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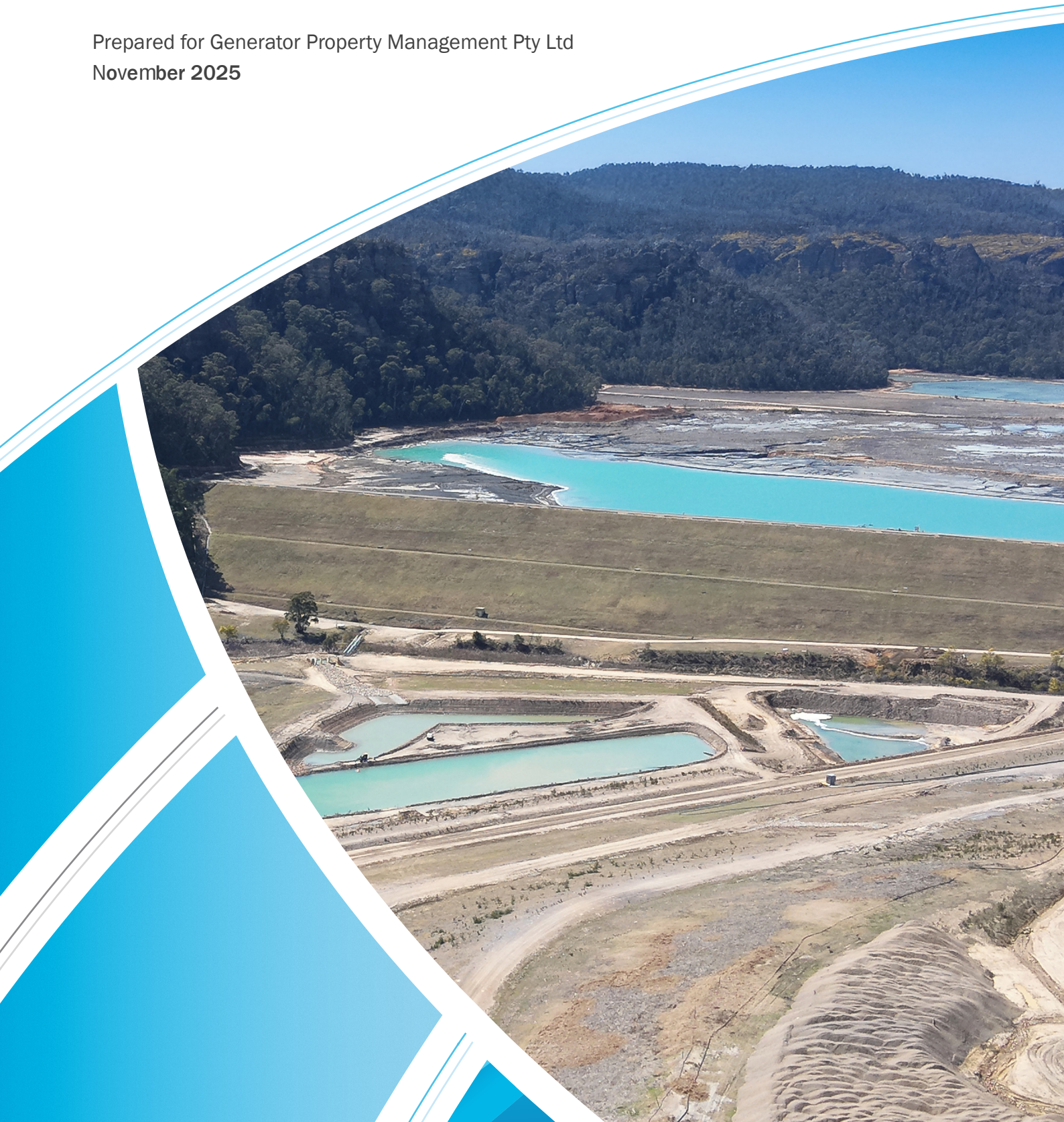
Kerosene Vale

