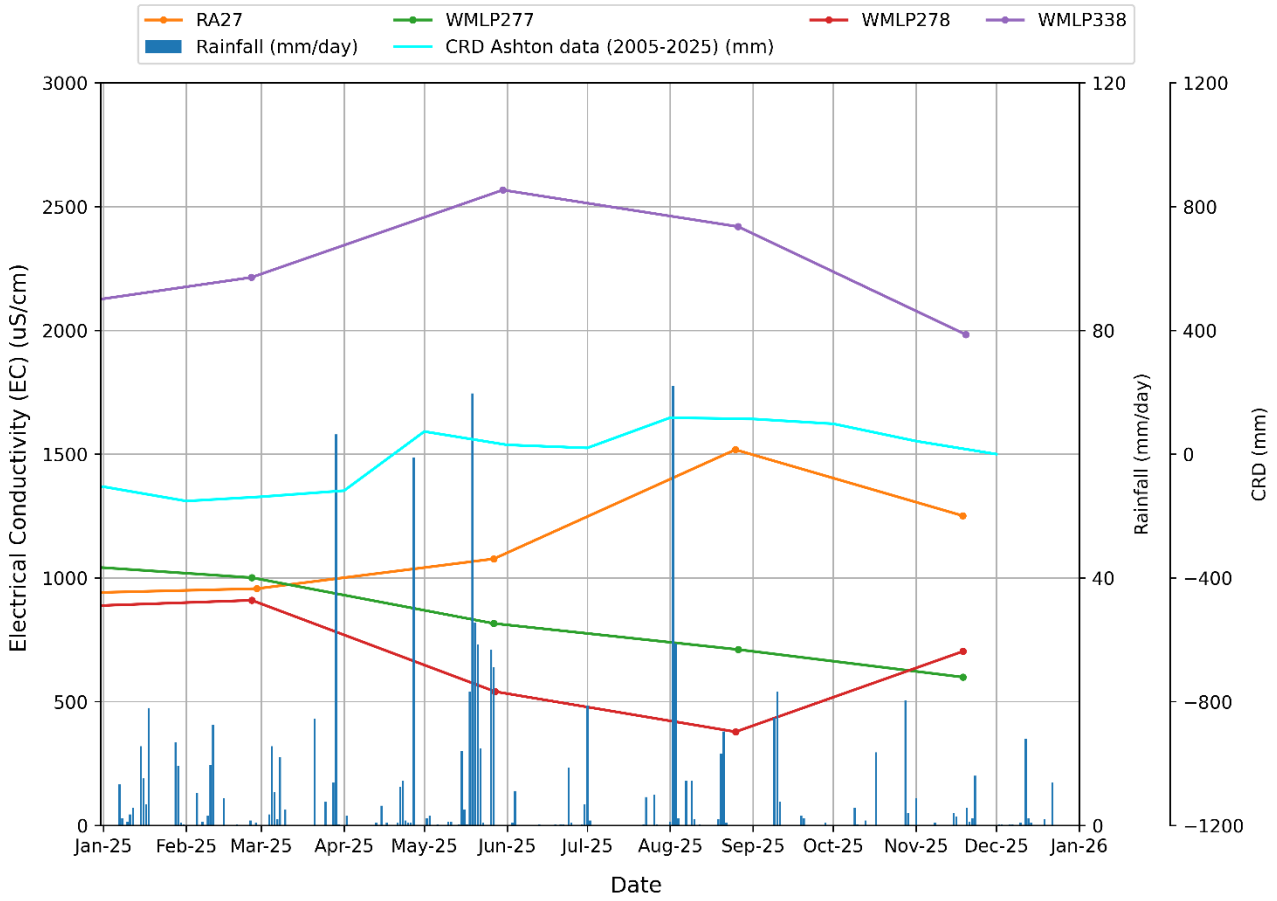

Figure 4.21 Other Hunter River alluvium bore EC trends

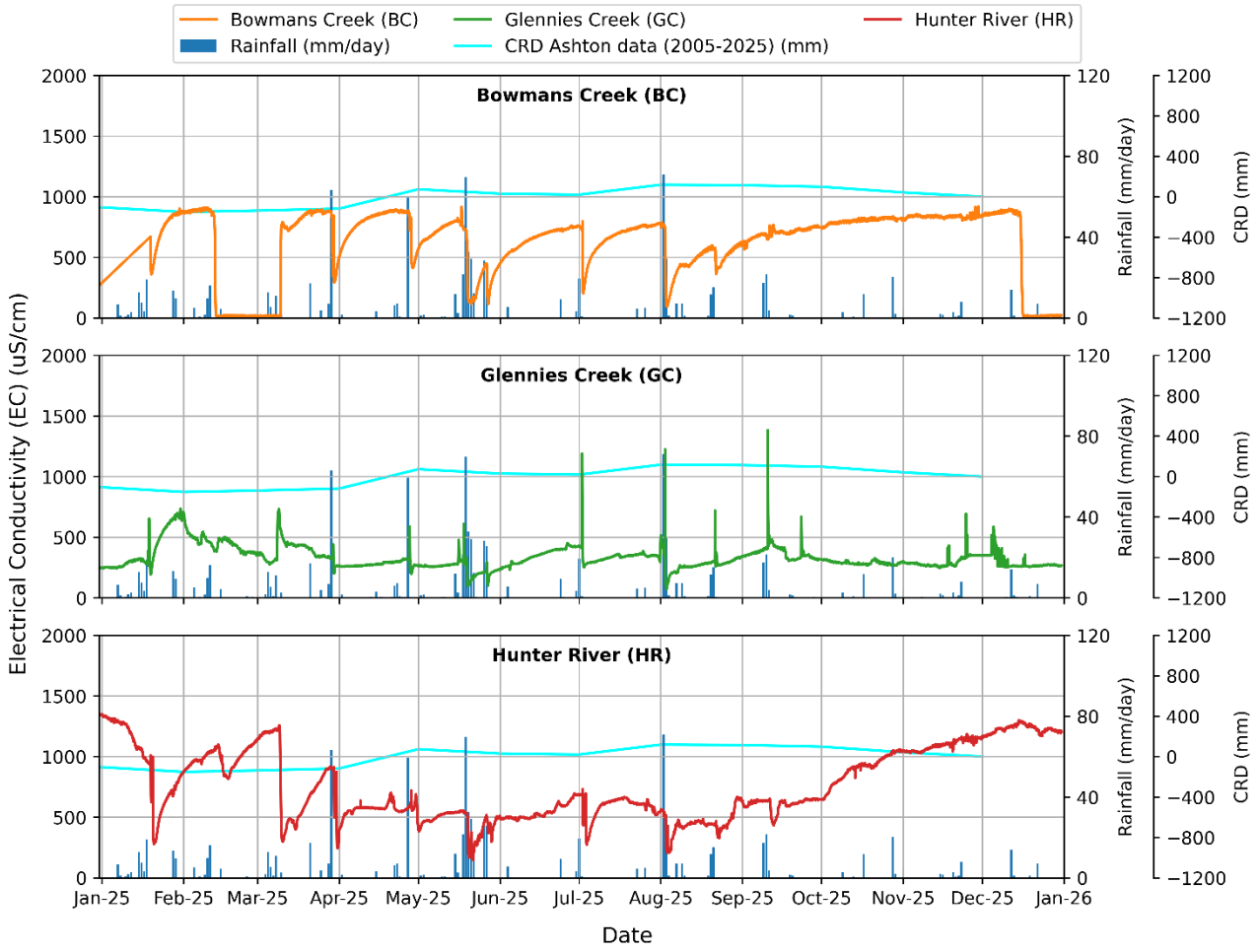

Figure 4.22 Surface water EC trends

4.1.4 BCA, GCA and HRA - Dissolved metals, select nutrients, turbidity and cyanide

Comprehensive laboratory analyses conducted in August 2025 included measurements of selected dissolved metals, nutrients, turbidity, and cyanide, as detailed in Appendix D. Concentrations of dissolved metals were assessed against ANZECC|ARMCANZ livestock water quality guidelines (ANZECC & ARMCANZ, 2000), with no exceedances observed for any of the metals tested, including arsenic, cadmium, chromium, copper, lead, nickel, selenium, and zinc. Manganese and iron were detected at trace levels; however, these metals are not considered specifically toxic at such concentrations, and no ANZECC|ARMCANZ livestock water quality guidelines are established for them.

Analysis of selected nutrients included nitrite and nitrate as N, total Kjeldahl nitrogen (TKN) as N, total nitrogen (TN) as N, and total phosphorus (TP) as P. All nitrogen-related concentrations were low, with nitrate levels remaining well below the ANZECC|ARMCANZ livestock guideline of 400 mg/L, and nitrite concentrations far below the 30 mg/L threshold. Total nitrogen values were significantly lower than the short-term trigger range of 25–125 mg/L. All bores remained below guideline phosphorus values (12 mg/L) as detailed in Appendix D. No site-specific analysis has yet been conducted at Ashton to establish an appropriate phosphorus trigger. Turbidity does not have a defined livestock guideline for comparison, but results indicate that bores typically hand-bailed rather than pumped exhibit the highest turbidity. Cyanide concentrations across all samples were below the limit of reporting (LOR), with no detections exceeding applicable standards.

4.2 Coal measure and coal measure overburden (CMOB) aquifer monitoring

Groundwater level and quality measurements for coal measure and CMOB monitoring bores were collected consistently throughout 2025. Additionally, longwall-specific VWP pressure heads were monitored. Detailed hydrographs for these bores are provided in Figure 4.23 to Figure 4.27.

4.2.1 Coal measure and CMOB aquifer groundwater levels

Groundwater level trends for both coal measure and CMOB monitoring bores are illustrated in Figure 4.23 and Figure 4.24, respectively. Detailed groundwater level measurements for the LW207A/LW207B monitoring bores are presented in Figure 4.25, while, longwall-specific VWP readings for LW208 and LW403 are depicted in Figure 4.26 and Figure 4.27. Additionally, daily rainfall measurements and CRD data are included to provide a comparative analysis of water elevation trends.

The following key observations were made for 2025:

- Groundwater elevations were mostly stable in coal measure bores throughout the year (Figure 4.23).
- During 2025, CMOB monitoring bores generally showed rising groundwater levels, as illustrated in Figure 4.24. Most CMOB bores saw elevations increase until mid-2025, after which groundwater levels gradually evened out and began to decline toward the end of the year, particularly in late October—a trend that aligned with rainfall patterns. The WMLP324 bore was an exception, remaining nearly stable or slightly declining throughout 2025.
- Groundwater elevations in monitoring bores near active mining panels continue to be heavily influenced by the CRD, with elevations generally increasing until the end of August and declining thereafter, as shown in Figure 4.25.
- Pressure head at VWP WML113A, south of LW208, showed variable patterns throughout 2025 (Figure 4.26). The 40 m sensor followed trends similar to nearby shallow bores, rising mid-year due to increased rainfall, then gradually declining as rainfall decreased. The 65 m sensor exhibited a steady drop in pressure head, with groundwater levels falling by about 7 metres across the year. Data from the 95 m sensor was invalid between July and November due to a connection issue, but after fixing it in November, pressure head showed a steady or slight increase. The 124 m sensor consistently produced invalid data.
- WMLP361 is a VWP located nearer to active mining than WML113A. In 2025, its sensors showed variable trends: the 51 m sensor saw a pressure head rise in May followed by a steady decline; the 161 m sensor had invalid data in mid-March and late May but overall showed a slight increase; the 191 m sensor steadily decreased throughout the year. Sensors at 28 m and 109.5 m stopped providing valid readings as of February 2023 and October 2020. In July 2025, the logger stopped collecting data but was repaired in November and resumed normal operation thereafter (Figure 4.27).
- Coal measure and CMOB bores were not impacted by mining activities beyond what was predicted in 2025.