Annual Environmental Management Report

September 2024 – August 2025

Prepared for Generator Property Management Pty Ltd

November 2025



Kerosene Vale Ash Repositories

Annual Environmental Management Report

Generator Property Management Pty Ltd

E230337 RP1

November 2025

Version	Date	Prepared by	Reviewed by	Comments
1	October 2025	Michelle Frankham	Nadia Eisenlohr	For internal review
2	November 2025	Michelle Frankham		Final for distribution

Approved by

Michelle Frankham
Senior Environmental Scientist
03 November 2025

Level 3 175 Scott Street
Newcastle NSW 2300
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Executive Summary

Table ES1 Annual Environmental Management Report title block

Name of operation	Kerosene Vale Ash Repository
Operation historically referred to as	• Wallerawang Ash Repository • Lidsdale Ash Dam
Name of operator	Generator Property Management Pty Limited
Development consent/project approval #	07/0005 (Mod 2)
Name of holder of development consent/project approval	Generator Property Management Pty Limited
AEMR start date	1 September 2024
AEMR end date	31 August 2025

I, *John Pola,* certify that this audit report is a true and accurate record of the compliance status of Kerosene Vale Ash Repository for the period 1 September 2024 to 31 August 2025 and that I am authorised to make this statement on behalf of Generator Property Management Pty Limited.

Note.
a) The AEMR is an 'environmental audit' for the purposes of section 9.42 of the Environmental Planning and Assessment Act 1979. Section 9.42 (1) provides that a person must not include false or misleading information in a report of monitoring data, or an audit report produced to the Minister in connection with and environmental audit, if the person knows that the information is false or misleading in a material respect.

Section 9.42 (2) provides the proponent of an approved project must not fail to include information in (or provide information for inclusion in) a report of monitoring data, or an audit report produced to the Minister in connection with an environmental audit, if the proponent knows that the information is materially relevant to the monitoring or audit.

Section 9.42 (3) provides that with respect to the retention of monitoring data or audit documentation, the proponent of an approved project must retain any monitoring data in accordance with the relevant condition of the approval for at least 5 years after it was collected, retain any documentation required to be prepared by the proponent in connection with an environmental audit for a period of at least 5 years after the audit report concerned was produced to the Minister, and produce during that period any such documentation on request to a departmental investigation officer under Division 9.2.

b) Maximum penalty – Tier 3 monetary penalty

*c). Section 9.54 provides that (1) If **Tier 3** is specified as the maximum penalty, a person who contravenes or fails to comply with that provision is guilty of an offence and liable to a penalty not exceeding $1 million (in the case of a corporation), and for a continuing offense, a further $10,000 for each day the offence continues. In the case of an individual, the liability is $250,000, and for a continuing offence—a further $2,500 for each day the offence continues. Section 9.54 (2) provides that if a period of imprisonment is also specified, the person is also liable to imprisonment not exceeding the period so specified.*

Name of authorised reporting officer	John Pola
Title of authorised reporting officer	Manager Environment

Signature of authorised reporting officer

Date 3rd November 2025

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1 Summary of compliance

Generator Property Management Pty Limited (GPM) owns and operates the Ash Storage Dams and stockpiles within the Kerosene Vale Ash Repository (KVAR) at Lidsdale. The facility covers approximately 528 hectares and was previously part of the decommissioned Wallerawang Power Station, located on Skelly Road, Lidsdale, NSW (referred to throughout as both 'the Project Area' and 'the Site').

The Project Area consists of:

- the Kerosene Vale Dry Ash Repository (KVAR) and underlying former Kerosene Vale Ash Dam (KVAD)
- Sawyers Swamp Creek Ash Dam (SSCAD)
- The associated heavy vehicle access route
- KVAR and SSCAD private access routes.

This Annual Environment Management Report (AEMR) has been prepared pursuant to Schedule 2, Condition 7.3 of Project Approval 07_0005 and in accordance with the NSW Government's *Post-approval requirements for State significant mining developments, Annual Review Guideline* dated October 2015. The reporting period covered by this AMER is 1 September 2024 to 31 August 2025.

A summary of the Kerosene Vale Ash Repository compliance achieved during the reporting period is provided in Table 1.1. There were no non-compliances against the Conditions of Approval (CoA) recorded during the 2024-2025 reporting period (1 September 2024 to 31 August 2025). An extended review of compliance with the CoA is presented in Appendix A.

Table 1.1 Statement of compliance during the 2024-2025 reporting period

Were all conditions of the relevant approval(s) complied with?	
Project Approval #07_0005	Yes

No non-compliances with the COA were identified during the AEMR reporting period. Assessment of compliance was conducted using the compliance status descriptions presented in Table 1.2 and in accordance with the *Independent Audit Post Approval Requirements* (NSW Government 2020). The review of the CoA in Appendix A satisfies the requirement for a Compliance Tracking Program, as per Condition 4.2 of Project Approval 07_0005.

Table 1.2 Compliance status descriptors

Status	Colour code	Description
Compliant		The auditor has collected sufficient verifiable evidence to demonstrate that all elements of the requirement have been complied with within the scope of the audit.
Non-compliant		The auditor has determined that one or more specific elements of the conditions or requirements have not been complied with within the scope of the audit.
Not triggered		A requirement has an activation or timing trigger that has not been met during the temporal scope of the audit being undertaken (may be a retrospective or future requirement), therefore an assessment of compliance is not relevant.

An acceptable standard of environmental performance has been achieved during the reporting period as evidenced by the following:

- In accordance with the Voluntary Management Plan (VPM), the Detailed Site Investigation (DSI) draft was submitted to the Accredited Site Auditor (the Auditor) in May 2025. A draft Human Health Environmental Risk Assessment (HHERA) was submitted to the Auditor in June 2025.

- All noise limits were complied with at all sensitive receivers during the reporting period.

- Air quality monitoring results relating to activities at the Kerosene Vale Repository site were below the Operational Environmental Management Plan (OEMP) assessment criteria for depositional dust gauges located in the Lidsdale township. There were two instances of exceedances of the OEMP threshold for total solids in January 2025 (DG32) and February 2025 (DG29) which were attributable to sample bottle contamination.

- During the AEMR Period, a review of progress against the Action Plan was included within the Water Quality Monitoring Report that was submitted to the EPA in March 2025.

- Surface water quality trends in Lidsdale Cut and the Sawyers Swamp Creek Ash Dam (SSCAD) are consistent with recent AEMR periods (i.e. 2018 to the current period). Dump Creek water quality over the AEMR period was variable with pH, salinity and metal concentrations, in some samples, exceeding Default Guideline Values (DGVs). Water quality results over the AEMR period at Dump Creek, indicated poor water quality conditions during drier months, where groundwater seepage to the creek is in a higher proportion than better quality surface water. Surface water quality downstream of the Site in Sawyers Swamp Creek was generally consistent with the understood surface water characteristics. Surface water quality in the Coxs River was not affected by the inflows from Sawyers Swamp Creek.

- Groundwater quality trends during the AEMR Period were generally consistent with recent AEMR periods (i.e. 2018 to the current period). Groundwater quality at monitoring bore WGM1/D3 (located between SSCAD and the KVAR/KVAD), may be degraded, however this is consistent with previous results, relative to water quality trends at upgradient bores. Groundwater quality at monitoring bore WGM1/D6 (located downgradient of KVAR/KVAD) is consistent with ash affected water. Elevated concentrations of arsenic were reported at WK_MW06 in November 2024 which is consistent with previous results at this location but is an anomaly compared to other groundwater monitoring locations. In May 2025 the concentration of arsenic decreased to within range of other groundwater monitoring bores. Groundwater quality at monitoring bore WGM1/D5 (located downgradient of KVAR/KVAD) has changed. The increases in concentrations of metals and EC at WGM1/D5 may be indicative of KVAD seepages.

- The groundwater level trends were consistent with historical trends and generally reflect the cumulative rainfall departure (CRD) trend.