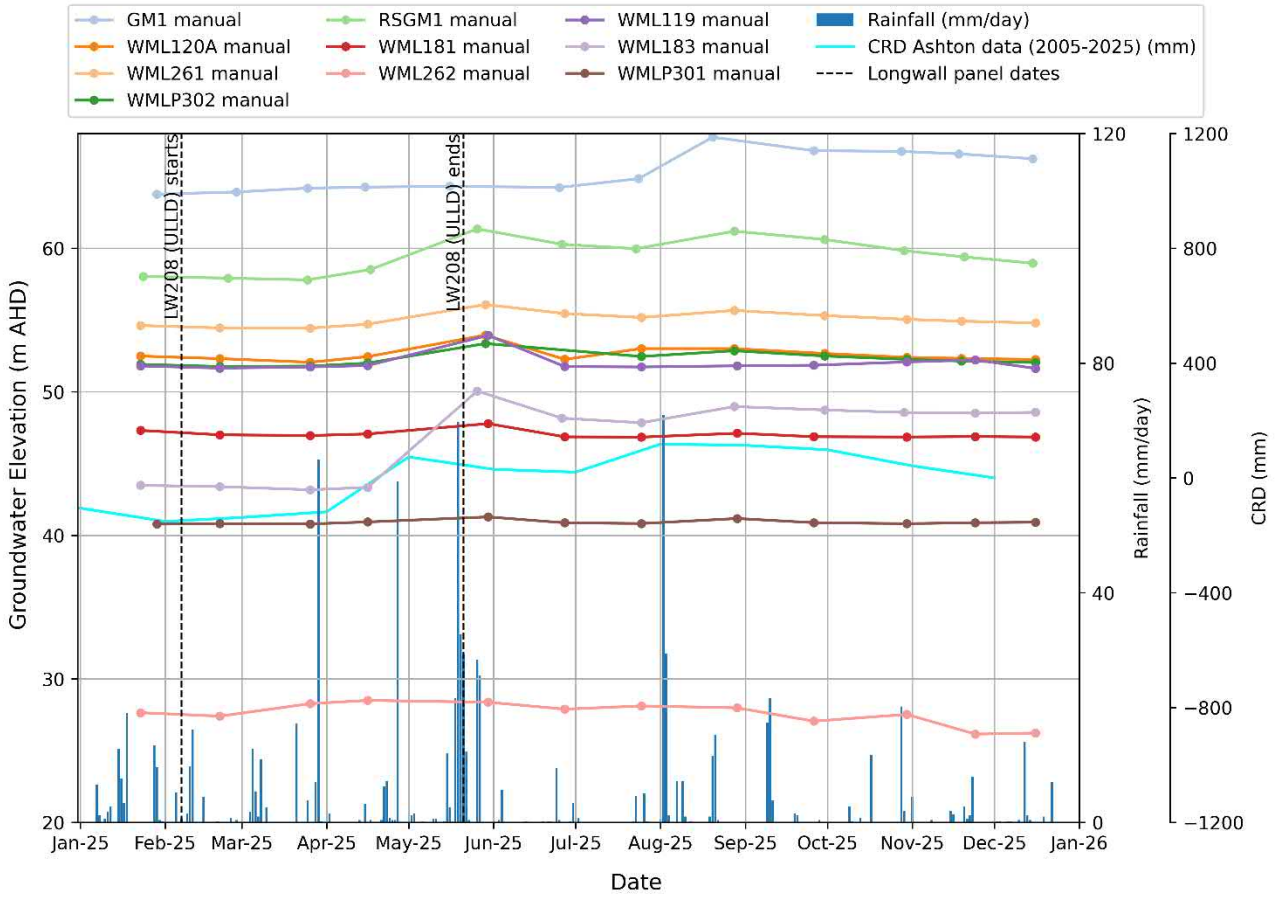

Figure 4.23 Coal measure bore hydrographs

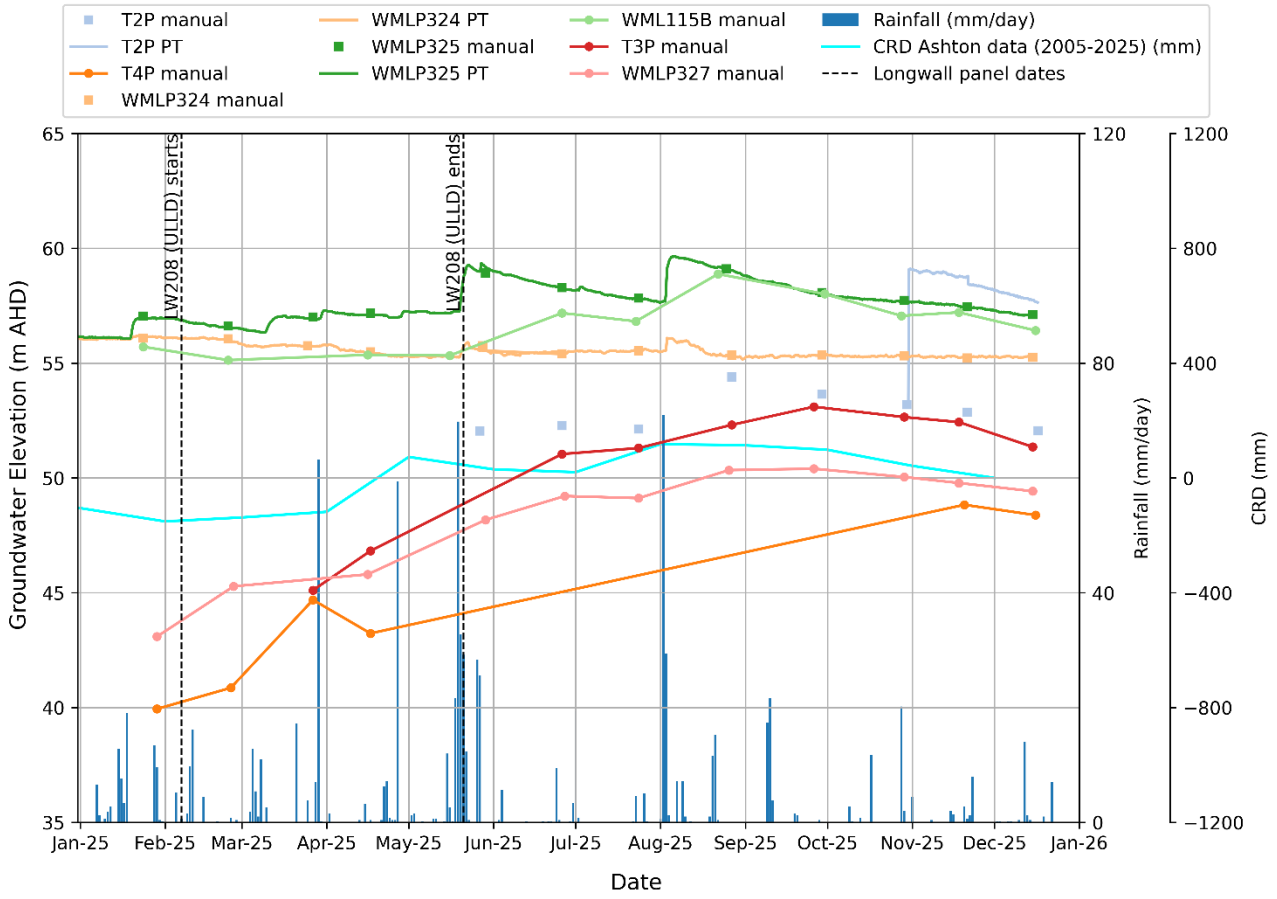

Figure 4.24 Coal measure overburden bore hydrographs

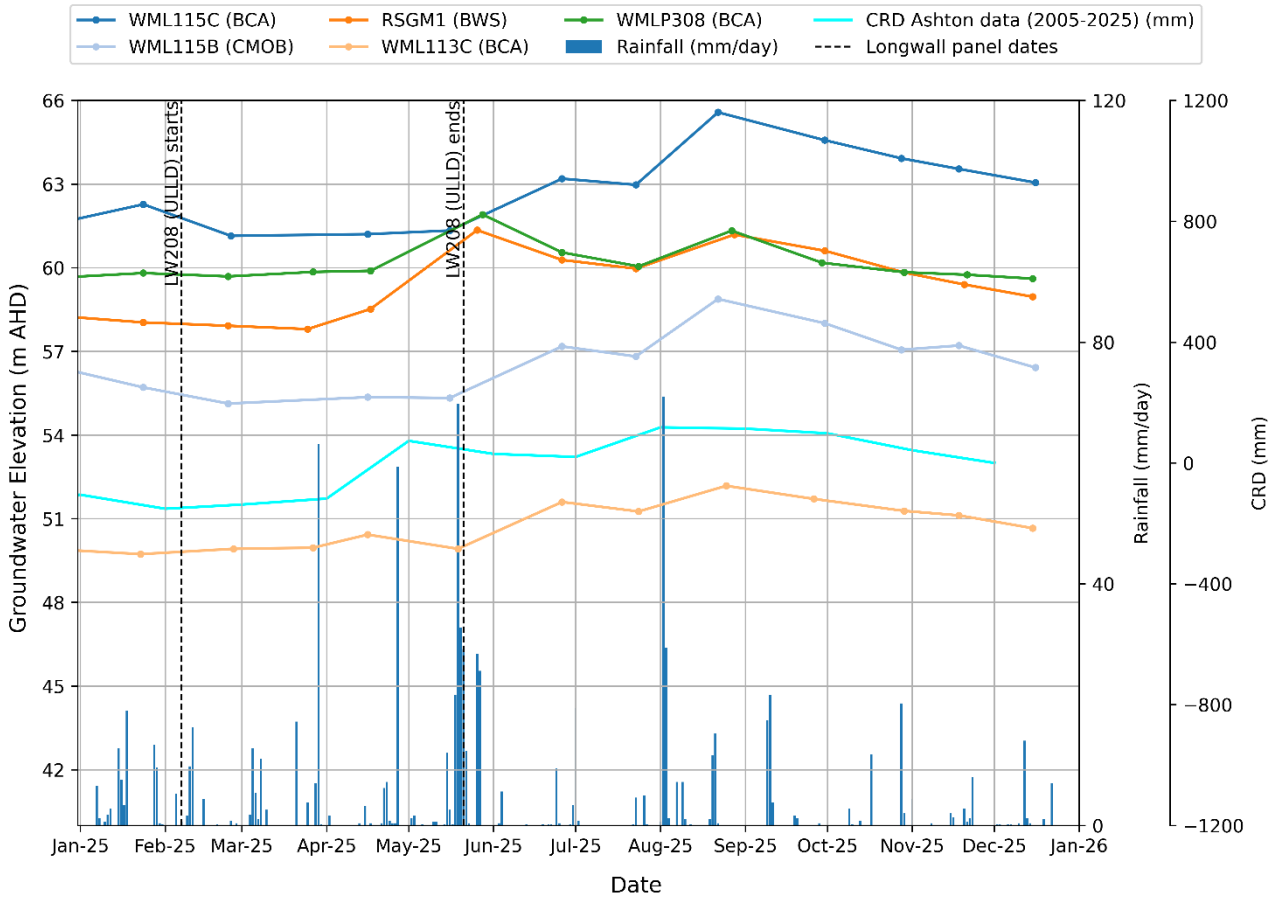

Figure 4.25 Hydrographs for monitoring bores in vicinity of LW208

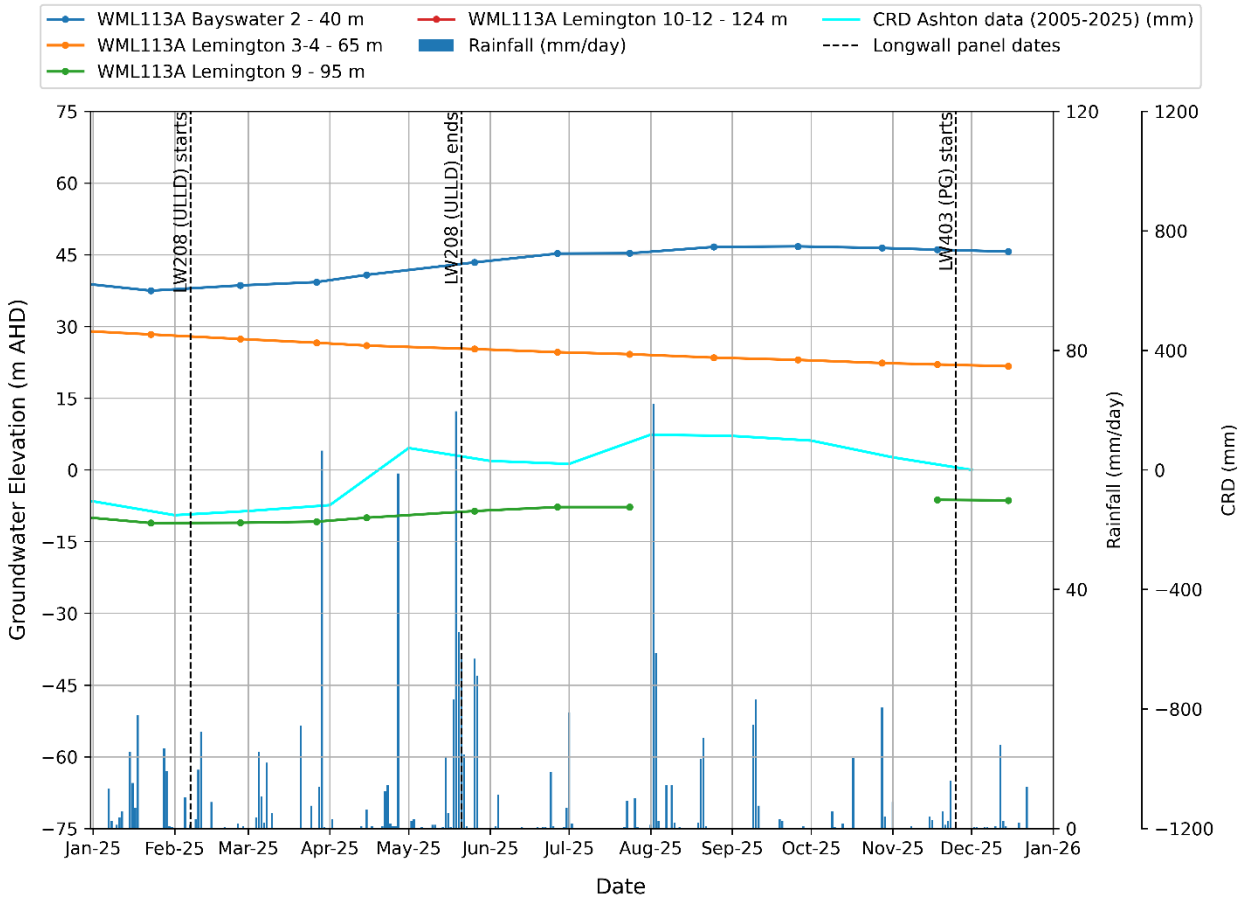

Figure 4.26 Hydrographs for VWP WML113A in vicinity of LW208 (1)

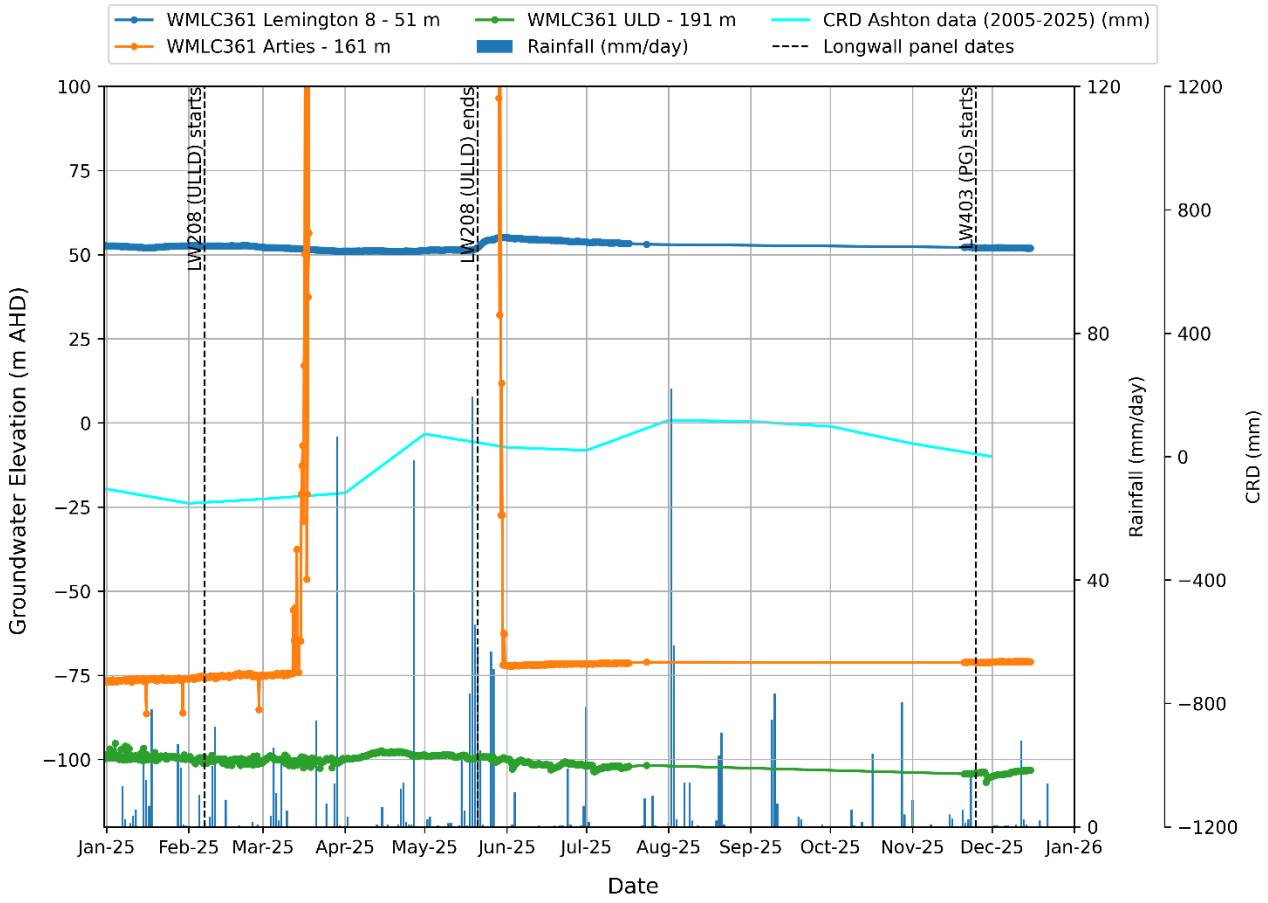

Figure 4.27 Hydrographs for VWP WMLP361 in vicinity of LW208 and LW403 (2)

4.2.2 pH, electrical conductivity and major ions

Coal measure and CMOB monitoring bores within the ACP monitoring network were sampled for pH, EC, and major ions throughout 2025, with the results displayed in Figure 4.28 to Figure 4.31. A detailed table of these results is provided in Appendix D, along with comprehensive analysis from the annual sampling conducted in August 2025. All related laboratory files are available in Appendix F for reference.

Groundwater pH in coal measure and CMOB bores was generally neutral to slightly alkaline throughout 2025, consistent with previous years. Readings for pH remained largely stable, predominantly ranging from 6.46 to 7.64. Any deviations outside this range were minimal and considered within the natural variation expected. The specific pH ranges observed within coal measure and CMOB bores in 2025 were as follows:

- coal measure – pH 6.46 (WML261) to pH 8.64 (WML119); and
- CMOB – pH 6.79 (WMLP324) to pH 7.95 (WMLP324).

In 2025, groundwater EC across the coal measure and CMOB monitoring network ranged from fresh to brackish. Most coal measure bores showed a decrease in EC throughout the year, except for WML181, which recorded a slight overall increase.

The EC ranges for coal measure and CMOB bores in 2025 were as follows:

- coal measure – 104.1 µS/cm (WML119) to 4,604 µS/cm (WML183); and
- CMOB – 437.2 µS/cm (WMLP324) to 1,940 µS/cm (WML115B).

The major ion content for coal measure and CMOB bores was assessed in 2025 (Appendix E). The cation water type in all monitoring bores was predominantly Na with lesser contributions from Ca and Mg. Anion chemistry is consistently dominated by Cl, coal measure and CMOB monitoring bores. Notably, the water types in coal measure bores were distinct from those in CMOB bores, with coal measure bores comparatively higher Mg contributions, while CMOB bores contained slightly higher concentrations of Ca.

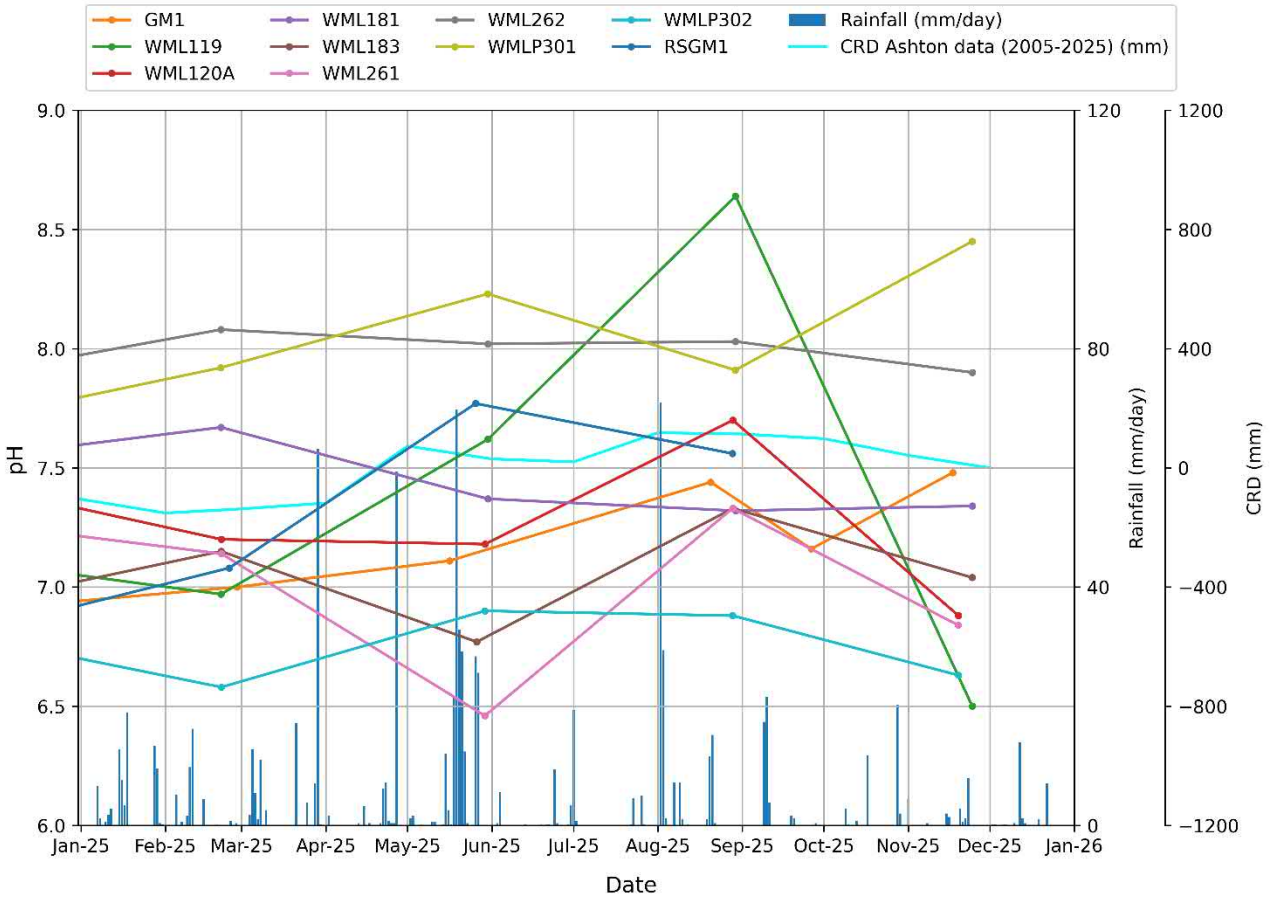

Figure 4.28 Coal measure bore pH trends

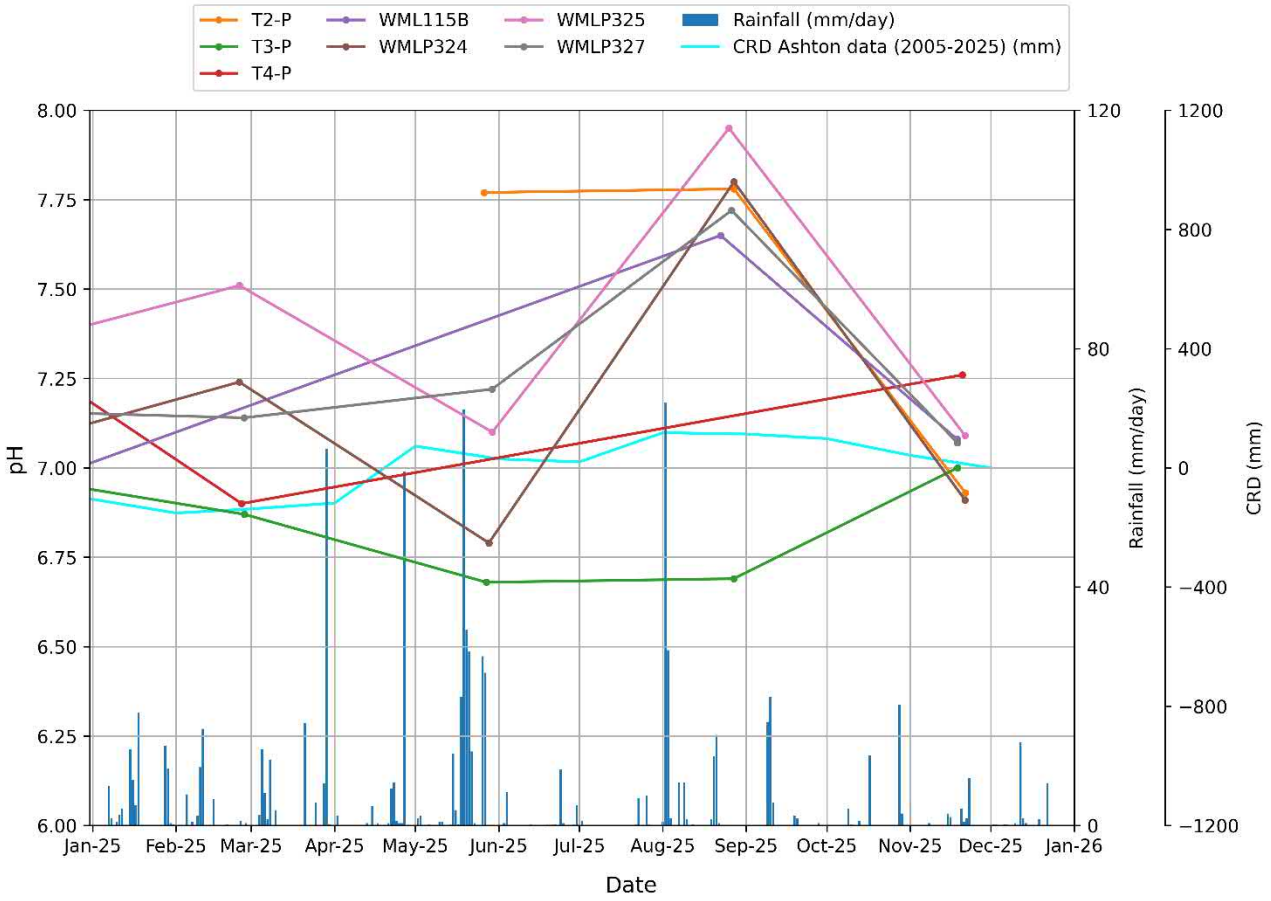

Figure 4.29 Coal measure overburden bore pH trends

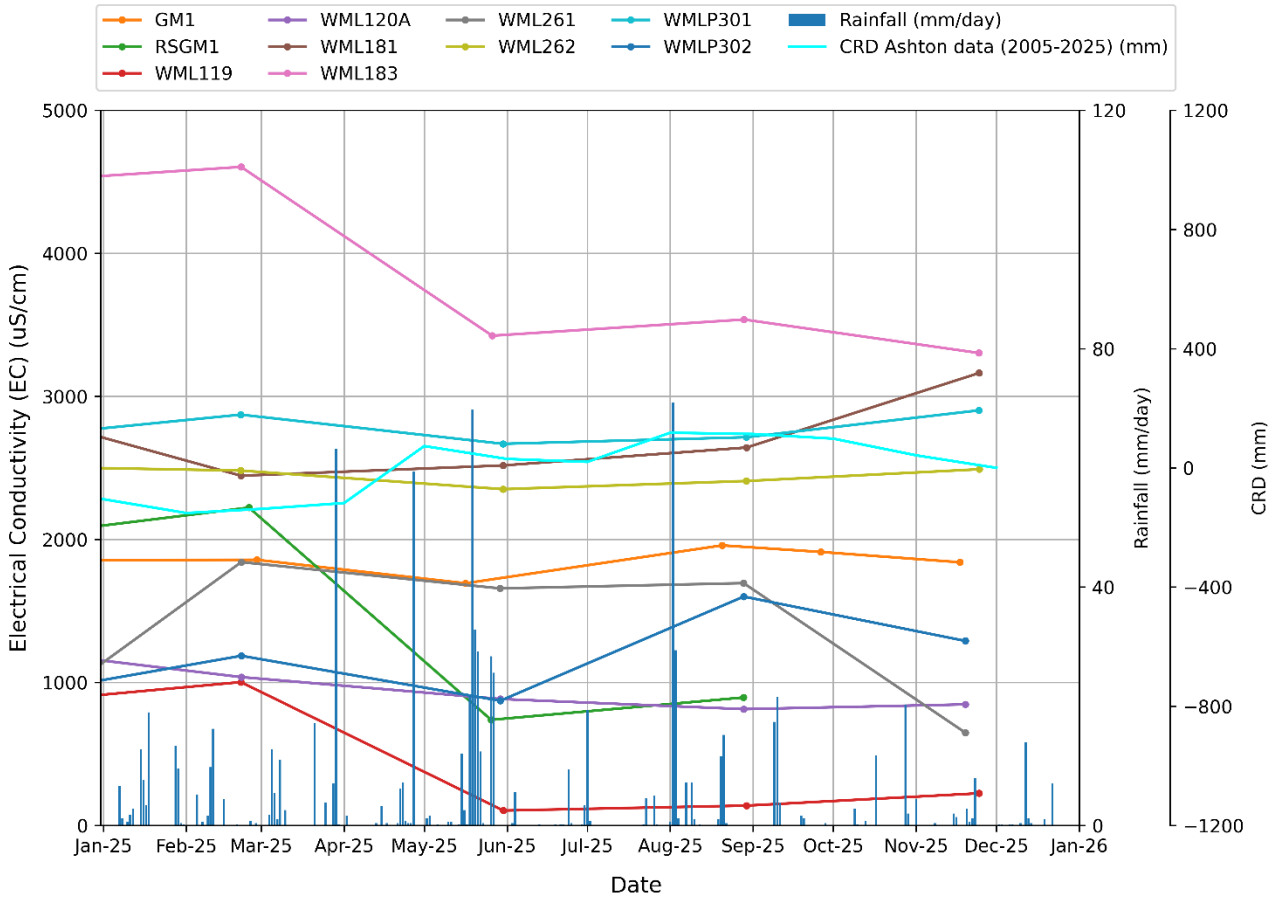

Figure 4.30 Coal measure bore EC trends

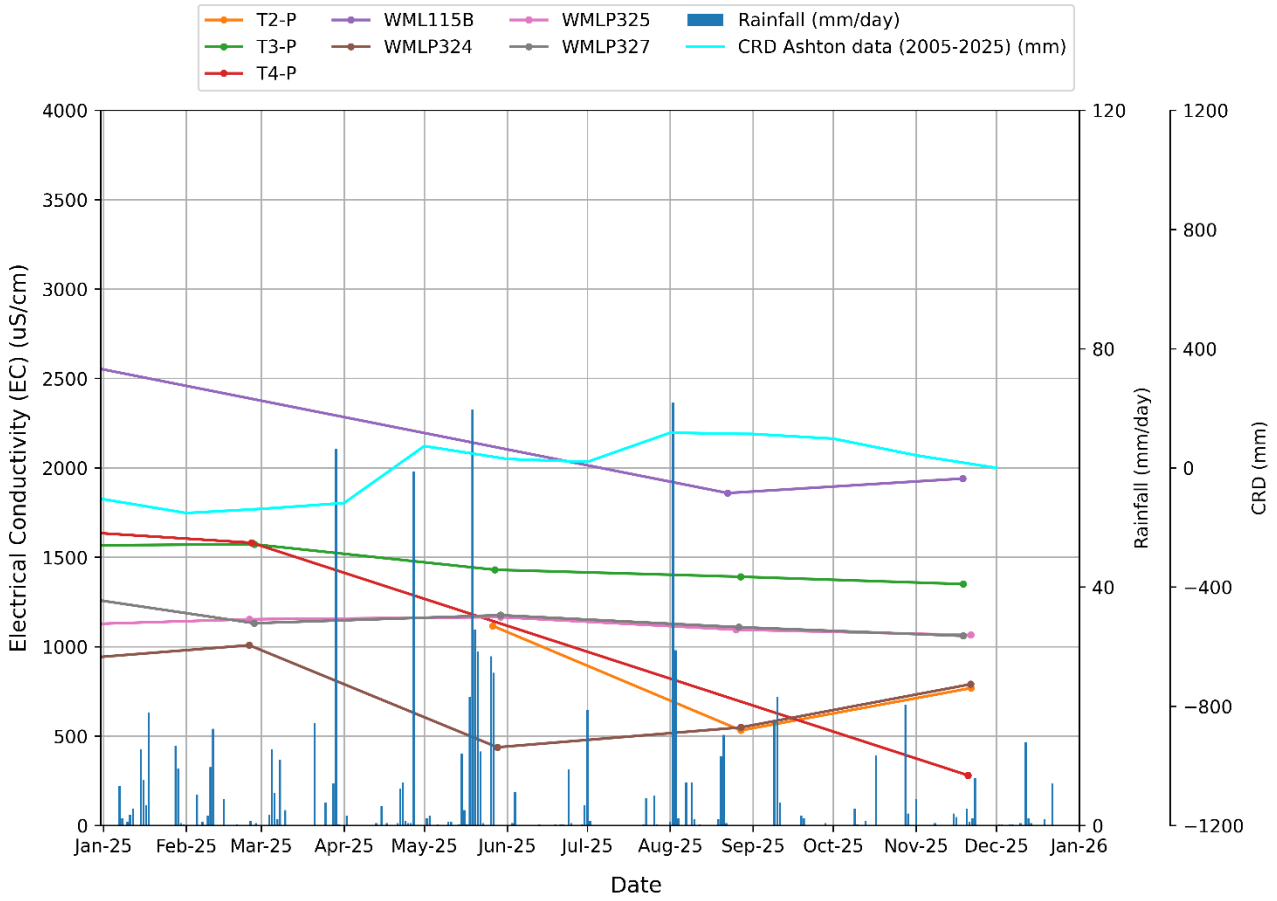

Figure 4.31 Coal measure overburden bore EC trends

4.2.3 Coal measure and CMOB - Dissolved metals, select nutrients, turbidity and cyanide

Comprehensive laboratory analysis conducted in August 2025 included the measurement of select dissolved metals, nutrients, turbidity, and cyanide, as detailed in the tables provided in Appendix D.

Dissolved metal concentrations were evaluated against the ANZECC|ARMCANZ livestock water quality guidelines (ANZECC & ARMCANZ, 2000), with no exceedances detected for any assessed metals, including arsenic, cadmium, chromium, copper, lead, nickel, selenium, and zinc. While manganese and iron were detected at very low concentrations, these metals are not considered toxic at such levels, and no ANZECC|ARMCANZ livestock water quality limits are defined for them.

The nutrient analysis encompassed nitrite and nitrate as N, total Kjeldahl nitrogen as N, total nitrogen as N, and total phosphorus as P. All nitrogen-related concentrations were low, with nitrate levels well below the ANZECC|ARMCANZ livestock guideline of 400 mg/L and nitrite levels far below the 30 mg/L threshold. Total nitrogen concentrations were consistently below the short-term trigger range of 25 to 125 mg/L. Phosphorus concentration values ranged from 0.02 mg/L (WML261) to 0.75 mg/L (RSGM1), well below the guideline value of 12 mg/L, as detailed in Appendix D. Turbidity, which lacks a defined livestock guideline, showed higher values in bores that were hand-bailed rather than pumped. Cyanide concentrations across all samples were below the limit of reporting (LOR), with no exceedances of applicable standards.

5 EPL 11879 monitoring bores

Monitoring results for 2025 from EPL 11879 bores (as specified in the Licence Variation of November 2022) are summarised in Table 5.1 (water levels) and Table 5.2 (EC).

Table 5.1 EPL 11879 monitoring bore groundwater levels (2025)

Bore ID	Feb-25	May-25	Aug-25	Nov-25
	Groundwater levels (m TOC)			
YAP016	3.88	3.63	3.31	3.67
WMLP320	-	5.98	5.92	7.33
WMLP279	13.17	11.17	11.02	12.37
WMLP280	11.64	9.64	9.31	10.78
WML120B	8.03	6.03	7.4	8.11
WML129	4.44	3.02	3.72	4.31
WMLP336	6.96	12.38	11.51	12.22
GM1	9.52	9.12	5.7	6.86
WML120A	8.64	7	7.94	8.62
WML262	32.32	31.35	31.74	33.57
WML181	17.3	16.52	17.19	17.42
WML183	33.33	26.67	27.75	28.21

Note: m TOC = metres top of casing.

Table 5.2 EPL 11879 monitoring bore groundwater EC measurements (2025)

Bore ID	Feb-25	May-25	Aug-25	Nov-25
	Groundwater EC (µS/cm)			
YAP016	1141	1023	1520	997.2
WMLP320	-	503.5	887.3	767.3
WMLP279	988.6	463.4	457.4	675.1
WMLP280	1009	538.7	883	684.9
WML120B	668.4	748.7	715.5	714.3
WML129	563.2	230.1	376.1	368.7
WMLP336	921.5	657.1	691.5	647.1
GM1	1857	1693	1958	1840
WML120A	1037	884	813.1	846
WML262	2481	2351	2408	2490
WML181	2445	2517	2642	3163
WML183	4604	3424	3537	3303

6 Mine inflow

Ashton Underground Mine inflows are estimated through an evaluation of dewatering abstraction volumes and a water balance assessment. The water balance approach is considered the most suitable method for assessing mine inflows, as the abstracted water comprises contributions from various sources, including groundwater, surface water, incidental take, and groundwater transitioning from its entry point to the abstraction point. This "stored" water is assumed to have a transition time on the order of years and is typically not classified as inflow from the past year. It is understood that this stored water primarily originates from groundwater sources, predominantly hard rock, rather than surface water. A portion of the abstracted water is believed to have infiltrated the mine prior to 2025, where it was temporarily stored in the goaf. Additionally, some of the incidental take from 2025 remains stored underground or has been lost as coal moisture or water vapor through outgoing air.

The assessment incorporates the following data sources:

- metered water volumes pumped into the mine from various sources;
- metered water volumes abstracted from the mine;
- Partitioned water contributions, derived from groundwater modelling, distinguishing between surface water and groundwater sources; and
- estimates of stored water volumes pumped from the mine.

The volumes are summarised in Table 6.1. In 2025, Ashton abstracted a total of 1701.99 ML of water through Borehole 8a (BH8a), Borehole 8b (BH8b), and the underground portal. Of the total volume, 215.99 ML was introduced into the mine as operational water, while the remaining 1486.00 ML was classified as incidental water take. The rest of the predicted incidental water is believed to have either been stored in the underground workings or lost through coal moisture and water vapor via out-by air. In 2025, the estimated abstracted inflow exceeded the total predicted water take for the year, resulting in a negative balance of -851.8 ML. This discrepancy is attributed to unexpected inflows encountered during the mining of LW207B, which required the abstraction of higher water volumes.

In 2023, ACOL engaged AGE to assess the potential sources of anomalously high-water inflow rates into the underground workings (AGE, 2023a). To evaluate the volume of groundwater potentially lost from the alluvium above LW206B, BCA groundwater elevation trends from late 2022 to June 2023 were analysed to identify the most impacted areas. The analysis suggested that the northern extent of the BCA above LW206B and LW207B was likely the most affected. The potential volumetric contribution from the BCA was then estimated using a range of specific yield values (1% - 15%), resulting in an impacted volume of between 5 ML and 81 ML, or approximately 543,000 m³. Water chemistry analysis further supported the conclusion that the majority of the anomalous inflow was sourced from deep groundwater, including that from seams below and including the Pikes Gully coal seam.

Table 6.1 Breakdown of abstracted water volumes (2025)

Total water abstracted from mine via BH6, BH7, BH8a BH8b and Portal	1701.99 ML	Mine water input (metered)	215.99 ML		
		Estimate of abstracted water considered inflow water	1486.00 ML	634.20 ML	Total predicted incidental water-take for 2025 (from 2023 GW)
		Portion of incidental water take considered stored in underground and/or lost via coal moisture and water vapour in out-by air	-851.8 ML		

7 Summary

Groundwater monitoring during the 2025 reporting period was conducted in accordance with the requirements outlined in the WMP. A summary of the key findings from this report is provided below:

- Throughout 2025, groundwater levels in the regulatory BCA monitoring bores were generally stable or declining, except in May and August when heavy rainfall temporarily increased groundwater elevations in all bores. Borehole T2A remained dry until August, at which point water levels recovered. All bores stayed above their trigger values during the year. Unlike the GCA and HRA, the BCA is not a regulated stream, and ACP has approval to intercept BCA groundwater under DA 309-11-2011-i MOD 5.
- Groundwater levels in other BCA alluvial bores (WML115C, WMLP308, RA18, WMLP320) stayed mostly steady but followed similar patterns as regulatory bores: water levels rose from early 2025 to August, then declined for the rest of the year, matching increased rainfall trends.
- Groundwater elevations in regulatory GCA bores remained largely consistent during the reporting period. Sampling from WMLP343 was not possible between August 2024 and August 2025 due to sediment accumulation within the screened interval. Increased precipitation in 2025 recharged water levels in the bore, enabling sampling to occur above the blockage. Airlift development is scheduled to address the sediment obstruction. Throughout 2025, no GCA groundwater elevations exceeded established trigger thresholds.
- HRA regulatory bore groundwater elevations were stable during the beginning of 2025,increased during the middle of the year, and decreased during the end of the year. Groundwater level in these bores can be partly attributed to rainfall and controlled releases upstream of the HR section crossing the ACP. All HRA elevations remained above trigger levels in 2025.
- Other non-regulatory HRA bores showed groundwater changes matching yearly rainfall, with marked rises in May and August. No mining impacts beyond earlier predictions were observed.
- Surface water elevations in Bowmans Creek, Glennies Creek, and the Hunter River were stable overall, with occasional spikes after heavy rainfall.
- Groundwater levels remained generally steady in coal measure bores over the year. A steady increase in groundwater elevation was seen in CMOB bores early in 2025, but levels started to drop around October, coinciding with below-average rainfall.
- Closer to active mining panels, groundwater elevations generally followed similar rainfall patterns with slight spikes in groundwater level during May and August and a declining trend from the end of August to the remainder of 2025 occurring in all bores.
- Pressure head at VWP bores WML113 and WMLP361 (near LW208 and LW403) showed varied trends in 2025. WML113's sensors at 40 m, 65 m, and 95 m functioned, but there was no data from 124 m. WMLP361 had working sensors at 51 m, 161 m, and 191 m; sensors at 28 m and 109.5 m stopped returning data in February 2023 and October 2020, respectively. The WMLP361 logging unit was offline from July and was repaired in November.
- Groundwater pH in alluvial bores remained mostly stable in 2025, generally between 6.5–7.5. A few bores, including WMLP349 and WMLP358, exceeded pH trigger values multiple times. This was attributed to the period in which triggers were derived not being representative of long term climatic conditions at Ashton. The 2025 pH ranges were: BCA (6.42–8.06), GCA (6.48–8.32), and HRA (6.31–8.51).
- In 2025, groundwater electrical conductivity (EC) across the BCA, GCA, and HRA monitoring networks ranged from fresh to slightly brackish, consistent with previous years' observations. Most bores exhibited stable to slightly declining EC levels throughout 2025. However, bore WMLP358 consistently recorded EC values exceeding trigger level criteria, registering four trigger level exceedances during the year. Investigations into these exceedances, particularly at WMLP349 and WMLP358, recommended revising trigger thresholds to better account for natural variability. HRA bores WMLP279 and WMLP337 exceeded EC triggers in April, but no other significant exceedances were recorded. Observed EC ranges were 213.4–3,878 µS/cm (BCA), 230.1–1,049 µS/cm (GCA), and 378.2–3,169 µS/cm (HRA).
- Electrical conductivity in surface water of rivers and creeks stayed consistent overall, showing brief variations following rainfall that returned to normal quickly.

- The major ion content of alluvial systems was assessed, with the cation water type dominated by Na or Ca, and Cl being the dominant anion, followed by lower concentrations of HCO3 and SO4. The BCA and HRA water types were similar but differed from the GCA water types due to variations in water sources and recharge/discharge mechanisms.
- No exceedances were observed for metals in alluvial bores, with levels of manganese and iron considered non-toxic. Nutrient analysis showed low nitrogen, turbidity was higher in hand-bailed bores, and cyanide levels were below detection limits.
- In 2025, groundwater pH levels in coal measure and CMOB monitoring bores stayed mostly stable and slightly alkaline, typically ranging from 6.5 to 7.5, which was similar to previous years. Only minimal deviations outside this range occurred, all within natural variation. For coal measure bores, the pH ranged from 6.46 to 8.64, while CMOB bores showed a pH range of 6.79 to 7.95.
- In 2025, groundwater EC readings in coal measure and CMOB bores ranged from fresh to brackish, with most bores showing an overall decrease. However, WML181 differed from prevailing trends by recording a general increase in groundwater EC. The EC values varied from 104.1 µS/cm to 4604.0 µS/cm in coal measure bores, and from 437.2 µS/cm to 1940.0 µS/cm in CMOB bores.
- Both coal measure and CMOB bores had Na or Ca as the main cations and Cl as the primary anion. However, coal measure bores were higher in Mg, while CMOB bores had greater amounts of Ca. These differences help distinguish the water types from each source.
- Dissolved metal concentrations in coal measure and CMOB bores were found to comply with ANZECC|ARMCANZ guidelines, with no exceedances observed for metals such as arsenic, cadmium, and zinc. Manganese and iron were present at low, non-toxic levels. Nutrient analysis indicated low nitrogen content, with nitrate and nitrite concentrations well below guideline thresholds, and no bores exceeded trigger ranges for phosphorus. Turbidity was elevated in hand-bailed bores, while cyanide levels remained below detection limits and no exceedances were recorded.
- During the 2025 monitoring period, the monitoring bores specified under EPL 11879 showed varying groundwater levels and electrical conductivity (EC) readings.
- Actual inflows into the underground mine surpassed initial forecasts. Previous investigations have determined that most of the groundwater entering the mine is probably originating from deep Permian strata, rather than from surface water sources.

Overall, the site's impacts match predictions, with minimal impacts on the GCA and HRA alluvial aquifers, and coal measure impacts remaining within expected levels.