- Small fragments of asbestos and a broken sheet (0.1m^2) of friable asbestos was found on Site and disposed of within the approved asbestos disposal areas by qualified asbestos personnel. No other asbestos waste was disposed of or received on Site during the reporting period.

- No known heritage sites associated with the Project Area were impacted during the reporting period and no new heritage sites were identified within the reporting period.

- Weed management has been ongoing throughout the reporting period targeting pampas grass, blackberry, St John's wort, Sifton bush, purple top, broom, stink wort, cineraria, hemlock, radiata pine, tussock and various broadleaf weeds.

- There were no community complaints received relating to the management of the Project Area during the AEMR period. There was one enquiry to the EPA from a member of the public regarding GPM's irrigation practices. A detailed response was provided to the EPA from GPM.

- Throughout the reporting period, GPM engaged regularly with the Community Consultative Group (CCG). Updates included the appointment of new CEO David Wood, who outlined his background and vision for the organisation, as well as progress on site activities and planned works. A key focus was GPM's long-term closure strategy for the Kerosene Vale Ash Repository, with an emphasis on creating a safe, stable, and self-sustaining landform rehabilitated with native vegetation.

- An Independent Environmental Representative (ER) conducted monthly inspections at the Site to ensure closure works are undertaken in accordance with the approval requirements. Multiple actions identified by the ER were completed by GPM during the AEMR reporting period.

GPM is committed to the continuous improvement and safe management of the site and propose to:

- Finalise, in consultation with the Auditor and NSW EPA, the Remedial Action Plan, incorporating the Remediation Options Assessment and submit to the NSW EPA in the next AEMR reporting period.

- Revise and submit to the EPA the HHERA, incorporating the Auditor comments, in the next AEMR reporting period.

- Ensure that the long term remediation and closure of the Site is planned and executed in accordance with the VMP and Auditor requirements and in consultation with the local community, including neighbours who adjoin the land holding.

- Review and update the OEMP to ensure care and maintenance of the Site reflects current practices and is in line with best practice. The OEMP is in the process of review and revision in consultation with DPHI and is anticipated to be approved, finalised and implemented during the 2025-2026 AEMR period.

- Review and update the Construction Environmental Management Plan (CEMP) to ensure construction activities required for the closure of the Site are included in the CEMP and are in accordance with the approval and licence conditions. The CEMP is anticipated to be approved, finalised and implemented during the 2025-2026 AEMR period.

- Potential groundwater contamination sources, pathways and receptors continue to be investigated as part of the Voluntary Management Proposal process that GPM has negotiated with the EPA.

- GPM will continue to progressively improve the water management system through implementing the Action Plan commitments.

2 Introduction

2.1 Background

The Kerosene Vale Ash Repository is located at Skelly Road, Lidsdale NSW (the Project Area) which is approximately 15 kilometres (km) northwest of Lithgow and 2.5 km north-east of former Wallerawang Power Station (WPS).

The WPS was separated into two separate ownership parcels in 2020 with the land north of the Castlereagh Highway purchased by Generator Property Management (GPM) in September 2020 from EnergyAustralia NSW. GPM continues to operate the site, which comprises an area of approximately 528 hectares (ha) and is situated on Lot 2 in Deposited Plan (DP) 1139928 and Lot 5 DP 1284934.

The Project Area comprises:

- the Kerosene Vale Dry Ash Repository (KVAR) and underlying former Kerosene Vale Ash Dam (KVAD)
- Sawyers Swamp Creek Ash Dam (SSCAD)
- The associated heavy vehicle access route
- KVAR and SSCAD private access routes.

The Project Area has a long history of being used for disposal of power station waste from the WPS since the late 1950s, and for disposal of other mining and industrial waste. The Project Area has been historically known as the Wallerawang Ash Repository, and the Lidsdale Ash Dam Area. Since the closure of WPS in 2014, the Kerosene Vale Ash Repository has been placed in care and maintenance. GPM's objectives within the Project Area include management of ongoing regulatory and contractual obligations during decommissioning, demolition, rehabilitation and closure of the site.