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Appendix A

Summary of WMP monitoring locations

Table A 1 GWMP monitoring locations summary

ID	Type	Easting (GDA94 Z56)	Northing (GDA94 Z56)	Top of casing (m AHD)	Depth (m BGL)
Ashton Well	Monitoring bore	318355	6406029	62	-
GM1	EPL Monitoring bore*	318431	6407214	67	203
GM3A	Monitoring bore	320246.5	6405976.9	59	7.5
GM3B	Monitoring bore	320250.9	6405976.7	59	16.2
PB1	Monitoring bore	317545	6405301	61.1	7.8
RA02	Monitoring bore	317712.8	6405233	55.2	11.3
RA18	Monitoring bore	317821.8	6405434.2	62.6	8.5
RA27	Monitoring bore	317952.1	6403738	61.6	10.7
RM01	Monitoring bore	318041	6404109.5	69.4	9.8
RM02	Monitoring bore	317942	6404506	61.1	12.9
RM03	Monitoring bore	317667	6404844.5	62.1	9.5
RM10	Monitoring bore	317589	6405292	61.6	10.5
RSGM1	Monitoring bore	317655	6406302	65.6	8.5
T2-A	Monitoring bore	317583.3	6405217.4	60.8	7.9
T2-P	Monitoring bore	317587	6405222	60.7	14.5
T3-A	Monitoring bore	317654.2	6404708	59.9	10.8
T3-P	Monitoring bore	317650	6404702	59.8	22.8
T4-A	Monitoring bore	317685.8	6404323.1	58.6	10.7
T4-P	Monitoring bore	317683	6404319	58.5	17.5
T5	Monitoring bore	317946.1	6406549.4	65.3	8.3
WML113A	Vibrating wire piezometer	317369	6404529	60.2	125
WML113C	Monitoring bore	317377	6404526	60.2	11.2
WML115B	Monitoring bore	317881	6406704	66.4	13
WML115C	Monitoring bore	317888	6406710	66.2	6.2
WML119	Monitoring bore	319255.3	6403930.1	61.5	25.8
WML120A	EPL Monitoring bore*	319292	6404579.6	60.4	15
WML120B	EPL Monitoring bore*	319293.6	6404587.5	60.1	9
WML129	EPL Monitoring bore*	319468.4	6403527.8	55.3	4.6
WML181	EPL Monitoring bore*	319215	6403958.3	64.3	36.7
WML183	EPL Monitoring bore*	319188.2	6404325.2	76.7	45.5
WML213	Vibrating wire piezometer	317210	6404154	61.5	316
WML239	Monitoring bore	319345	6404044.8	58.8	12.2
WML245	Vibrating wire piezometer	320035	6404835	64.9	110
WML261	Monitoring bore	319320.2	6404705.9	58.7	43
WML262	EPL Monitoring bore*	319220.1	6403927.7	63.2	60.3
WMLP269	Vibrating wire piezometer	317850	6404073	65.5	147

ID	Type	Easting (GDA94 Z56)	Northing (GDA94 Z56)	Top of casing (m AHD)	Depth (m BGL)
WMLC144	Vibrating wire piezometer	319500	6404170	59.3	132
WMLC248	Vibrating wire piezometer	319326	6404721	58.5	144.6
WMLC334	Vibrating wire piezometer	318589	6403088	75.9	218.5
WMLC335	Vibrating wire piezometer	318892	6402936	64.5	200.5
WMLP277	Monitoring bore	317643.2	6403958.5	59	13.3
WMLP278	Monitoring bore	317626.3	6403894.2	62.3	11.5
WMLP279	EPL Monitoring bore*	317298.9	6403991.8	62.7	17.2
WMLP280	EPL Monitoring bore*	317797.6	6403793.4	62.5	14.9
WMLP301	Monitoring bore	319235	6403858	60.2	41.5
WMLP302	Monitoring bore	319299.6	6404600.2	59.7	25.2
WMLP308	Monitoring bore	318222.7	6406373	65.7	8.9
WMLP311	Monitoring bore	318178.9	6406047.9	63.6	7.6
WMLP320	EPL Monitoring bore*	317457.2	6405388	61.5	8.5
WMLP323	Monitoring bore	318242.2	6406594.7	64.5	7.3
WMLP324	Monitoring bore	318240	6406594	64.5	14.1
WMLP325	Monitoring bore	318181	6406050	63.7	14.6
WMLP326	Monitoring bore	317571	6404103.2	59.3	11.9
WMLP327	Monitoring bore	317573	6404103	59.4	18.3
WMLP328	Monitoring bore	317927.3	6405611.6	62.8	11.5
WMLP336	EPL Monitoring bore*	318965.4	6402841.9	60.6	15.5
WMLP337	Monitoring bore	318418	6403129	59.9	13.5
WMLP338	Monitoring bore	318624.7	6402794	58.8	12.9
WMLP343	Monitoring bore	319623	6404606	61	9.6
WMLP346	Monitoring bore	319366.5	6404457.2	60.68	11.5
WMLP349	Monitoring bore	319516	6404198	58.3	8.7
WMLP358	Monitoring bore	319560	6403704	59.49	9.3
WMLP361	Vibrating wire piezometer	317722	6405962	62.9	191
WMLP363	Vibrating wire piezometer	317963	6406634	66	164
YAP016	EPL Monitoring bore*	318438	6407195	66.8	7.3

Note: * Per EPL 11879 (Licence version date: 3 November 2022).

Appendix B

Summary of GWMP Plan – parameters and frequency

Table B 1 GWMP plan summary

ID	Type	Data recording method	Targets	Monthly	Quarterly	Annually
Ashton Well	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
GM1	EPL Monitoring bore*	-	Coal measure	Water level only	Monthly plus field EC only	Quarterly plus field parameters and **comprehensive** analysis
GM3A	Monitoring bore	-	GCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
GM3B	Monitoring bore	-	GCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
PB1	Monitoring bore	-	BCA	Water level only	Monthly plus field EC only	Quarterly plus minor lab analysis
RA02	Monitoring bore	-	BCA + CMOB	Water level only	Monthly plus field EC only	Quarterly plus field parameters and **comprehensive** analysis
RA18	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
RA27	Monitoring bore	-	HRA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
RM01	Monitoring bore	-	BCA	Water level only	Monthly plus field EC only	Quarterly plus minor lab analysis
RM02	Monitoring bore	-	BCA + CMOB	Water level only	Monthly plus field EC only	Water level and field EC only
RM03	Monitoring bore	-	BCA + CMOB	Water level only	Monthly plus field EC only	Quarterly plus minor lab analysis
RM10	Monitoring bore	-	BCA + CMOB	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus minor lab analysis
RSGM1	Monitoring bore	-	Coal measure (BWS)	Water level only	Monthly plus field EC only	Quarterly plus field parameters and **comprehensive** analysis
T2-A	Monitoring bore	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
T2-P	Monitoring bore	Pressure transducer	CMOB	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
T3-A	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
T3-P	Monitoring bore	-	CMOB	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis

ID	Type	Data recording method	Targets	Monthly	Quarterly	Annually
T4-A	Monitoring bore	-	BCA + BWS	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
T4-P	Monitoring bore	-	CMOB	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
T5	Monitoring bore	Pressure transducer	BCA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WML113A	Vibrating wire piezometer	-	BW 2, Lem 4, Lem 9, Lem 11-12, Lem 15	Pressure head	Pressure head	Pressure head
WML113C	Monitoring bore	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WML115B	Monitoring bore	-	CMOB & Lem 3-4	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
WML115C	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
WML119	Monitoring bore	-	PG	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WML120A	EPL Monitoring bore*	-	PG	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WML120B	EPL Monitoring bore*	-	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WML129	EPL Monitoring bore*	Pressure transducer	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WML181	EPL Monitoring bore*	-	PG	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WML183	EPL Monitoring bore*	-	PG	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WML213	Vibrating wire piezometer	-	BWS, Lem 8-9, Lem 15, Lem 19, PG, ULD, ULLD, LB	Pressure head	Pressure head	Pressure head
WML239	Monitoring bore	Pressure transducer	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis

ID	Type	Data recording method	Targets	Monthly	Quarterly	Annually
WML245	Vibrating wire piezometer	-	ULD, MLD, LB, LB-HEB int	Pressure head	Pressure head	Pressure head
WML261	Monitoring bore	-	ULD	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WML262	EPL Monitoring bore*	-	ULD	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP269	Vibrating wire piezometer	-	Lem 5, Lem 7, Lem 8-9, Lem 11-12, Lem 15, Lem 19	Pressure head	Pressure head	Pressure head
WMLC144	Vibrating wire piezometer	-	ULD, MLD1, MLD2, ULLD, LLLD, UBS, LB	Pressure head	Pressure head	Pressure head
WMLC248	Vibrating wire piezometer	-	ULD, ULLD, LB, HEB	Pressure head	Pressure head	Pressure head
WMLC334	Vibrating wire piezometer	-	Lem 13, Lem 15, Lem 18/19, Art, ULD, ULLD, UB, LB	Pressure head	Pressure head	Pressure head
WMLC335	Vibrating wire piezometer	-	Lem 15B, Lem 17, PG Upper, Art, ULD, LLLD, UB, LB	Pressure head	Pressure head	Pressure head
WMLP277	Monitoring bore	Pressure transducer	HRA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WMLP278	Monitoring bore	-	HRA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WMLP279	EPL Monitoring bore*	-	HRA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP280	EPL Monitoring bore*	-	HRA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP301	Monitoring bore	-	Arties Seam	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP302	Monitoring bore	-	Arties Seam	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis

ID	Type	Data recording method	Targets	Monthly	Quarterly	Annually
WMLP308	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WMLP311	Monitoring bore	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP320	EPL Monitoring bore*	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
WMLP323	Monitoring bore	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP324	Monitoring bore	Pressure transducer	CMOB	Water level only	Monthly plus field parameters and minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP325	Monitoring bore	Pressure transducer	CMOB	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WMLP326	Monitoring bore	-	BCA	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
WMLP327	Monitoring bore	-	CMOB	Water level only	Monthly plus field parameters	Quarterly plus minor lab analysis
WMLP328	Monitoring bore	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP336	EPL Monitoring bore*	-	HRA + CMOB	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP337	Monitoring bore	-	HRA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP338	Monitoring bore	-	HRA	Water level only	Monthly plus field parameters	Quarterly plus **comprehensive** analysis
WMLP343	Monitoring bore	Pressure transducer	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP346	Monitoring bore	Pressure transducer	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP349	Monitoring bore	-	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis
WMLP358	Monitoring bore	-	GCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis

ID	Type	Data recording method	Targets	Monthly	Quarterly	Annually
WMLP361	Vibrating wire piezometer	VWP datalogger	Lem 5, Lem 8, Lem 15A, Art, ULD	Pressure head	Pressure head	Pressure head
WMLP363	Vibrating wire piezometer	VWP datalogger	CMOB, Lem 8, Lem 9-10 int, Lem 12, Lem 14, Lem 15, PG roof, ULD	Pressure head	Pressure head	Pressure head
YAP016	EPL Monitoring bore*	Pressure transducer	BCA	Water level and field parameters	Monthly plus minor lab analysis	Quarterly plus **comprehensive** analysis

Note: * Per EPL 11879 (Licence version date: 3 November 2022).

Appendix C

Extract from GWMP protocol for exceedance of groundwater trigger values (Yancoal, 2025)

In the event of a groundwater assessment criterion (Table 21 and Section 7.2) being exceeded, the following protocol will be followed:

1. Check and validate the data which indicates an exceedance of the criterion, including whether the exceedance is ongoing.
2. A preliminary investigation will be undertaken to establish the cause(s) and determine whether changes to the water management system or operations are required. This will involve the consideration of the monitoring results in conjunction with:
   a) site activities being undertaken at the time;
   b) activities at nearby operations (cumulative affects);
   c) groundwater extraction by others;
   d) baseline monitoring results and natural fluctuations;
   e) predictive modelling;
   f) groundwater monitoring at nearby locations;
   g) the prevailing and preceding meteorological and streamflow conditions; and
   h) changes to the land use/activities being undertaken nearby.
3. If the preliminary investigation shows that the impact is linked to activities undertaken by ACOL, a report will be emailed to the DPHI and any other relevant department. Causal factors will be addressed and rectified if possible. Contingency measures will be developed in consultation with the DPHI and any other relevant department and implemented in response to the outcomes of the investigation.
4. Remedial/compensatory measures will be developed in consultation with DPHI and any other relevant department and implemented in response to the outcomes of the investigations.
5. Monitoring would be implemented as required to confirm the effectiveness of remedial measures.
6. Where required, an independent hydrogeologist will be engaged to conduct investigations. ACOL will seek the Secretary of DPHI's approval in selecting a hydrogeologist.

Where a groundwater performance trigger continues to be exceeded for six sampling events, ACOL will:

- Notify DCCEEW-Water that the groundwater performance trigger has been exceeded for six sampling events.
- Conduct further analysis to understand the cause of the continued exceedance.
- Any exceedances and responses taken to ameliorate these exceedances will be reported in the Annual Review.

Appendix D

Annual groundwater quality laboratory results 2025

Bore ID	Geology	Laboratory ID	Date	pH Value (Field)	pH Value (Lab)	pH RPD	EC (Field)	EC (Lab)	EC RPD	Total Dissolved Solids (TDS)
Units				**pH**	**pH**	**%**	**µS/cm**	**µS/cm**	**%**	**mg/L**
Limit of Reporting (LOR)				**-**	**0.01**	**-**	**-**	**1**	**-**	**10**
ANZECC livestock limits				**-**	**-**	**-**	**5970**	**5970**	**-**	**4000**
Ashton Well	BCA	ES2526126004	22-Aug-25	7.44	7.20	3.28	404.6	402	0.64	-
GM1	Coal	ES2525820002	20-Aug-25	7.44	7.36	1.08	1958	1900	3.01	1110
GM3A	GCA	ES2525820003	20-Aug-25	7.44	7.85	-5.36	5971	5990	-0.32	-
PB1	BCA	ES2526126006	22-Aug-25	7.81	7.06	10.09	261.9	260	0.73	-
RA18	BCA	ES2526855010	29-Aug-25	7.08	7.00	1.14	984.8	997	-1.23	-
RA27	HRA	ES2526262002	25-Aug-25	7.07	7.09	-0.28	1518	1540	-1.44	890
RM01	BCA	ES2526855008	28-Aug-25	8.65	6.52	28.08	2536	2570	-1.33	-
RM10	BCA + CMOB	ES2526126005	22-Aug-25	7.88	7.76	1.53	330.4	326	1.34	-
RSGM1	Coal	ES2526855002	28-Aug-25	7.56	7.52	0.53	894.5	901	-0.72	976
T2-A	BCA	ES2526559010	27-Aug-25	7.34	7.18	2.20	970.9	978	-0.73	557
T2-P	CMOB	ES2526559011	27-Aug-25	7.78	6.99	10.70	531.8	535	-0.60	358
T3-A	BCA	ES2526559008	26-Aug-25	7.46	6.99	6.51	2389	2410	-0.88	1600
T3-P	CMOB	ES2526559009	27-Aug-25	6.69	7.20	-7.34	1391	1390	0.07	807
T5	BCA	ES2526855001	28-Aug-25	7.15	6.96	2.69	267.1	265	0.79	393
WML113C	BCA	ES2526262001	25-Aug-25	6.65	7.01	-5.27	815.7	816	-0.04	491
WML115B	CMOB	ES2526126002	22-Aug-25	7.65	7.06	8.02	1859	1870	-0.59	-
WML115C	BCA	ES2526126003	22-Aug-25	7.49	7.02	6.48	213.4	213	0.19	-
WML119	Coal	ES2526855014	29-Aug-25	8.64	6.60	26.77	138.6	125	10.32	346
WML120A	Coal	ES2526855005	28-Aug-25	7.70	7.24	6.16	813.1	822	-1.09	492
WML120B	GCA	ES2526855006	28-Aug-25	7.56	6.80	10.58	715.5	727	-1.59	464
WML129	GCA	ES2526855016	29-Aug-25	8.32	7.29	13.20	376.1	373	0.83	236
WML181	Coal	ES2526855015	29-Aug-25	7.32	7.27	0.69	2642	2670	-1.05	1540
WML183	Coal	ES2526855007	28-Aug-25	7.33	7.17	2.21	3537	3590	-1.49	2080

Bore ID	Geology	Laboratory ID	Date	pH Value (Field)	pH Value (Lab)	pH RPD	EC (Field)	EC (Lab)	EC RPD	Total Dissolved Solids (TDS)
Units				**pH**	**pH**	**%**	**µS/cm**	**µS/cm**	**%**	**mg/L**
Limit of Reporting (LOR)				**-**	**0.01**	**-**	**-**	**1**	**-**	**10**
ANZECC livestock limits				**-**	**-**	**-**	**5970**	**5970**	**-**	**4000**
WML239	GCA	ES2525820007	20-Aug-25	7.58	7.02	7.67	573.3	556	3.06	336
WML261	Coal	ES2526855003	28-Aug-25	7.33	7.14	2.63	1694	1710	-0.94	932
WML262	Coal	ES2526855013	29-Aug-25	8.03	8.02	0.12	2408	2430	-0.91	1460
WMLP277	HRA	ES2526559004	26-Aug-25	8.51	7.28	15.58	710.5	723	-1.74	420
WMLP278	HRA	ES2526262004	25-Aug-25	7.95	7.22	9.62	378.2	379	-0.21	240
WMLP279	HRA	ES2526559005	26-Aug-25	7.69	7.06	8.54	457.4	468	-2.29	310
WMLP280	HRA	ES2526262003	25-Aug-25	7.82	7.06	10.22	883	892	-1.01	499
WMLP301	Coal	ES2526855012	29-Aug-25	7.91	7.95	-0.50	2714	2750	-1.32	1980
WMLP302	Coal	ES2526855004	28-Aug-25	6.88	7.32	-6.20	1600	6010	-115.90	3640
WMLP308	BCA	ES2526559014	27-Aug-25	7.94	7.04	12.02	653.3	681	-4.15	430
WMLP311	BCA	ES2526262005	25-Aug-25	7.61	6.88	10.08	927.7	941	-1.42	542
WMLP320	BCA	ES2526855009	29-Aug-25	6.58	6.91	-4.89	887.3	895	-0.86	535
WMLP323	BCA	ES2526559013	27-Aug-25	7.96	7.04	12.27	478.3	484	-1.18	322
WMLP324	CMOB	ES2526559012	27-Aug-25	7.80	7.18	8.28	548.5	551	-0.45	326
WMLP325	CMOB	ES2526262006	25-Aug-25	7.95	7.47	6.23	1095	1110	-1.36	632
WMLP326	BCA	ES2526559006	26-Aug-25	8.06	7.32	9.62	761.3	769	-1.01	-
WMLP327	CMOB	ES2526559007	26-Aug-25	7.72	7.18	7.25	1109	1120	-0.99	-
WMLP328	BCA	ES2526855011	29-Aug-25	7.48	7.14	4.65	700.8	705	-0.60	519
WMLP336	HRA + CMOB	ES2526559001	26-Aug-25	6.41	6.62	-3.22	691.5	695	-0.50	424
WMLP337	HRA	ES2526559003	26-Aug-25	7.11	7.17	-0.84	3169	3210	-1.29	1840
WMLP338	HRA	ES2526559002	26-Aug-25	6.77	6.82	-0.74	2419	2430	-0.45	1500
WMLP343	GCA	ES2525820005	20-Aug-25	7.56	7.32	3.23	744.1	711	4.55	380
WMLP346	GCA	ES2525820006	20-Aug-25	7.28	6.90	5.36	650.7	631	3.07	348

Bore ID	Geology	Laboratory ID	Date	pH Value (Field)	pH Value (Lab)	pH RPD	EC (Field)	EC (Lab)	EC RPD	Total Dissolved Solids (TDS)
Units				**pH**	**pH**	**%**	**µS/cm**	**µS/cm**	**%**	**mg/L**
Limit of Reporting (LOR)				**-**	**0.01**	**-**	**-**	**1**	**-**	**10**
ANZECC livestock limits				**-**	**-**	**-**	**5970**	**5970**	**-**	**4000**
WMLP349	GCA	ES2525820004	20-Aug-25	8.21	6.86	17.92	438.5	429	2.19	264
WMLP358	GCA	ES2526126001	22-Aug-25	6.53	6.70	-2.57	433.5	424	2.22	293
YAP016	BCA	ES2525820001	20-Aug-25	6.71	7.12	-5.93	1520	1480	2.67	855

Bore ID	Geology	Laboratory ID	Date	Calcium	Magnesium	Sodium	Potassium	Chloride
Units				**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
Limit of Reporting (LOR)				**1**	**1**	**1**	**1**	**1**
ANZECC livestock limits				**-**	**-**	**-**	**-**	**-**
Ashton Well	BCA	ES2526126004	22-Aug-25	30.00	10.00	38.00	4	47
GM1	Coal	ES2525820002	20-Aug-25	76.00	53.00	262.00	4	411
GM3A	GCA	ES2525820003	20-Aug-25	26.00	22.00	1360.00	5	1420
PB1	BCA	ES2526126006	22-Aug-25	9.00	4.00	41.00	<1	19
RA18	BCA	ES2526855010	29-Aug-25	35.00	21.00	138.00	1	173
RA27	HRA	ES2526262002	25-Aug-25	50.00	41.00	214.00	<1	294
RM01	BCA	ES2526855008	28-Aug-25	10.00	22.00	460.00	7	815
RM10	BCA + CMOB	ES2526126005	22-Aug-25	9.00	5.00	55.00	6	17
RSGM1	Coal	ES2526855002	28-Aug-25	4.00	5.00	176.00	2	181
T2-A	BCA	ES2526559010	27-Aug-25	45.00	23.00	137.00	1	167
T2-P	CMOB	ES2526559011	27-Aug-25	31.00	12.00	61.00	2	55
T3-A	BCA	ES2526559008	26-Aug-25	61.00	54.00	384.00	<1	631
T3-P	CMOB	ES2526559009	27-Aug-25	44.00	34.00	215.00	3	250
T5	BCA	ES2526855001	28-Aug-25	8.00	4.00	44.00	<1	21

Bore ID	Geology	Laboratory ID	Date	Calcium	Magnesium	Sodium	Potassium	Chloride
Units				mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				1	1	1	1	1
ANZECC livestock limits				-	-	-	-	-
WML113C	BCA	ES2526262001	25-Aug-25	46.00	20.00	100.00	1	128
WML115B	CMOB	ES2526126002	22-Aug-25	45.00	23.00	344.00	2	235
WML115C	BCA	ES2526126003	22-Aug-25	10.00	4.00	28.00	4	22
WML119	Coal	ES2526855014	29-Aug-25	6.00	2.00	17.00	1	17
WML120A	Coal	ES2526855005	28-Aug-25	42.00	29.00	84.00	1	131
WML120B	GCA	ES2526855006	28-Aug-25	36.00	24.00	74.00	<1	134
WML129	GCA	ES2526855016	29-Aug-25	17.00	10.00	46.00	2	52
WML181	Coal	ES2526855015	29-Aug-25	11.00	12.00	580.00	3	560
WML183	Coal	ES2526855007	28-Aug-25	98.00	138.00	513.00	7	671
WML239	GCA	ES2525820007	20-Aug-25	32.00	14.00	66.00	1	81
WML261	Coal	ES2526855003	28-Aug-25	40.00	46.00	251.00	3	377
WML262	Coal	ES2526855013	29-Aug-25	9.00	10.00	545.00	3	378
WMLP277	HRA	ES2526559004	26-Aug-25	20.00	12.00	129.00	<1	90
WMLP278	HRA	ES2526262004	25-Aug-25	11.00	5.00	66.00	<1	30
WMLP279	HRA	ES2526559005	26-Aug-25	31.00	13.00	50.00	<1	45
WMLP280	HRA	ES2526262003	25-Aug-25	32.00	20.00	123.00	<1	140
WMLP301	Coal	ES2526855012	29-Aug-25	5.00	4.00	595.00	2	462
WMLP302	Coal	ES2526855004	28-Aug-25	103.00	161.00	961.00	8	1580
WMLP308	BCA	ES2526559014	27-Aug-25	28.00	15.00	98.00	2	99
WMLP311	BCA	ES2526262005	25-Aug-25	38.00	24.00	130.00	2	143
WMLP320	BCA	ES2526855009	29-Aug-25	52.00	24.00	92.00	2	133
WMLP323	BCA	ES2526559013	27-Aug-25	23.00	12.00	66.00	1	54
WMLP324	CMOB	ES2526559012	27-Aug-25	27.00	13.00	75.00	2	61

Bore ID	Geology	Laboratory ID	Date	Calcium	Magnesium	Sodium	Potassium	Chloride
Units				mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				1	1	1	1	1
ANZECC livestock limits				-	-	-	-	-
WMLP325	CMOB	ES2526262006	25-Aug-25	52.00	24.00	154.00	2	194
WMLP326	BCA	ES2526559006	26-Aug-25	20.00	10.00	135.00	<1	89
WMLP327	CMOB	ES2526559007	26-Aug-25	35.00	20.00	181.00	2	182
WMLP328	BCA	ES2526855011	29-Aug-25	31.00	17.00	87.00	2	98
WMLP336	HRA + CMOB	ES2526559001	26-Aug-25	49.00	23.00	64.00	2	92
WMLP337	HRA	ES2526559003	26-Aug-25	121.00	136.00	423.00	5	672
WMLP338	HRA	ES2526559002	26-Aug-25	123.00	79.00	293.00	1	602
WMLP343	GCA	ES2525820005	20-Aug-25	41.00	20.00	79.00	4	114
WMLP346	GCA	ES2525820006	20-Aug-25	36.00	19.00	70.00	<1	126
WMLP349	GCA	ES2525820004	20-Aug-25	14.00	7.00	76.00	<1	51
WMLP358	GCA	ES2526126001	22-Aug-25	36.00	14.00	29.00	<1	62
YAP016	BCA	ES2525820001	20-Aug-25	36.00	25.00	275.00	4	272

Bore ID	Geology	Laboratory ID	Date	Hydroxide Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Total Alkalinity	Sulfate as SO4
Units				mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				1	1	1	1	1
ANZECC livestock limits				-	-	-	-	1000
Ashton Well	BCA	ES2526126004	22-Aug-25	<1	<1	127.00	127	16
GM1	Coal	ES2525820002	20-Aug-25	<1	<1	273.00	273	264
GM3A	GCA	ES2525820003	20-Aug-25	<1	<1	1200.00	1200	<10
PB1	BCA	ES2526126006	22-Aug-25	<1	<1	75.00	75	32
RA18	BCA	ES2526855010	29-Aug-25	<1	<1	176.00	176	116

Bore ID	Geology	Laboratory ID	Date	Hydroxide Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Total Alkalinity	Sulfate as SO4
Units				mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				1	1	1	1	1
ANZECC livestock limits				-	-	-	-	1000
RA27	HRA	ES2526262002	25-Aug-25	<1	<1	341.00	341	90
RM01	BCA	ES2526855008	28-Aug-25	<1	<1	65.00	65	32
RM10	BCA + CMOB	ES2526126005	22-Aug-25	<1	<1	147.00	147	12
RSGM1	Coal	ES2526855002	28-Aug-25	<1	<1	167.00	167	39
T2-A	BCA	ES2526559010	27-Aug-25	<1	<1	190.00	190	100
T2-P	CMOB	ES2526559011	27-Aug-25	<1	<1	118.00	118	89
T3-A	BCA	ES2526559008	26-Aug-25	<1	<1	218.00	218	180
T3-P	CMOB	ES2526559009	27-Aug-25	<1	<1	275.00	275	136
T5	BCA	ES2526855001	28-Aug-25	<1	<1	86.00	86	22
WML113C	BCA	ES2526262001	25-Aug-25	<1	<1	179.00	179	70
WML115B	CMOB	ES2526126002	22-Aug-25	<1	<1	519.00	519	213
WML115C	BCA	ES2526126003	22-Aug-25	<1	<1	59.00	59	19
WML119	Coal	ES2526855014	29-Aug-25	<1	<1	31.00	31	<1
WML120A	Coal	ES2526855005	28-Aug-25	<1	<1	217.00	217	38
WML120B	GCA	ES2526855006	28-Aug-25	<1	<1	148.00	148	41
WML129	GCA	ES2526855016	29-Aug-25	<1	<1	106.00	106	13
WML181	Coal	ES2526855015	29-Aug-25	<1	<1	657.00	657	3
WML183	Coal	ES2526855007	28-Aug-25	<1	<1	800.00	800	327
WML239	GCA	ES2525820007	20-Aug-25	<1	<1	131.00	131	24
WML261	Coal	ES2526855003	28-Aug-25	<1	<1	323.00	323	57
WML262	Coal	ES2526855013	29-Aug-25	<1	32.00	815.00	848	<1
WMLP277	HRA	ES2526559004	26-Aug-25	<1	<1	220.00	220	33

Bore ID	Geology	Laboratory ID	Date	Hydroxide Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Total Alkalinity	Sulfate as SO4
Units				mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				1	1	1	1	1
ANZECC livestock limits				-	-	-	-	1000
WMLP278	HRA	ES2526262004	25-Aug-25	<1	<1	138.00	138	21
WMLP279	HRA	ES2526559005	26-Aug-25	<1	<1	152.00	152	28
WMLP280	HRA	ES2526262003	25-Aug-25	<1	<1	222.00	222	52
WMLP301	Coal	ES2526855012	29-Aug-25	<1	19.00	867.00	886	2
WMLP302	Coal	ES2526855004	28-Aug-25	<1	<1	767.00	767	101
WMLP308	BCA	ES2526559014	27-Aug-25	<1	<1	150.00	150	61
WMLP311	BCA	ES2526262005	25-Aug-25	<1	<1	193.00	193	104
WMLP320	BCA	ES2526855009	29-Aug-25	<1	<1	156.00	156	131
WMLP323	BCA	ES2526559013	27-Aug-25	<1	<1	145.00	145	28
WMLP324	CMOB	ES2526559012	27-Aug-25	<1	<1	164.00	164	54
WMLP325	CMOB	ES2526262006	25-Aug-25	<1	<1	233.00	233	86
WMLP326	BCA	ES2526559006	26-Aug-25	<1	<1	232.00	232	44
WMLP327	CMOB	ES2526559007	26-Aug-25	<1	<1	268.00	268	88
WMLP328	BCA	ES2526855011	29-Aug-25	<1	<1	153.00	153	66
WMLP336	HRA + CMOB	ES2526559001	26-Aug-25	<1	<1	168.00	168	42
WMLP337	HRA	ES2526559003	26-Aug-25	<1	<1	737.00	737	154
WMLP338	HRA	ES2526559002	26-Aug-25	<1	<1	349.00	349	113
WMLP343	GCA	ES2525820005	20-Aug-25	<1	<1	201.00	201	8
WMLP346	GCA	ES2525820006	20-Aug-25	<1	<1	138.00	138	13
WMLP349	GCA	ES2525820004	20-Aug-25	<1	<1	117.00	117	20
WMLP358	GCA	ES2526126001	22-Aug-25	<1	<1	112.00	112	20
YAP016	BCA	ES2525820001	20-Aug-25	<1	<1	245.00	245	232

Bore ID	Geology	Laboratory ID	Date	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Selenium	Zinc
Units				**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
Limit of Reporting (LOR)				**0.001**	**0.0001**	**0.001**	**0.001**	**0.05**	**0.001**	**0.001**	**0.001**	**0.01**	**0.005**
ANZECC livestock limits				**0.5**	**0.1**	**1**	**0.4**	**-**	**0.1**	**-**	**1**	**0.02**	**20**
Ashton Well	BCA	ES2526126004	22-Aug-25	-	-	-	-		-	-	-	-	-
GM1	Coal	ES2525820002	20-Aug-25	0.002	<0.0001	<0.001	<0.001	1.94	<0.001	0.414	<0.001	<0.01	0.022
GM3A	GCA	ES2525820003	20-Aug-25	-	-	-	-	-	-	-	-	-	-
PB1	BCA	ES2526126006	22-Aug-25	-	-	-	-	-	-	-	-	-	-
RA18	BCA	ES2526855010	29-Aug-25	-	-	-	-	-	-	-	-	-	-
RA27	HRA	ES2526262002	25-Aug-25	<0.001	<0.0001	0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	<0.005
RM01	BCA	ES2526855008	28-Aug-25	-	-	-	-	-	-	-	-	-	-
RM10	BCA + CMOB	ES2526126005	22-Aug-25	-	-	-	-	-	-	-	-	-	-
RSGM1	Coal	ES2526855002	28-Aug-25	0.004	<0.0001	<0.001	0.005	0.27	<0.001	0.002	0.002	<0.01	0.01
T2-A	BCA	ES2526559010	27-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	0.025
T2-P	CMOB	ES2526559011	27-Aug-25	<0.001	<0.0001	<0.001	0.001	<0.05	<0.001	0.204	0.01	<0.01	0.055
T3-A	BCA	ES2526559008	26-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.001	<0.001	<0.01	0.009
T3-P	CMOB	ES2526559009	27-Aug-25	<0.001	<0.0001	<0.001	<0.001	3.45	<0.001	0.145	<0.001	<0.01	<0.005
T5	BCA	ES2526855001	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.08	<0.001	<0.001	<0.001	<0.01	0.035
WML113C	BCA	ES2526262001	25-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.002	<0.001	<0.01	0.114
WML115B	CMOB	ES2526126002	22-Aug-25	-	-	-	-	-	-	-	-	-	-
WML115C	BCA	ES2526126003	22-Aug-25	-	-	-	-	-	-	-	-	-	-
WML119	Coal	ES2526855014	29-Aug-25	<0.001	<0.0001	<0.001	0.002	0.4	<0.001	0.039	0.002	<0.01	0.028
WML120A	Coal	ES2526855005	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.91	<0.001	0.163	<0.001	<0.01	<0.005
WML120B	GCA	ES2526855006	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.039	<0.001	<0.01	0.02
WML129	GCA	ES2526855016	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.137	<0.001	<0.01	<0.005

Bore ID	Geology	Laboratory ID	Date	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Selenium	Zinc
Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				0.001	0.0001	0.001	0.001	0.05	0.001	0.001	0.001	0.01	0.005
ANZECC livestock limits				0.5	0.1	1	0.4	-	0.1	-	1	0.02	20
WML181	Coal	ES2526855015	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.09	<0.001	0.03	<0.001	<0.01	<0.005
WML183	Coal	ES2526855007	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.22	<0.001	0.198	<0.001	<0.01	0.008
WML239	GCA	ES2525820007	20-Aug-25	<0.001	<0.0001	0.004	0.003	3.98	0.002	0.028	0.002	<0.01	0.078
WML261	Coal	ES2526855003	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	1.14	<0.001	0.036	<0.001	<0.01	<0.005
WML262	Coal	ES2526855013	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.06	<0.001	0.03	<0.001	<0.01	<0.005
WMLP277	HRA	ES2526559004	26-Aug-25	<0.001	<0.0001	<0.001	0.003	<0.05	<0.001	0.004	0.001	<0.01	0.016
WMLP278	HRA	ES2526262004	25-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	0.008
WMLP279	HRA	ES2526559005	26-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	0.011
WMLP280	HRA	ES2526262003	25-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	0.001	<0.01	<0.005
WMLP301	Coal	ES2526855012	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.08	<0.001	0.018	<0.001	<0.01	<0.005
WMLP302	Coal	ES2526855004	28-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.056	0.002	<0.01	<0.005
WMLP308	BCA	ES2526559014	27-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.001	<0.001	<0.01	0.007
WMLP311	BCA	ES2526262005	25-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.001	<0.001	<0.01	0.032
WMLP320	BCA	ES2526855009	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.14	<0.001	0.002	<0.001	<0.01	0.05
WMLP323	BCA	ES2526559013	27-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.001	<0.001	<0.01	0.007
WMLP324	CMOB	ES2526559012	27-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.014	0.001	<0.01	0.015
WMLP325	CMOB	ES2526262006	25-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.27	<0.001	0.322	<0.001	<0.01	<0.005
WMLP326	BCA	ES2526559006	26-Aug-25	-	-	-	-	-	-	-	-	-	-
WMLP327	CMOB	ES2526559007	26-Aug-25	-	-	-	-	-	-	-	-	-	-
WMLP328	BCA	ES2526855011	29-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	0.015
WMLP336	HRA + CMOB	ES2526559001	26-Aug-25	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.004	0.001	<0.01	0.072
WMLP337	HRA	ES2526559003	26-Aug-25	<0.001	0.0001	<0.001	<0.001	0.36	<0.001	0.292	0.004	<0.01	0.042

Bore ID	Geology	Laboratory ID	Date	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Selenium	Zinc
Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Limit of Reporting (LOR)				0.001	0.0001	0.001	0.001	0.05	0.001	0.001	0.001	0.01	0.005
ANZECC livestock limits				0.5	0.1	1	0.4	-	0.1	-	1	0.02	20
WMLP338	HRA	ES2526559002	26-Aug-25	0.001	<0.0001	<0.001	<0.001	1.2	<0.001	0.478	0.004	<0.01	0.034
WMLP343	GCA	ES2525820005	20-Aug-25	<0.001	<0.0001	0.001	<0.001	2.82	<0.001	0.671	0.004	<0.01	0.061
WMLP346	GCA	ES2525820006	20-Aug-25	<0.001	<0.0001	<0.001	<0.001	0.48	<0.001	0.108	0.001	<0.01	0.086
WMLP349	GCA	ES2525820004	20-Aug-25	<0.001	<0.0001	<0.001	0.003	0.44	<0.001	0.016	0.001	<0.01	0.14
WMLP358	GCA	ES2526126001	22-Aug-25	<0.001	<0.0001	<0.001	<0.001	-	<0.001	-	<0.001	-	0.05
YAP016	BCA	ES2525820001	20-Aug-25	<0.001	<0.0001	0.003	0.001	1.14	0.001	0.044	0.001	<0.01	0.266

Bore ID	Geology	Laboratory ID	Date	Turbidity	Total Cyanide	Nitrite + Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Total Phosphorous as P	Total Anions	Total Cations	Ionic Balance
Units				NTU	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%
Limit of Reporting (LOR)				0.1	0.004	0.01	0.1	0.1	0.01	0.01	0.01	0.01
ANZECC livestock limits				-	-	-	-	-	-	-	-	-
Ashton Well	BCA	ES2526126004	22-Aug-25	-	-	-	-	-	-	4.2	4.08	1.46
GM1	Coal	ES2525820002	20-Aug-25	49	<0.004	<0.01	0.6	0.6	0.07	22.5	19.6	6.85
GM3A	GCA	ES2525820003	20-Aug-25	-	-	-	-	-	-	64	62.4	1.3
PB1	BCA	ES2526126006	22-Aug-25	-	-	-	-	-	-	2.7	2.56	-
RA18	BCA	ES2526855010	29-Aug-25	-	-	-	-	-	-	10.8	9.5	6.44
RA27	HRA	ES2526262002	25-Aug-25	480	<0.004	1.57	<1.0	1.6	1.4	17	15.2	5.6
RM01	BCA	ES2526855008	28-Aug-25	-	-	-	-	-	-	25	22.5	5.18
RM10	BCA + CMOB	ES2526126005	22-Aug-25	-	-	-	-	-	-	3.67	3.41	3.68

Bore ID	Geology	Laboratory ID	Date	Turbidity	Total Cyanide	Nitrite + Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Total Phosphorous as P	Total Anions	Total Cations	Ionic Balance
Units				**NTU**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**meq/L**	**meq/L**	**%**
Limit of Reporting (LOR)				**0.1**	**0.004**	**0.01**	**0.1**	**0.1**	**0.01**	**0.01**	**0.01**	**0.01**
ANZECC livestock limits				**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
RSGM1	Coal	ES2526855002	28-Aug-25	1450	<0.004	0.27	3	3.3	0.75	9.25	8.32	5.33
T2-A	BCA	ES2526559010	27-Aug-25	10.7	<0.004	1.12	0.4	1.5	0.04	10.6	10.1	2.25
T2-P	CMOB	ES2526559011	27-Aug-25	38.2	<0.004	1.56	2.6	4.2	0.51	5.76	5.24	4.75
T3-A	BCA	ES2526559008	26-Aug-25	77.7	<0.004	0.86	0.3	1.2	0.13	25.9	24.2	3.42
T3-P	CMOB	ES2526559009	27-Aug-25	41.4	<0.004	0.03	0.6	0.6	0.1	15.4	14.4	3.21
T5	BCA	ES2526855001	28-Aug-25	315	<0.004	0.89	1.2	2.1	0.22	2.77	2.64	2.34
WML113C	BCA	ES2526262001	25-Aug-25	192	<0.004	1.02	<0.5	1	0.36	8.64	8.32	1.93
WML115B	CMOB	ES2526126002	22-Aug-25	-	-	-	-	-	-	21.4	19.2	5.62
WML115C	BCA	ES2526126003	22-Aug-25	-	-	-	-	-	-	2.19	2.15	-
WML119	Coal	ES2526855014	29-Aug-25	261	<0.004	0.18	3.9	4.1	0.48	1.1	1.23	5.59
WML120A	Coal	ES2526855005	28-Aug-25	36	<0.004	0.08	0.3	0.4	0.09	8.82	8.16	3.89
WML120B	GCA	ES2526855006	28-Aug-25	218	<0.004	0.49	0.8	1.3	0.36	7.59	6.99	4.12
WML129	GCA	ES2526855016	29-Aug-25	41.3	<0.004	<0.01	0.4	0.4	0.12	3.86	3.72	1.74
WML181	Coal	ES2526855015	29-Aug-25	9.3	<0.004	<0.01	1.5	1.5	0.03	29	26.8	3.84
WML183	Coal	ES2526855007	28-Aug-25	67.8	<0.004	0.02	1.1	1.1	0.03	41.7	38.7	3.7
WML239	GCA	ES2525820007	20-Aug-25	94.6	<0.004	0.58	0.5	1.1	0.12	5.4	5.64	2.2
WML261	Coal	ES2526855003	28-Aug-25	6.9	<0.004	<0.01	0.5	0.5	0.02	18.3	16.8	4.28
WML262	Coal	ES2526855013	29-Aug-25	5.7	<0.004	<0.01	1.4	1.4	0.17	27.6	25	4.84
WMLP277	HRA	ES2526559004	26-Aug-25	24.9	<0.004	0.38	0.2	0.6	0.21	7.62	7.6	0.16
WMLP278	HRA	ES2526262004	25-Aug-25	50.5	<0.004	0.25	0.2	0.4	0.19	4.04	3.83	2.66
WMLP279	HRA	ES2526559005	26-Aug-25	46.3	<0.004	0.27	0.3	0.6	0.28	4.89	4.79	1.01
WMLP280	HRA	ES2526262003	25-Aug-25	22.7	<0.004	0.37	0.1	0.5	0.22	9.47	8.59	4.84