2.2 Site history

The original ash placement operations were conducted at the KVAD. The void was filled with ash transported from the WPS as slurry (i.e. wet ash placement). When the KVAD was full, it was capped clay and then ash placement operations began at the SSCAD, which saw wet ash placement take place between 1980 to 2003.

The need to further develop the KVAR area in order to maintain power-generation operations at WPS was identified in 2001. The existing wet ash storage area (i.e. SSCAD) was approaching its design capacity and the placement of dry ash at the KVAR was identified as a viable alternative. The extent of both the KVAR and SSCAD ash placement areas is depicted in Figure 2.1.

Conversion from wet to dry ash placement aimed to minimise environmental and social impacts potentially resulting from heavy metal accumulation. Key benefits of a dry ash handling facility included:

- the potential for ash to be beneficially reused in its dry form
- an approximate 80% decrease in the water required to transport ash
- discharges to the Coxs River are decreased in the long term
- the SSCAD can be progressively rehabilitated
- there would be a decreased flood risk for Kerosene Vale, Kerosene Vale and surrounding areas (Hyder Consulting, 2001).

In 2002, Project Approval was granted by the then Minister of Planning to change from wet to dry ash-producing activities and to use the KVAR area for dry ash storage.

On 26 November 2008, Project Approval was granted by the then Minister of Planning for the extension of the existing KVAR area to permit the continued disposal of ash generated by the WPS under Part 3A (now repealed) of the Environmental Planning and Assessment Act 1979. The KVAR Stage 1 placement works were completed and capped in February 2009. The KVAR Stage 2 placement works commenced soon after in April 2009.

In August 2018, a modification (MOD 1) was approved to allow for the importation of clean fill to the Kerosene Vale Ash Repository (former Wallerawang Ash Repository) from off-site sources outside of the Lithgow Local Government Area (LGA).

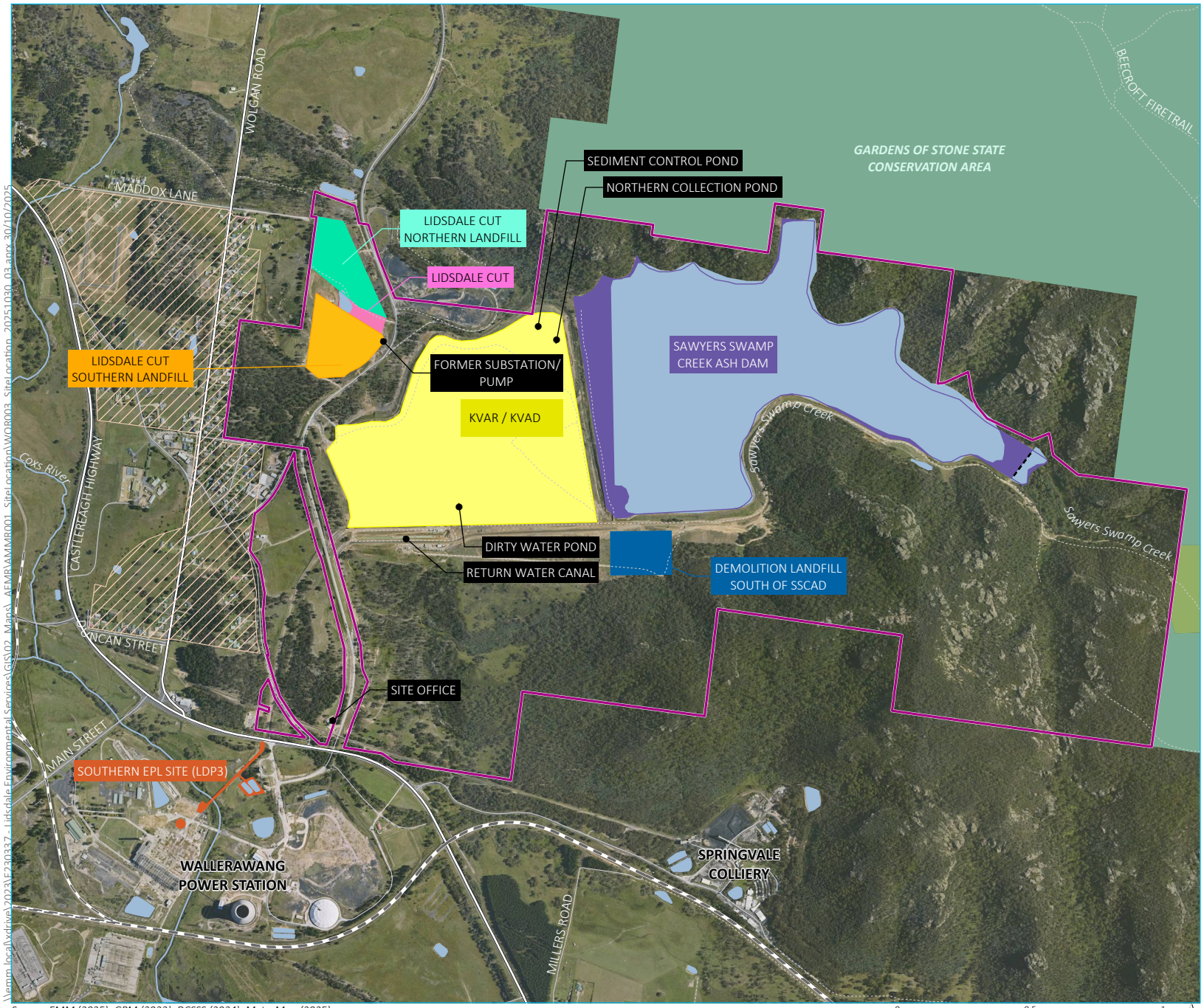
In October 2023, a modification (MOD 2) was approved to allow for an extension of time by ten years to continue transporting capping material to the project site. This extension of time accounts for the significant volumes of suitable capping material required to fully rehabilitate the Project Area, and the inherent supply limitations of suitable excavated material from large infrastructure projects within a reasonable haulage distance to the site.

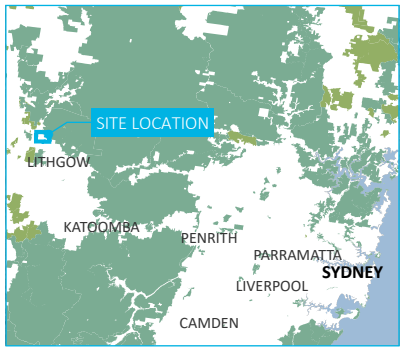
The original ash placement strategy, as outlined within the Operation Environmental Management Plan (OEMP) (EnergyAustralia NSW, 2018), was as follows:

- Stage 2A as an extension of Stage 1.
- Stage 2B to allow time for the re-alignment of Sawyer's Swamp Creek and for material to be obtained from the pine plantation area to reinforce the stabilisation berm to the north of KVAR Stage 1.
- Stage 2C as a final ash placement area once reinforcements of a proposed stabilisation berm with creek realignment had been carried out.
- Since the first AEMR was submitted in 2011, the ash placement strategy for KVAR Stage 2 has been updated to reflect changes from the three-stage process outlined above, to a two-staged approach. This change in strategy was in response to Centennial Coal relinquishing their right to extract coal from the areas of mining interest within the KVAR Stage 2 proposal.
- WPS ceased energy production in April 2014 with the closure of the WPS outlined in a three-phase plan that involves the decommissioning, deconstruction and repurposing (DDR) of the power station including Kerosene Vale Ash Repository. In 2014 the closure and demolition of the WPS was approved which included the development of an asbestos repository for the disposal of material from WPS. The selected asbestos repository site is located immediately south of the return water canal near the southwestern corner of the KVAR/KVAD.
- In 2018, approval was granted to import virgin excavated natural material (VENM) and excavated natural material (ENM) to use as capping material from sources outside of the Project Area and Lithgow LGA at the site, pursuant to former section 75W of the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act).
- In 2020 when ownership was transferred to GPM, the Project Area had minimal active management since closure of the WPS and had been heavily impacted by bushfires in the summer of 2019 and again in 2020.