Bore ID	Geology	Laboratory ID	Date	Turbidity	Total Cyanide	Nitrite + Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Total Phosphorous as P	Total Anions	Total Cations	Ionic Balance
Units				**NTU**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**meq/L**	**meq/L**	**%**
Limit of Reporting (LOR)				**0.1**	**0.004**	**0.01**	**0.1**	**0.1**	**0.01**	**0.01**	**0.01**	**0.01**
ANZECC livestock limits				**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
WMLP301	Coal	ES2526855012	29-Aug-25	16.8	<0.004	<0.01	1	1	0.06	30.8	26.5	7.45
WMLP302	Coal	ES2526855004	28-Aug-25	55.8	<0.004	<0.01	4.4	4.4	0.31	62	60.4	1.31
WMLP308	BCA	ES2526559014	27-Aug-25	47.6	<0.004	0.35	<0.5	<0.5	0.06	7.06	6.94	0.81
WMLP311	BCA	ES2526262005	25-Aug-25	26.3	<0.004	1.62	0.3	1.9	0.05	10	9.58	2.43
WMLP320	BCA	ES2526855009	29-Aug-25	80.4	<0.004	1.61	0.6	2.2	0.15	9.6	8.62	5.34
WMLP323	BCA	ES2526559013	27-Aug-25	200	<0.004	0.49	<2.0	<2.0	0.26	5	5.03	0.28
WMLP324	CMOB	ES2526559012	27-Aug-25	55.4	<0.004	0.23	0.6	0.8	0.12	6.12	5.73	3.3
WMLP325	CMOB	ES2526262006	25-Aug-25	84.8	<0.004	<0.01	0.5	0.5	0.17	11.9	11.3	2.58
WMLP326	BCA	ES2526559006	26-Aug-25	-	-	-	-	-	-	8.06	7.69	2.34
WMLP327	CMOB	ES2526559007	26-Aug-25	-	-	-	-	-	-	12.3	11.3	4.25
WMLP328	BCA	ES2526855011	29-Aug-25	235	<0.004	0.38	0.7	1.1	0.18	7.2	6.78	2.96
WMLP336	HRA + CMOB	ES2526559001	26-Aug-25	16.4	<0.004	5.14	1	6.1	0.18	6.83	7.17	2.48
WMLP337	HRA	ES2526559003	26-Aug-25	44.7	<0.004	0.05	0.4	0.4	0.11	36.9	35.8	1.55
WMLP338	HRA	ES2526559002	26-Aug-25	56.7	<0.004	0.46	0.3	0.8	0.1	26.3	25.4	1.74
WMLP343	GCA	ES2525820005	20-Aug-25	24.3	<0.004	0.06	7.1	7.2	0.96	7.4	7.23	1.15
WMLP346	GCA	ES2525820006	20-Aug-25	16.3	<0.004	0.03	0.2	0.2	0.05	6.58	6.4	1.36
WMLP349	GCA	ES2525820004	20-Aug-25	21.5	<0.004	0.63	0.3	0.9	0.08	4.19	4.58	4.42
WMLP358	GCA	ES2526126001	22-Aug-25	4.6	<0.004	0.78	0.2	1	0.07	4.4	4.21	2.24
YAP016	BCA	ES2525820001	20-Aug-25	32	<0.004	0.95	0.6	1.6	0.06	17.4	15.9	4.44

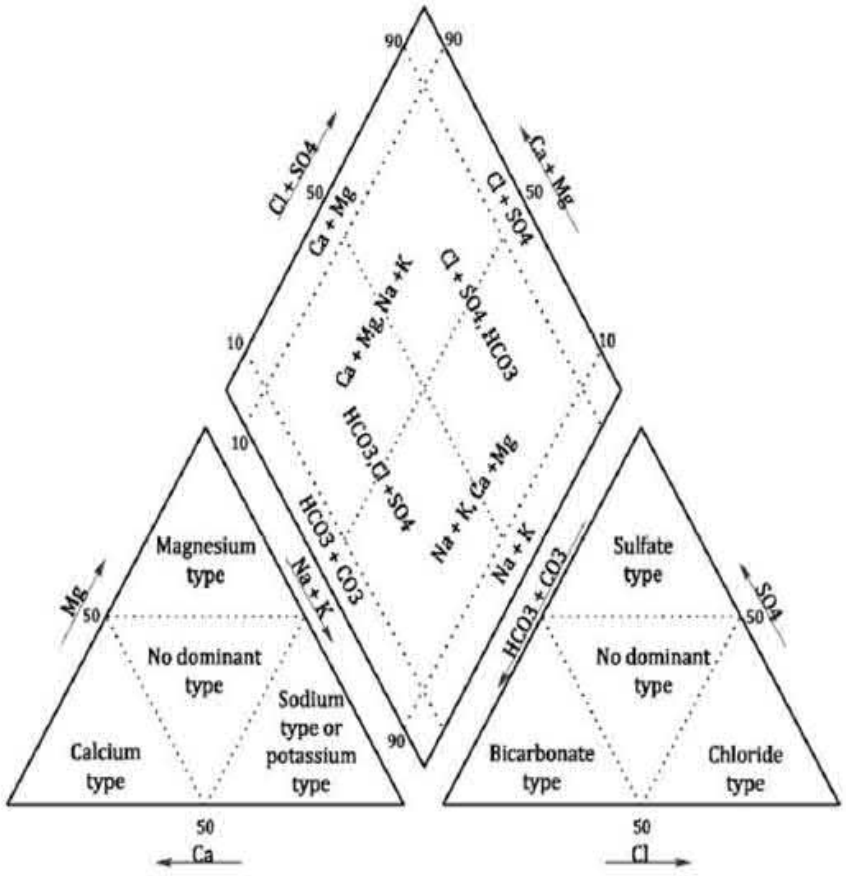
Appendix E

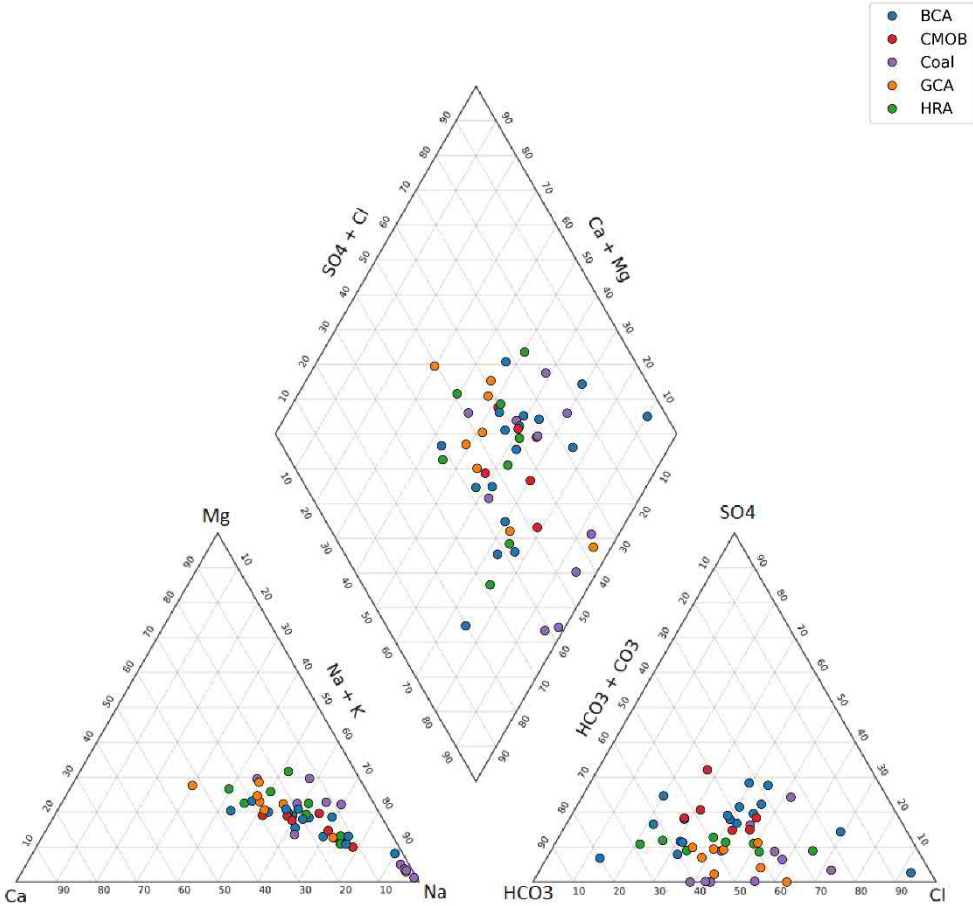
Groundwater chemistry – aquifer speciation

Table E1 Ashton August 2025 key monitoring bore water types

Station ID	Geology	Water Type	General Water Type
WMLP358	GCA	Ca-Na-Mg-HCO3-Cl	
WMLP325	CMOB	Na-Ca-Cl-HCO3	
WML113C	BCA	Na-Ca-Cl-HCO3-SO4	
WML120A	Coal	Na-Ca-HCO3-Cl	
WML239	GCA	Na-Ca-Mg-Cl-HCO3	
WMLP343	GCA	Na-Ca-Mg-Cl-HCO3	
WMLP279	HRA	Na-Ca-Mg-HCO3-Cl	
WMLP336	HRA	Na-Ca-Mg-HCO3-Cl	
T5	BCA	Na-Ca-Mg-SO4-Cl-HCO3	
WMLP320	BCA	Na-Ca-Mg-SO4-Cl-HCO3	
T2P	CMOB	Na-Ca-Mg-SO4-Cl-HCO3	
PB1	BCA	Na-Cl-HCO3	
RA18	BCA	Na-Cl-HCO3	
RM01	BCA	Na-Cl-HCO3	Na-Ca
T2A	BCA	Na-Cl-HCO3	
T3A	BCA	Na-Cl-HCO3	
WML115C	BCA	Na-Cl-HCO3	
WMLP308	BCA	Na-Cl-HCO3	
WMLP328	BCA	Na-Cl-HCO3	
T3P	CMOB	Na-Cl-HCO3	
WMLP327	CMOB	Na-Cl-HCO3	
WML181	Coal	Na-Cl-HCO3	
WML183	Coal	Na-Cl-HCO3	
RA27	HRA	Na-Cl-HCO3	
YAP016	BCA	Na-Cl-SO4-HCO3	
WMLP311	BCA	Na-HCO3-Cl	
WMLP323	BCA	Na-HCO3-Cl	
WMLP326	BCA	Na-HCO3-Cl	
WML115B	CMOB	Na-HCO3-Cl	
WML262	Coal	Na-HCO3-Cl	
WMLP301	Coal	Na-HCO3-Cl	
WML129	GCA	Na-HCO3-Cl	
WMLP349	GCA	Na-HCO3-Cl	

Station ID	Geology	Water Type	General Water Type
WMLP280	HRA	Na-HCO3-Cl	
RM10	BCA	Na-HCO3-SO4	
WML120B	GCA	Na-Mg-Ca-Cl-HCO3	Na-Mg
GM3A	Coal	Na-Mg-Cl-HCO3	
RSGM1	Coal	Na-Mg-Cl-HCO3	
WML119	Coal	Na-Mg-Cl-HCO3	
WML261	Coal	Na-Mg-Cl-HCO3	
WMLP302	Coal	Na-Mg-Cl-HCO3	
WMLP346	GCA	Na-Mg-Cl-HCO3	
WMLP277	HRA	Na-Mg-Cl-HCO3	
WMLP337	HRA	Na-Mg-Cl-HCO3	
WMLP338	HRA	Na-Mg-Cl-HCO3	
GM1	Coal	Na-Mg-Cl-HCO3-SO4	
Ashton Well	BCA	Na-Mg-HCO3	
WMLP324	Coal	Na-Mg-HCO3-Cl	
WMLP278	HRA	Na-Mg-HCO3-Cl	


Cl + SO4
Ca + Mg
Ca + Mg, Na + K
Cl + SO4, HCO3
HCO3, Cl + SO4
Na + K, Ca + Mg
Na + K
HCO3 + CO3
Magnesium type
No dominant type
Calcium type
Sodium type or potassium type
Sulfate type
No dominant type
Bicarbonate type
Chloride type
Mg
SO4
Ca
Cl


BCA
CMOB
Coal
GCA
HRA
SO4 + Cl
Ca + Mg
Mg
Na + K
Ca
Na
SO4
HCO3 + CO3
HCO3
Cl

Appendix F

Laboratory certificate of analysis and chain of custody documents (August 2025)

CERTIFICATE OF ANALYSIS

Work Order	: **ES2525820**	Page	: 1 of 6
Client	: **AUSTRALASIAN GROUNDWATER AND ENVIRONMENTAL CONSULTANTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: BYRCE MCKAY	Contact	: Customer Services ES
Address	: 4 HUDSON STREET HAMILTON NSW 2303	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Ashton Coal Mine GW Sampling	Date Samples Received	: 21-Aug-2025 08:05
Order number	: ASH5027	Date Analysis Commenced	: 22-Aug-2025
C-O-C number	: ----	Issue Date	: 27-Aug-2025 18:08
Sampler	: Danjel Djukic		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 7		
No. of samples analysed	: 7		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EK041G: LOR raised for sulfate due to sample matrix.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	YAP016	GM1	GM3A	WMLP349	WMLP343
			Sampling date / time	20-Aug-2025 08:20	20-Aug-2025 09:25	20-Aug-2025 11:25	20-Aug-2025 12:07	20-Aug-2025 13:16
Compound	CAS Number	LOR	Unit	ES2525820-001	ES2525820-002	ES2525820-003	ES2525820-004	ES2525820-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.12**	**7.36**	**7.85**	**6.86**	**7.32**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1480**	**1900**	**5990**	**429**	**711**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**855**	**1110**	**----**	**264**	**380**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**32.0**	**49.0**	**----**	**21.5**	**24.3**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**245**	**273**	**1200**	**117**	**201**
Total Alkalinity as CaCO3	----	1	mg/L	**245**	**273**	**1200**	**117**	**201**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**232**	**264**	<10	**20**	**8**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**272**	**411**	**1420**	**51**	**114**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**36**	**76**	**26**	**14**	**41**
Magnesium	7439-95-4	1	mg/L	**25**	**53**	**22**	**7**	**20**
Sodium	7440-23-5	1	mg/L	**275**	**262**	**1360**	**76**	**79**
Potassium	7440-09-7	1	mg/L	**4**	**4**	**5**	<1	**4**
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.002**	**----**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	**----**	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	**0.003**	<0.001	**----**	<0.001	**0.001**
Copper	7440-50-8	0.001	mg/L	**0.001**	<0.001	**----**	**0.003**	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.001**	<0.001	**----**	**0.001**	**0.004**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	YAP016	GM1	GM3A	WMLP349	WMLP343
				Sampling date / time	20-Aug-2025 08:20	20-Aug-2025 09:25	20-Aug-2025 11:25	20-Aug-2025 12:07	20-Aug-2025 13:16
Compound	CAS Number	LOR	Unit		ES2525820-001	ES2525820-002	ES2525820-003	ES2525820-004	ES2525820-005
					Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		**0.001**	<0.001	----	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.266**	**0.022**	----	**0.140**	**0.061**
Manganese	7439-96-5	0.001	mg/L		**0.044**	**0.414**	----	**0.016**	**0.671**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		**1.14**	**1.94**	----	**0.44**	**2.82**
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	----	<0.004	<0.004
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	<0.01	**0.01**
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.95**	<0.01	----	**0.63**	**0.05**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.95**	<0.01	----	**0.63**	**0.06**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.6**	**0.6**	----	**0.3**	**7.1**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.6**	**0.6**	----	**0.9**	**7.2**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.06**	**0.07**	----	**0.08**	**0.96**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**17.4**	**22.5**	**64.0**	**4.19**	**7.40**
ø Total Cations	----	0.01	meq/L		**15.9**	**19.6**	**62.4**	**4.58**	**7.23**
ø Ionic Balance	----	0.01	%		**4.44**	**6.85**	**1.30**	**4.42**	**1.15**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP346	WMLP239	----	----	----
				Sampling date / time	20-Aug-2025 13:50	20-Aug-2025 14:50	----	----	----
Compound	CAS Number	LOR	Unit		ES2525820-006	ES2525820-007	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.90**	**7.02**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**631**	**556**	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**348**	**336**	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**16.3**	**94.6**	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**138**	**131**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**138**	**131**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**13**	**24**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**126**	**81**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**36**	**32**	----	----	----
Magnesium	7439-95-4	1	mg/L		**19**	**14**	----	----	----
Sodium	7440-23-5	1	mg/L		**70**	**66**	----	----	----
Potassium	7440-09-7	1	mg/L		<1	**1**	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.004**	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	**0.003**	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.002**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP346	WMLP239	----	----	----
				Sampling date / time	20-Aug-2025 13:50	20-Aug-2025 14:50	----	----	----
Compound	CAS Number	LOR	Unit		ES2525820-006	ES2525820-007	--------	--------	--------
					Result	Result	----	----	----
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	**0.002**	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.086**	**0.078**	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.108**	**0.028**	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.48**	**3.98**	----	----	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.03**	**0.58**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.03**	**0.58**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**0.5**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**0.2**	**1.1**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.05**	**0.12**	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**6.58**	**5.40**	----	----	----
ø **Total Cations**	----	0.01	meq/L		**6.40**	**5.64**	----	----	----
ø **Ionic Balance**	----	0.01	%		**1.36**	**2.20**	----	----	----

client

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
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WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: AGE Consultants	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT **(List due date):**	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: Newcastle		☐ Non Standard or urgent TAT **(List due date):**	Custody Seal Intact? Yes / No / N/A
PROJECT: Ashton Coal Mine GW Sampling	**ALS QUOTE NO.:** EN/222/21		Free ice / frozen ice bricks present upon receipt? Yes / No / N/A
PROJECT ID: ASH5027		**COC SEQUENCE NUMBER (Circle)**	Random Sample Temperature on Receipt: 2.5 °C
PROJECT MANAGER: Bryce McKay	**CONTACT PH:** 0414 324 504	COC: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Danijel Djukic	**SAMPLER MOBILE:** 0423 266 442	OF: 1 2 3 4 5 6 7	
COC Emailed to ALS? YES	**EDD FORMAT (or default):** XTAB, ENMRG, ESDAT, PDF, MonPro		
Email Reports to: Danijel@ageconsultants.com.au, MonitorProData@yancoal.com.au, Brycem@ageconsultants.com.au			
Email Invoice to: As above + accounts@ageconsultants.com.au			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
	SC	SA	L.D
DATE/TIME:	DATE/TIME: 21/8/25 1920	DATE/TIME: 21/8 1700	DATE/TIME: 21.8.25 8:05