The site has been placed in care and maintenance with no ash received from WPS during the AEMR reporting. Environmental studies and investigations are currently underway to support GPM's safe decommissioning, demolition, rehabilitation and management of ongoing regulatory and contractual obligations associated with the Project Area.

On 22 August 2022, the EPA agreed to a voluntary declaration and declared the site under a Contaminated Land Declaration Notice which declares the Site as significantly contaminated land under division 2 the Contaminated Land Management Act 1997. GPM has submitted a VMP to the EPA that establishes a proposed investigation and remediation approach (section 10.1).





KEY

- Site boundary
- Nearest sensitive (residential) receivers
- 2018 proposed asbestos disposal area
- Demolition landfill south of SSCAD
- Kerosene Vale ash repository
- Lidsdale cut northern landfill
- Lidsdale cut southern landfill
- Lidsdale cut
- Sawyers Swamp Creek ash dam
- Southern EPL site
- Diversion dam

Existing environment

- Rail line
- Major road
- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- Waterbody
- NPWS reserve
- State forest

INSET KEY

- NPWS reserve
- State forest

Source: EMM (2025); GPM (2023); DCSSS (2024); MetroMap (2025)

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Site layout and location

Kerosene Vale Ash Repositories
Annual Environmental Management Report
Figure 2.1

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2.3 Purpose of this AEMR

This AEMR has been prepared to satisfy Schedule 2, Condition 7.3 of Project Approval 07_0005 (see Table 2.1). This report covers the operations and environment and community performance of the site from 1 September 2024 to 31 August 2025 (the AEMR reporting period).

Table 2.1 Relevant condition of PA 07_0005

Condition	Detail	Section where addressed
7.3	The Applicant shall, throughout the life of the project, prepare and submit for the approval of the Secretary, an **Annual Environmental Management Report** (AEMR). The AEMR shall review the performance of the project against the Operation Environmental Management Plan (refer to condition 6.4 of this approval) and the conditions of this approval. The AEMR shall include, but not necessarily be limited to:	This report
7.3 (a)	details of compliance with the conditions of this approval	This table and Appendix A
7.3 (b)	a copy of the Complaints Register (refer to condition 5.4 of this approval) for the preceding twelve-month period (exclusive of personal details), and details of how these complaints were addressed and resolved	Not applicable; no complaints were received during the reporting period
7.3 (c)	identification of any circumstances in which the environmental impacts and performance of the project during the year have not been generally consistent with the environmental impacts and performance predicted in the documents listed under condition 1.1 of this approval, with details of additional mitigation measures applied to the project to address recurrence of these circumstances	Section 9 and Appendix A
7.3 (d)	results of all environmental monitoring required under conditions 3.3 to 3.8 of this approval, including interpretations and discussion by a suitably qualified person	Section 5 and section 6
7.3 (e)	a list of all occasions in the preceding twelve-month period when environmental goals/objectives/impact assessment criteria for the project have not been achieved, indicating the reason for failure to meet the criteria and the action taken to prevent recurrence of that type of failure.	Section 9

2.4 Actions required from previous AEMR

The 2023-2024 AEMR was submitted via the DPHI Portal. Acknowledgement and approval reference was provided 27 November 2024 from DPHI. There were no outstanding actions requested from DPHI which were required to be addressed within the 2024 - 2025 reporting period.

2.5 Project contacts

The contact details for the Kerosene Vale Ash Repository Areas are:

Mr Paul Glasson

Western Region Manager

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Mr John Pola

Manager, Environment

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3 Approvals

Activities throughout the AEMR reporting period were undertaken in accordance with the Project Approval, OEMP, CEMP and Environment Protection Licence 21185.

The monitoring and management of the environmental aspects, including noise, ecology, air quality, waste, heritage, surface water and groundwater are undertaken to ensure regulatory compliance is achieved.

This AEMR has been prepared to address the conditions of the PA 07_0005 and the Statement of Commitments for the AEMR reporting period.