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED Including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS	pH & EC	NT-1 & NT-2	W-1 (7 metals)	EG020 - Fe, Mn, Se	EA015H - TDS	EA045 - turdidity	NT-11 - Total P, Total N	EK058G - NO3	ED035 - HCO3	EK02SF	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	YAP016	20/08/2025 8:20	W	P	4	X	X	X	X	X	X	X	X	X	X	
2	GM1	20/08/2025 9:25	W	P	4	X	X	X	X	X	X	X	X	X	X	
3	GM3A	20/08/2025 11:25	W	P	1	X	X									
4	WMLP349	20/08/2025 12:07	W	P	4	X	X	X	X	X	X	X	X	X	X	
5	WMLP343	20/08/2025 13:16	W	P	4	X	X	X	X	X	X	X	X	X	X	
6	WMLP346	20/08/2025 13:50	W	P	4	X	X	X	X	X	X	X	X	X	X	
7	WML239	20/08/2025 14:50	W	P	4	X	X	X	X	X	X	X	X	X	X	
8			W	P		X	X	X	X	X	X	X	X	X	X	
9			W	P		X	X	X	X	X	X	X	X	X	X	
10			W	P		X	X	X	X	X	X	X	X	X	X	
11			W	P		X	X	X	X	X	X	X	X	X	X	
12			W	P		X	X	X	X	X	X	X	X	X	X	
				TOTAL	25											

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Division Sydney
Work Order Reference
ES2525820

Telephone : +61-2-8784 8555

E-MAILED

LAB OF ORIGIN: NEWCASTLE

CERTIFICATE OF ANALYSIS

Work Order	: **ES2526126**	Page	: 1 of 5
Client	: **AUSTRALASIAN GROUNDWATER AND ENVIRONMENTAL CONSULTANTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: BYRCE MCKAY	Contact	: Customer Services ES
Address	: 4 HUDSON STREET HAMILTON NSW 2303	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: ASH5027 Ashton Coal Mine GW Sampling	Date Samples Received	: 22-Aug-2025 16:44
Order number	: ----	Date Analysis Commenced	: 22-Aug-2025
C-O-C number	: ----	Issue Date	: 28-Aug-2025 17:34
Sampler	: Danijel Djukic		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Gregory Towers	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WMLP358	WML115B	WML115C	Ashton Well	RM10
			Sampling date / time	22-Aug-2025 08:15	22-Aug-2025 12:05	22-Aug-2025 12:20	22-Aug-2025 12:58	22-Aug-2025 13:40
Compound	CAS Number	LOR	Unit	ES2526126-001	ES2526126-002	ES2526126-003	ES2526126-004	ES2526126-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.70	7.06	7.02	7.20	7.76
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	424	1870	213	402	326
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	293	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	4.6	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	112	519	59	127	147
Total Alkalinity as CaCO3	----	1	mg/L	112	519	59	127	147
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	20	213	19	16	12
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	62	235	22	47	17
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	36	45	10	30	9
Magnesium	7439-95-4	1	mg/L	14	23	4	10	5
Sodium	7440-23-5	1	mg/L	29	344	28	38	55
Potassium	7440-09-7	1	mg/L	<1	2	4	4	6
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP358	WML115B	WML115C	Ashton Well	RM10
				Sampling date / time	22-Aug-2025 08:15	22-Aug-2025 12:05	22-Aug-2025 12:20	22-Aug-2025 12:58	22-Aug-2025 13:40
Compound	CAS Number	LOR	Unit		ES2526126-001	ES2526126-002	ES2526126-003	ES2526126-004	ES2526126-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.050**	----	----	----	----
EG020T: Total Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L		**0.007**	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.17**	----	----	----	----
EK025SF: Free CN by Segmented Flow Analyser									
Free Cyanide	----	0.004	mg/L		<0.004	----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.78**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.78**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.0**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.07**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**4.40**	**21.4**	**2.19**	**4.20**	**3.67**
ø Total Cations	----	0.01	meq/L		**4.21**	**19.2**	**2.15**	**4.08**	**3.41**
ø Ionic Balance	----	0.01	%		**2.24**	**5.62**	----	**1.46**	**3.68**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	PB01	----	----	----	----
				Sampling date / time	22-Aug-2025 14:05	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2526126-006	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.06	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		260	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		75	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		75	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		32	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		9	----	----	----	----
Magnesium	7439-95-4	1	mg/L		4	----	----	----	----
Sodium	7440-23-5	1	mg/L		41	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		2.70	----	----	----	----
ø Total Cations	----	0.01	meq/L		2.56	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(WATER) EA005P: pH by PC Titrator

(WATER) EA010P: Conductivity by PC Titrator

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5630 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Weber Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee mail@alsglobal.com
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SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: AGE Consultants	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: Newcastle		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: Ashton Coal Mine GW Sampling	**ALS QUOTE NO.:** EN/222/21	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes No N/A
PROJECT ID: ASH5027		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 4.0 °C
PROJECT MANAGER: Bryce McKay	**CONTACT PH:** 0414 324 504	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Danijel Djukic	**SAMPLER MOBILE:** 0423 266 442	**RELINQUISHED BY:**	**RECEIVED BY:** Cassie
COC Emailed to ALS? YES	**EDD FORMAT (or default):** XTAB, ENMRG, ESDAT, PDF, MonPro	DATE/TIME:	DATE/TIME: 22/08 1649
Email Reports to: Danijel@ageconsultants.com.au, MonitorProData@yancoal.com.au, Brycem@ageconsultants.com.au			**RELINQUISHED BY:** IR DATE/TIME: 22-8-25 1700
Email Invoice to: As above + accounts@ageconsultants.com.au			**RECEIVED BY:** C.C DATE/TIME: 22/8 19:30

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: PH/EC ONLY

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	pH & EC	NT-1 & NT-2	W-1 (7 metals)	EG020 - Fe, Mn, Se	EA015H - TDS	EA045 - turdidity	NT-11 - Total P, Total N	EK058G - NO3	ED035 - HCO3	EK02SF	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	WMLP358	22/08/2025 8:15	W	P	4	X	X	X	X	X	X	X	X	X	X	LAB OF ORIGIN: NEWCASTLE
2	WML115B	22/08/2025 12:05	W	P	1	X	X									
3	WML115C	22/08/2025 12:20	W	P	1	X	X									E-MAILED
4	Ashton Well	22/08/2025 12:58	W	P	1	X	X									
5	RM10	22/08/2025 13:40	W	P	1	X	X									
6	PB01	22/08/2025 14:05	W	P	1	X	X									
7			W	P		X	X	X	X	X	X	X	X	X	X	
8			W	P		X	X	X	X	X	X	X	X	X	X	
9			W	P		X	X	X	X	X	X	X	X	X	X	
10			W	P		X	X	X	X	X	X	X	X	X	X	
11			W	P		X	X	X	X	X	X	X	X	X	X	
12			W	P		X	X	X	X	X	X	X	X	X	X	
				TOTAL	9											

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formalc
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Division Sydney
Work Order Reference
ES2526126

Telephone : +61-2-8784 8555

CERTIFICATE OF ANALYSIS

Work Order	: **ES2526262**	Page	: 1 of 6
Client	: **AUSTRALASIAN GROUNDWATER AND ENVIRONMENTAL CONSULTANTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: BYRCE MCKAY	Contact	: Customer Services ES
Address	: 4 HUDSON STREET HAMILTON NSW 2303	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: ASH5027 Ashton Coal Mine GW Sampling	Date Samples Received	: 25-Aug-2025 17:00
Order number	: ----	Date Analysis Commenced	: 25-Aug-2025
C-O-C number	: ----	Issue Date	: 28-Aug-2025 18:11
Sampler	: Danijel Djukic		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Gregory Towers	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Zoran Grozdanovski	Team Leader - Chemistry	Newcastle - Inorganics, Mayfield West, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EK061G: LOR raised for TKN due to sample matrix.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WML113C	RA27	WMLP280	WMLP278	WMLP311
			Sampling date / time	25-Aug-2025 08:06	25-Aug-2025 08:50	25-Aug-2025 10:20	25-Aug-2025 10:55	25-Aug-2025 13:20
Compound	CAS Number	LOR	Unit	ES2526262-001	ES2526262-002	ES2526262-003	ES2526262-004	ES2526262-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.01	7.09	7.06	7.22	6.88
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	816	1540	892	379	941
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	491	890	499	240	542
EA045: Turbidity								
Turbidity	----	0.1	NTU	192	480	22.7	50.5	26.3
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	179	341	222	138	193
Total Alkalinity as CaCO3	----	1	mg/L	179	341	222	138	193
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	70	90	52	21	104
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	128	294	140	30	143
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	46	50	32	11	38
Magnesium	7439-95-4	1	mg/L	20	41	20	5	24
Sodium	7440-23-5	1	mg/L	100	214	123	66	130
Potassium	7440-09-7	1	mg/L	1	<1	<1	<1	2
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WML113C	RA27	WMLP280	WMLP278	WMLP311
				Sampling date / time	25-Aug-2025 08:06	25-Aug-2025 08:50	25-Aug-2025 10:20	25-Aug-2025 10:55	25-Aug-2025 13:20
Compound	CAS Number	LOR	Unit		ES2526262-001	ES2526262-002	ES2526262-003	ES2526262-004	ES2526262-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.114**	<0.005	<0.005	**0.008**	**0.032**
Manganese	7439-96-5	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	<0.004	<0.004	<0.004
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**1.02**	**1.57**	**0.37**	**0.25**	**1.62**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**1.02**	**1.57**	**0.37**	**0.25**	**1.62**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.5	<1.0	**0.1**	**0.2**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.0**	**1.6**	**0.5**	**0.4**	**1.9**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.36**	**1.40**	**0.22**	**0.19**	**0.05**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**8.64**	**17.0**	**9.47**	**4.04**	**10.0**
ø Total Cations	----	0.01	meq/L		**8.32**	**15.2**	**8.59**	**3.83**	**9.58**
ø Ionic Balance	----	0.01	%		**1.93**	**5.60**	**4.84**	**2.66**	**2.43**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP325	----	----	----	----
				Sampling date / time	25-Aug-2025 14:28	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2526262-006	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.47**	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**1110**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**632**	----	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**84.8**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**233**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**233**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**86**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**194**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**52**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**24**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**154**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**2**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP325	----	----	----	----
				Sampling date / time	25-Aug-2025 14:28	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2526262-006	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.322**	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.27**	----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.5**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**0.5**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.17**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**11.9**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**11.3**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**2.58**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(WATER) EA005P: pH by PC Titrator

(WATER) EA010P: Conductivity by PC Titrator

CERTIFICATE OF ANALYSIS

Work Order	: **ES2526559**	Page	: 1 of 11
Client	: **AUSTRALASIAN GROUNDWATER AND ENVIRONMENTAL CONSULTANTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: BRYCE McKAY	Contact	: Customer Services ES
Address	: 4 HUDSON STREET HAMILTON NSW 2303	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4926 2091	Telephone	: +61-2-8784 8555
Project	: Ashton Coal Mine GW Sampling	Date Samples Received	: 27-Aug-2025 16:35
Order number	: ASH5027	Date Analysis Commenced	: 27-Aug-2025
C-O-C number	: ----	Issue Date	: 02-Sep-2025 18:09
Sampler	: Danijel Djukic		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 14		
No. of samples analysed	: 14		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
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General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EG020: It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.
- EK061G: LOR raised for TKN due to sample matrix.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WMLP336	WMLP338	WMLP337	WMLP277	WMLP279
			Sampling date / time	26-Aug-2025 09:10	26-Aug-2025 09:55	26-Aug-2025 10:40	26-Aug-2025 11:40	26-Aug-2025 12:23
Compound	CAS Number	LOR	Unit	ES2526559-001	ES2526559-002	ES2526559-003	ES2526559-004	ES2526559-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.62**	**6.82**	**7.17**	**7.28**	**7.06**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**695**	**2430**	**3210**	**723**	**468**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**424**	**1500**	**1840**	**420**	**310**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**16.4**	**56.7**	**44.7**	**24.9**	**46.3**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**168**	**349**	**737**	**220**	**152**
Total Alkalinity as CaCO3	----	1	mg/L	**168**	**349**	**737**	**220**	**152**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**42**	**113**	**154**	**33**	**28**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**92**	**602**	**672**	**90**	**45**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**49**	**123**	**121**	**20**	**31**
Magnesium	7439-95-4	1	mg/L	**23**	**79**	**136**	**12**	**13**
Sodium	7440-23-5	1	mg/L	**64**	**293**	**423**	**129**	**50**
Potassium	7440-09-7	1	mg/L	**2**	**1**	**5**	<1	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.001**	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	**0.0001**	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	**0.003**	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.001**	**0.004**	**0.004**	**0.001**	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP336	WMLP338	WMLP337	WMLP277	WMLP279
				Sampling date / time	26-Aug-2025 09:10	26-Aug-2025 09:55	26-Aug-2025 10:40	26-Aug-2025 11:40	26-Aug-2025 12:23
Compound	CAS Number	LOR	Unit		ES2526559-001	ES2526559-002	ES2526559-003	ES2526559-004	ES2526559-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.072**	**0.034**	**0.042**	**0.016**	**0.011**
Manganese	7439-96-5	0.001	mg/L		**0.004**	**0.478**	**0.292**	**0.004**	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		<0.05	**1.20**	**0.36**	<0.05	<0.05
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.003**	<0.001	<0.001	**0.001**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.002**	**0.003**	**0.006**	**0.003**
Copper	7440-50-8	0.001	mg/L		**0.001**	**0.002**	**0.009**	**0.012**	**0.003**
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.005**	**0.006**	**0.005**	**0.004**
Lead	7439-92-1	0.001	mg/L		<0.001	**0.002**	**0.003**	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.108**	**0.062**	**0.084**	**0.037**	**0.023**
Manganese	7439-96-5	0.001	mg/L		**0.013**	**0.482**	**0.308**	**0.045**	**0.107**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		**0.59**	**4.32**	**2.33**	**1.31**	**4.40**
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	<0.004	<0.004	<0.004
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	**0.02**	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**5.14**	**0.44**	**0.05**	**0.38**	**0.27**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**5.14**	**0.46**	**0.05**	**0.38**	**0.27**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.0**	**0.3**	**0.4**	**0.2**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP336	WMLP338	WMLP337	WMLP277	WMLP279
				Sampling date / time	26-Aug-2025 09:10	26-Aug-2025 09:55	26-Aug-2025 10:40	26-Aug-2025 11:40	26-Aug-2025 12:23
Compound	CAS Number	LOR	Unit		ES2526559-001	ES2526559-002	ES2526559-003	ES2526559-004	ES2526559-005
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		**6.1**	**0.8**	**0.4**	**0.6**	**0.6**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.18**	**0.10**	**0.11**	**0.21**	**0.28**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**6.83**	**26.3**	**36.9**	**7.62**	**4.89**
ø Total Cations	----	0.01	meq/L		**7.17**	**25.4**	**35.8**	**7.60**	**4.79**
ø Ionic Balance	----	0.01	%		**2.48**	**1.74**	**1.55**	**0.16**	**1.01**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP326	WMLP327	T3-A	T3-P	T2-A
				Sampling date / time	26-Aug-2025 13:27	26-Aug-2025 14:05	26-Aug-2025 14:50	27-Aug-2025 08:13	27-Aug-2025 09:35
Compound	CAS Number	LOR	Unit		ES2526559-006	ES2526559-007	ES2526559-008	ES2526559-009	ES2526559-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.32	7.18	6.99	7.20	7.18
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		769	1120	2410	1390	978
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		----	----	1600	807	557
EA045: Turbidity									
Turbidity	----	0.1	NTU		----	----	77.7	41.4	10.7
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		232	268	218	275	190
Total Alkalinity as CaCO3	----	1	mg/L		232	268	218	275	190
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		44	88	180	136	100
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		89	182	631	250	167
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		20	35	61	44	45
Magnesium	7439-95-4	1	mg/L		10	20	54	34	23
Sodium	7440-23-5	1	mg/L		135	181	384	215	137
Potassium	7440-09-7	1	mg/L		<1	2	<1	3	1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		----	----	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		----	----	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		----	----	<0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP326	WMLP327	T3-A	T3-P	T2-A
				Sampling date / time	26-Aug-2025 13:27	26-Aug-2025 14:05	26-Aug-2025 14:50	27-Aug-2025 08:13	27-Aug-2025 09:35
Compound	CAS Number	LOR	Unit		ES2526559-006	ES2526559-007	ES2526559-008	ES2526559-009	ES2526559-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		----	----	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		----	----	**0.009**	<0.005	**0.025**
Manganese	7439-96-5	0.001	mg/L		----	----	**0.001**	**0.145**	<0.001
Selenium	7782-49-2	0.01	mg/L		----	----	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		----	----	<0.05	**3.45**	<0.05
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		----	----	**0.002**	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		----	----	**0.004**	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		----	----	**0.003**	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		----	----	**0.003**	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		----	----	**0.002**	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		----	----	**0.022**	**0.008**	**0.047**
Manganese	7439-96-5	0.001	mg/L		----	----	**0.041**	**0.146**	**0.006**
Selenium	7782-49-2	0.01	mg/L		----	----	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		----	----	**4.10**	**3.52**	**0.51**
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		----	----	<0.004	<0.004	<0.004
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		----	----	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		----	----	**0.86**	**0.03**	**1.12**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		----	----	**0.86**	**0.03**	**1.12**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	----	**0.3**	**0.6**	**0.4**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP326	WMLP327	T3-A	T3-P	T2-A
				Sampling date / time	26-Aug-2025 13:27	26-Aug-2025 14:05	26-Aug-2025 14:50	27-Aug-2025 08:13	27-Aug-2025 09:35
Compound	CAS Number	LOR	Unit		ES2526559-006	ES2526559-007	ES2526559-008	ES2526559-009	ES2526559-010
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		**----**	**----**	**1.2**	**0.6**	**1.5**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**----**	**----**	**0.13**	**0.10**	**0.04**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**8.06**	**12.3**	**25.9**	**15.4**	**10.6**
ø Total Cations	----	0.01	meq/L		**7.69**	**11.3**	**24.2**	**14.4**	**10.1**
ø Ionic Balance	----	0.01	%		**2.34**	**4.25**	**3.42**	**3.21**	**2.25**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	T2-P	WMLP324	WMLP323	WMLP308	----
			Sampling date / time	27-Aug-2025 10:20	27-Aug-2025 11:20	27-Aug-2025 11:57	27-Aug-2025 13:30	----
Compound	CAS Number	LOR	Unit	ES2526559-011	ES2526559-012	ES2526559-013	ES2526559-014	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.99**	**7.18**	**7.04**	**7.04**	**----**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**535**	**551**	**484**	**681**	**----**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**358**	**326**	**322**	**430**	**----**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**38.2**	**55.4**	**200**	**47.6**	**----**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	**----**
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	**----**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**118**	**164**	**145**	**150**	**----**
Total Alkalinity as CaCO3	----	1	mg/L	**118**	**164**	**145**	**150**	**----**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**89**	**54**	**28**	**61**	**----**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**55**	**61**	**54**	**99**	**----**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**31**	**27**	**23**	**28**	**----**
Magnesium	7439-95-4	1	mg/L	**12**	**13**	**12**	**15**	**----**
Sodium	7440-23-5	1	mg/L	**61**	**75**	**66**	**98**	**----**
Potassium	7440-09-7	1	mg/L	**2**	**2**	**1**	**2**	**----**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	**----**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	**----**
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	**----**
Copper	7440-50-8	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	**----**
Nickel	7440-02-0	0.001	mg/L	**0.010**	**0.001**	<0.001	<0.001	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	T2-P	WMLP324	WMLP323	WMLP308	----
				Sampling date / time	27-Aug-2025 10:20	27-Aug-2025 11:20	27-Aug-2025 11:57	27-Aug-2025 13:30	----
Compound	CAS Number	LOR	Unit		ES2526559-011	ES2526559-012	ES2526559-013	ES2526559-014	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		**0.055**	**0.015**	**0.007**	**0.007**	----
Manganese	7439-96-5	0.001	mg/L		**0.204**	**0.014**	**0.001**	**0.001**	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.007**	<0.001	**0.002**	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.004**	**0.006**	**0.002**	----
Copper	7440-50-8	0.001	mg/L		**0.003**	**0.003**	**0.006**	**0.001**	----
Nickel	7440-02-0	0.001	mg/L		**0.012**	**0.004**	**0.006**	**0.002**	----
Lead	7439-92-1	0.001	mg/L		**0.002**	**0.005**	**0.009**	**0.001**	----
Zinc	7440-66-6	0.005	mg/L		**0.101**	**0.042**	**0.038**	**0.019**	----
Manganese	7439-96-5	0.001	mg/L		**0.218**	**0.653**	**0.631**	**0.041**	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Iron	7439-89-6	0.05	mg/L		**3.08**	**3.46**	**7.59**	**2.14**	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	<0.004	<0.004	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.02**	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**1.54**	**0.23**	**0.49**	**0.35**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**1.56**	**0.23**	**0.49**	**0.35**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.6**	**0.6**	<2.0	<0.5	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	T2-P	WMLP324	WMLP323	WMLP308	----
				Sampling date / time	27-Aug-2025 10:20	27-Aug-2025 11:20	27-Aug-2025 11:57	27-Aug-2025 13:30	----
Compound	CAS Number	LOR	Unit		ES2526559-011	ES2526559-012	ES2526559-013	ES2526559-014	--------
					Result	Result	Result	Result	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ **Total Nitrogen as N**	----	0.1	mg/L		**4.2**	**0.8**	<2.0	<0.5	**----**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.51**	**0.12**	**0.26**	**0.06**	**----**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**5.76**	**6.12**	**5.00**	**7.06**	**----**
ø Total Cations	----	0.01	meq/L		**5.24**	**5.73**	**5.03**	**6.94**	**----**
ø Ionic Balance	----	0.01	%		**4.75**	**3.30**	**0.28**	**0.81**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(WATER) EA005P: pH by PC Titrator

(WATER) EA010P: Conductivity by PC Titrator

CD10

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE: 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE: 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE: 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5800 E: gladstone@alsglobal.com
MACKAY: 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE: 3-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE: 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
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WOLLONGONG: 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: AGE Consultants	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Newcastle		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes / No / (N/A)
PROJECT: Ashton Coal Mine GW Sampling	ALS QUOTE NO.: EN/222/21	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	Free ice / frozen ice bricks present upon receipt? (Yes) / No / N/A
PROJECT ID: ASH5027		OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 1.9 °C
PROJECT MANAGER: Bryce McKay	CONTACT PH: 0414 324 504		Other comment:
SAMPLER: Danijel Djukic	SAMPLER MOBILE: 0423 266 442	RELINQUISHED BY:	RECEIVED BY: SA
COC Emailed to ALS? YES	EDD FORMAT (or default): XTAB, ENMRG, ESDAT, PDF, MonPro	DATE/TIME:	DATE/TIME: 27/08 1630
Email Reports to: Danijel@ageconsultants.com.au, MonitorProData@yancoal.com.au, Brycem@ageconsultants.com.au		RELINQUISHED BY: SA	RECEIVED BY: SG SA AG
Email Invoice to: As above + accounts@ageconsultants.com.au		DATE/TIME: 27/08 1700	DATE/TIME: 27/8/25 1930

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	pH & EC	NT-1 & NT-2	W-1 (7 metals)	EG020 - Fe, Mn, Se	EA015H - TDS	EA045 - turdidity	NT-11 - Total P, Total N	EK058G - NO3	ED037 - HCO3	EK026	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	WMLP336	26/08/2025 9:10	W	P	5	X	X	X	X	X	X	X	X	X	X	
2	WMLP338	26/08/2025 9:55	W	P	5	X	X	X	X	X	X	X	X	X	X	
3	WMLP337	26/08/2025 10:40	W	P	5	X	X	X	X	X	X	X	X	X	X	
4	WMLP277	26/08/2025 11:40	W	P	5	X	X	X	X	X	X	X	X	X	X	
5	WMLP279	26/08/2025 12:23	W	P	5	X	X	X	X	X	X	X	X	X	X	
6	WMLP326	26/08/2025 13:27	W	P	1	X	X									
7	WMLP327	26/08/2025 14:05	W	P	1	X	X									
8	T3-A	26/08/2025 14:50	W	P	5	X	X	X	X	X	X	X	X	X	X	
9	T3-P	27/08/2025 8:13	W	P	10	X	X	X	X	X	X	X	X	X	X	
10	T2-A	27/08/2025 9:35	W	P	5	X	X	X	X	X	X	X	X	X	X	
11	T2-P	27/08/2025 10:20	W	P	5	X	X	X	X	X	X	X	X	X	X	
12	WMLP324	27/08/2025 11:20	W	P	5	X	X	X	X	X	X	X	X	X	X	
13	WMLP323	27/08/2025 11:57	W	P	5	X	X	X	X	X	X	X	X	X	X	
14	WMLP308	27/08/2025 13:30	W	P	5	X	X	X	X	X	X	X	X	X	X	
15			W	P		X	X	X	X	X	X	X	X	X	X	
16			W	P		X	X	X	X	X	X	X	X	X	X	
				TOTAL	67											

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Division Sydney
Work Order Reference
ES2526559

Telephone : +61-2-8784 8555

E-MAILED

LAB OF ORIGIN: NEWCASTLE

CERTIFICATE OF ANALYSIS

Work Order	: **ES2526855**	Page	: 1 of 14
Client	: **AUSTRALASIAN GROUNDWATER AND ENVIRONMENTAL CONSULTANTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: BYRCE MCKAY	Contact	: Customer Services ES
Address	: 4 HUDSON STREET HAMILTON NSW 2303	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Ashton Coal Mine GW Sampling	Date Samples Received	: 29-Aug-2025 16:50
Order number	: ASH5027	Date Analysis Commenced	: 29-Aug-2025
C-O-C number	: ----	Issue Date	: 05-Sep-2025 17:59
Sampler	: Danijel Djukic		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 16		
No. of samples analysed	: 16		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Gregory Towers	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- TDS by method EA-015 sample 1 and 2 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- TDS by method EA-015 sample 14 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	T5	RSGM1	WML261	WMLP302	WML120A
			Sampling date / time	28-Aug-2025 08:10	28-Aug-2025 09:15	28-Aug-2025 10:40	28-Aug-2025 11:45	28-Aug-2025 12:22
Compound	CAS Number	LOR	Unit	ES2526855-001	ES2526855-002	ES2526855-003	ES2526855-004	ES2526855-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.96	7.52	7.14	7.32	7.24
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	265	901	1710	6010	822
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	393	976	932	3640	492
EA045: Turbidity								
Turbidity	----	0.1	NTU	315	1450	6.9	55.8	36.0
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	86	167	323	767	217
Total Alkalinity as CaCO3	----	1	mg/L	86	167	323	767	217
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	22	39	57	101	38
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	21	181	377	1580	131
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	8	4	40	103	42
Magnesium	7439-95-4	1	mg/L	4	5	46	161	29
Sodium	7440-23-5	1	mg/L	44	176	251	961	84
Potassium	7440-09-7	1	mg/L	<1	2	3	8	1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.004	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.005	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	0.002	<0.001	0.002	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	T5	RSGM1	WML261	WMLP302	WML120A
				Sampling date / time	28-Aug-2025 08:10	28-Aug-2025 09:15	28-Aug-2025 10:40	28-Aug-2025 11:45	28-Aug-2025 12:22
Compound	CAS Number	LOR	Unit		ES2526855-001	ES2526855-002	ES2526855-003	ES2526855-004	ES2526855-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.035**	**0.010**	<0.005	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.002**	**0.036**	**0.056**	**0.163**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		**0.08**	**0.27**	**1.14**	<0.05	**0.91**
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.003**	**0.010**	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	**0.0002**	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.011**	**0.033**	<0.001	**0.004**	**0.002**
Copper	7440-50-8	0.001	mg/L		**0.011**	**0.028**	<0.001	**0.002**	<0.001
Nickel	7440-02-0	0.001	mg/L		**0.006**	**0.022**	<0.001	**0.004**	**0.001**
Lead	7439-92-1	0.001	mg/L		**0.007**	**0.022**	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.145**	**0.100**	**0.007**	**0.029**	<0.005
Manganese	7439-96-5	0.001	mg/L		**0.216**	**0.355**	**0.038**	**0.074**	**0.183**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		**16.7**	**44.2**	**1.28**	**2.86**	**3.84**
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	<0.004	<0.004	<0.004
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.89**	**0.27**	<0.01	<0.01	**0.08**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.89**	**0.27**	<0.01	<0.01	**0.08**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.2**	**3.0**	**0.5**	**4.4**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	T5	RSGM1	WML261	WMLP302	WML120A
				Sampling date / time	28-Aug-2025 08:10	28-Aug-2025 09:15	28-Aug-2025 10:40	28-Aug-2025 11:45	28-Aug-2025 12:22
Compound	CAS Number	LOR	Unit		ES2526855-001	ES2526855-002	ES2526855-003	ES2526855-004	ES2526855-005
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		**2.1**	**3.3**	**0.5**	**4.4**	**0.4**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.22**	**0.75**	**0.02**	**0.31**	**0.09**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**2.77**	**9.25**	**18.3**	**62.0**	**8.82**
ø Total Cations	----	0.01	meq/L		**2.64**	**8.32**	**16.8**	**60.4**	**8.16**
ø Ionic Balance	----	0.01	%		**2.34**	**5.33**	**4.28**	**1.31**	**3.89**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WML120B	WML183	RM01	WMLP320	RA18
			Sampling date / time	28-Aug-2025 12:50	28-Aug-2025 14:00	28-Aug-2025 14:30	29-Aug-2025 08:00	29-Aug-2025 08:40
Compound	CAS Number	LOR	Unit	ES2526855-006	ES2526855-007	ES2526855-008	ES2526855-009	ES2526855-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.80	7.17	6.52	6.91	7.00
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	727	3590	2570	895	997
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	464	2080	----	535	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	218	67.8	----	80.4	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	148	800	65	156	176
Total Alkalinity as CaCO3	----	1	mg/L	148	800	65	156	176
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	41	327	32	131	116
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	134	671	815	133	173
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	36	98	10	52	35
Magnesium	7439-95-4	1	mg/L	24	138	22	24	21
Sodium	7440-23-5	1	mg/L	74	513	460	92	138
Potassium	7440-09-7	1	mg/L	<1	7	7	2	1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	<0.001	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	<0.001	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	<0.001	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WML120B	WML183	RM01	WMLP320	RA18
				Sampling date / time	28-Aug-2025 12:50	28-Aug-2025 14:00	28-Aug-2025 14:30	29-Aug-2025 08:00	29-Aug-2025 08:40
Compound	CAS Number	LOR	Unit		ES2526855-006	ES2526855-007	ES2526855-008	ES2526855-009	ES2526855-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	<0.001	----
Zinc	7440-66-6	0.005	mg/L		**0.020**	**0.008**	----	**0.050**	----
Manganese	7439-96-5	0.001	mg/L		**0.039**	**0.198**	----	**0.002**	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	<0.01	----
Iron	7439-89-6	0.05	mg/L		<0.05	**0.22**	----	**0.14**	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.001**	<0.001	----	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		**0.005**	<0.001	----	<0.001	----
Copper	7440-50-8	0.001	mg/L		**0.007**	**0.001**	----	**0.002**	----
Nickel	7440-02-0	0.001	mg/L		**0.007**	<0.001	----	<0.001	----
Lead	7439-92-1	0.001	mg/L		**0.005**	<0.001	----	<0.001	----
Zinc	7440-66-6	0.005	mg/L		**0.074**	**0.018**	----	**0.080**	----
Manganese	7439-96-5	0.001	mg/L		**0.291**	**0.200**	----	**0.082**	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	<0.01	----
Iron	7439-89-6	0.05	mg/L		**5.92**	**0.41**	----	**0.76**	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	----	<0.004	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	**0.01**	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.49**	**0.02**	----	**1.60**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.49**	**0.02**	----	**1.61**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.8**	**1.1**	----	**0.6**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WML120B	WML183	RM01	WMLP320	RA18
				Sampling date / time	28-Aug-2025 12:50	28-Aug-2025 14:00	28-Aug-2025 14:30	29-Aug-2025 08:00	29-Aug-2025 08:40
Compound	CAS Number	LOR	Unit		ES2526855-006	ES2526855-007	ES2526855-008	ES2526855-009	ES2526855-010
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		**1.3**	**1.1**	**----**	**2.2**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.36**	**0.03**	**----**	**0.15**	**----**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**7.59**	**41.7**	**25.0**	**9.60**	**10.8**
ø Total Cations	----	0.01	meq/L		**6.99**	**38.7**	**22.5**	**8.62**	**9.50**
ø Ionic Balance	----	0.01	%		**4.12**	**3.70**	**5.18**	**5.34**	**6.44**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WMLP328	WMLP301	WML262	WML119	WML181
			Sampling date / time	29-Aug-2025 09:30	29-Aug-2025 10:55	29-Aug-2025 11:40	29-Aug-2025 12:30	29-Aug-2025 13:15
Compound	CAS Number	LOR	Unit	ES2526855-011	ES2526855-012	ES2526855-013	ES2526855-014	ES2526855-015
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.14**	**7.95**	**8.02**	**6.60**	**7.27**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**705**	**2750**	**2430**	**125**	**2670**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**519**	**1980**	**1460**	**346**	**1540**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**235**	**16.8**	**5.7**	**261**	**9.3**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	**19**	**32**	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**153**	**867**	**815**	**31**	**657**
Total Alkalinity as CaCO3	----	1	mg/L	**153**	**886**	**848**	**31**	**657**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**66**	**2**	<1	<1	**3**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**98**	**462**	**378**	**17**	**560**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**31**	**5**	**9**	**6**	**11**
Magnesium	7439-95-4	1	mg/L	**17**	**4**	**10**	**2**	**12**
Sodium	7440-23-5	1	mg/L	**87**	**595**	**545**	**17**	**580**
Potassium	7440-09-7	1	mg/L	**2**	**2**	**3**	**1**	**3**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	**0.002**	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	**0.002**	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP328	WMLP301	WML262	WML119	WML181
				Sampling date / time	29-Aug-2025 09:30	29-Aug-2025 10:55	29-Aug-2025 11:40	29-Aug-2025 12:30	29-Aug-2025 13:15
Compound	CAS Number	LOR	Unit		ES2526855-011	ES2526855-012	ES2526855-013	ES2526855-014	ES2526855-015
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.015**	<0.005	<0.005	**0.028**	<0.005
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.018**	**0.030**	**0.039**	**0.030**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		<0.05	**0.08**	**0.06**	**0.40**	**0.09**
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	<0.001	**0.008**	<0.001
Copper	7440-50-8	0.001	mg/L		**0.004**	**0.001**	<0.001	**0.008**	**0.002**
Nickel	7440-02-0	0.001	mg/L		**0.003**	<0.001	<0.001	**0.006**	<0.001
Lead	7439-92-1	0.001	mg/L		**0.002**	<0.001	<0.001	**0.188**	**0.002**
Zinc	7440-66-6	0.005	mg/L		**0.036**	**0.081**	**0.044**	**0.105**	**0.035**
Manganese	7439-96-5	0.001	mg/L		**0.128**	**0.024**	**0.031**	**0.182**	**0.035**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L		**1.18**	**0.44**	**0.23**	**10.5**	**0.35**
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	<0.004	<0.004	<0.004
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	**0.01**	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.38**	<0.01	<0.01	**0.17**	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.38**	<0.01	<0.01	**0.18**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.7**	**1.0**	**1.4**	**3.9**	**1.5**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WMLP328	WMLP301	WML262	WML119	WML181
				Sampling date / time	29-Aug-2025 09:30	29-Aug-2025 10:55	29-Aug-2025 11:40	29-Aug-2025 12:30	29-Aug-2025 13:15
Compound	CAS Number	LOR	Unit		ES2526855-011	ES2526855-012	ES2526855-013	ES2526855-014	ES2526855-015
					Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ Total Nitrogen as N	----	0.1	mg/L		**1.1**	**1.0**	**1.4**	**4.1**	**1.5**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.18**	**0.06**	**0.17**	**0.48**	**0.03**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**7.20**	**30.8**	**27.6**	**1.10**	**29.0**
ø Total Cations	----	0.01	meq/L		**6.78**	**26.5**	**25.0**	**1.23**	**26.8**
ø Ionic Balance	----	0.01	%		**2.96**	**7.45**	**4.84**	**5.59**	**3.84**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WML129	----	----	----	----
				Sampling date / time	29-Aug-2025 01:40	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2526855-016	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.29	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		373	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		236	----	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		41.3	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		106	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		106	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		13	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		52	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		17	----	----	----	----
Magnesium	7439-95-4	1	mg/L		10	----	----	----	----
Sodium	7440-23-5	1	mg/L		46	----	----	----	----
Potassium	7440-09-7	1	mg/L		2	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WML129	----	----	----	----
				Sampling date / time	29-Aug-2025 01:40	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2526855-016	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.137**	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	----	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.001**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.008**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.325**	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**1.38**	----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WML129	----	----	----	----
				Sampling date / time	29-Aug-2025 01:40	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2526855-016	--------	--------	--------	--------
					Result	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued									
^ **Total Nitrogen as N**	----	0.1	mg/L		**0.4**	**----**	**----**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.12**	**----**	**----**	**----**	**----**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**3.86**	**----**	**----**	**----**	**----**
ø Total Cations	----	0.01	meq/L		**3.72**	**----**	**----**	**----**	**----**
ø Ionic Balance	----	0.01	%		**1.74**	**----**	**----**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(WATER) EA005P: pH by PC Titrator

(WATER) EA010P: Conductivity by PC Titrator

CD10

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

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CLIENT: AGE Consultants	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT **(List due date):**	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: Newcastle		☐ Non Standard or urgent TAT **(List due date):**	Custody Seal Intact? Yes / No / N/A
PROJECT: Ashton Coal Mine GW Sampling	**ALS QUOTE NO.:** EN/222/21	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes / No / N/A
PROJECT ID: ASH5027		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 2.0 °C
PROJECT MANAGER: Bryce McKay	**CONTACT PH:** 0414 324 504	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Danijel Djukic	**SAMPLER MOBILE:** 0423 266 442		
COC Emailed to ALS? YES	**EDD FORMAT (or default):** XTAB, ENMRG, ESDAT, PDF, MonPro		
Email Reports to: Danijel@ageconsultants.com.au, MonitorProData@yancoal.com.au, Brycem@ageconsultants.com.au			
Email Invoice to: As above + accounts@ageconsultants.com.au			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DJ	SA	SA	SOCS Courier AU
DATE/TIME: 29/8/25 16:50	DATE/TIME: 29/8 1650	DATE/TIME: 29/8 1700	DATE/TIME: 29/8/25 2015

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS	pH & EC	NT-1 & NT-2	W-1 (7 metals)	EG020 - Fe, Mn, Se	EA015H - TDS	EA045 - turdidity	NT-11 - Total P, Total N	EK058G - NO3	ED037 - HCO3	EK026	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	T5	28/08/2025 8:10	W	P	5	X	X	X	X	X	X	X	X	X	X	
2	RSGM1	28/08/2025 9:15	W	P	5	X	X	X	X	X	X	X	X	X	X	
3	WML261	28/08/2025 10:40	W	P	10	X	X	X	X	X	X	X	X	X	X	
4	WMLP302	28/08/2025 11:45	W	P	5	X	X	X	X	X	X	X	X	X	X	
5	WML120A	28/08/2025 12:22	W	P	5	X	X	X	X	X	X	X	X	X	X	
6	WML120B	28/08/2025 12:50	W	P	5	X	X	X	X	X	X	X	X	X	X	
7	WML183	28/08/2025 14:00	W	P	5	X	X	X	X	X	X	X	X	X	X	
8	RM01	28/08/2025 14:30	W	P	1	X	X									
9	WMLP320	29/08/2025 8:00	W	P	5	X	X	X	X	X	X	X	X	X	X	
10	RA18	29/08/2025 8:40	W	P	1	X	X									
11	WMLP328	29/08/2025 9:30	W	P	5	X	X	X	X	X	X	X	X	X	X	
12	WMLP301	29/08/2025 10:55	W	P	5	X	X	X	X	X	X	X	X	X	X	
13	WML262	29/08/2025 11:40	W	P	5	X	X	X	X	X	X	X	X	X	X	
14	WML119	29/08/2025 12:30	W	P	5	X	X	X	X	X	X	X	X	X	X	
15	WML181	29/08/2025 13:15	W	P	5	X	X	X	X	X	X	X	X	X	X	
16	WML129	29/08/2025 14:10	W	P	5	X	X	X	X	X	X	X	X	X	X	
				TOTAL	77											

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

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Work Order Reference
ES2526855

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