The statutory authorities that the project operates in accordance with are outlined in Table 3.1.

Table 3.1 Key consents, leases and permits

Approval/Lease/Licence	Issue date	Expiry date	Details/comments
Project Approval 07_0005	29 July 2005 (Renewed: 26 November 2008)	Works physically commenced in 2005 prior to GPM ownership in September 2020, therefore Condition 1.4 is satisfied, and there is no expiry date for the consent.	Granted by the then Minister for (former) Department of Planning (DoP), Section 75J of the EP&A Act.
	9 August 2018 (MOD 1)	No expiry date	Import of clean fill
	13 October 2023 (MOD 2)	October 2033 for condition 2.36A	Extension Time for import of capping material for 10 years
Environment Protection Licence (EPL) No. 21185	14 September 2023	14 September (annual anniversary date)	Granted by NSW Environment Protection Authority (EPA).
Variation to EPL 21185	27 January 2023	14 September (annual anniversary date)	Variation to Licence No. 21185 was approved on 27 January 2022, to allow for asbestos disposal at the site.
Variation to EPL 21185	18 July 2023	14 September (annual anniversary date)	Variation to Licence No. 21185 was approved on 18 July 2022, to allow for the licence to capture a series of water monitoring and operational conditions, characterisation studies and a Pollution Reduction Program to achieve improved environmental outcomes at the Premises.
Variation to EPL 21185	19 December 2023	14 September (annual anniversary date)	Variation to Licence No. 21185 was approved on 19 December 2023, to updated various conditions associated with water management. A subsequent variation application was submitted to the EPA in October 2024. GPM is currently in discussion with the EPA regarding the variation application.

3.1 Operational Environmental Management Plan

The OEMP provides a framework for managing environmental aspects associated with the operation of the project as stipulated in the relevant provisions of Project Approval 07_0005, EPL 21185 and Statement of Commitments (SoC) (Parsons Brinckerhoff 2008a).

The OEMP scope covers the routine operations of the site outside the specific construction activities identified in Section 3.2. As part of this OEMP, the implementation of the following plans occurs:

- Operational Noise Management Plan (C&ONMP)
- Operational Groundwater Management Plan (OGWMP)
- Operational Surface Water Management Plan (OSWMP)
- Operational Air Quality Management Plan (OAQMP)
- Operational Landscape / Revegetation Management Plan (OLRMP)
- Operational Transport Management Plan.

The OEMP was submitted to DPHI in the AEMR reporting period. Comments were received from DPHI and incorporated into a subsequent revision of the OEMP. This subsequent revision is currently with DPHI for further review. It is anticipated that the OEMP is implemented during the 2025 - 2026 AEMR period once approved.

3.2 Construction Environmental Management Plan

The CEMP outlines the environmental management practices and procedures to be followed during construction, and includes implementation of the following plans as part of the CEMP:

- Construction Traffic Management Plan (CTMP)
- Construction Noise Management Plan (C&ONMP)
- Construction Erosion and Sediment Control Plan (CESCP).

The CEMP was submitted to DPHI in the AEMR reporting period. Comments were received from DPHI and incorporated into a subsequent revision of the CEMP. This subsequent revision is currently with DPHI for further review. It is anticipated that the CEMP is implemented during the 2025 - 2026 AEMR period once approved.

A breakdown of the activities covered by each of the management plans is contained in Table 3.2.

Table 3.2 Activities covered by OEMP and CEMP

Environmental Management Plan	Activities covered
OEMP – care and maintenance operations	• ash management • management of on-site water systems • capping material haulage, placement and management • landscaping and revegetation/rehabilitation of the site • upgrading and maintaining internal access roads in the project area

Environmental Management Plan	Activities covered
CEMP – construction activities	• Sawyers Swamp Creek realignment • construction of stability berms around the perimeter of the KVAR • excavation of the former pine plantation area • sediment controls and surface water dams associated with construction of the KVAR stability berm and realignment of the Sawyers Swamp Creek • establishment of freshwater collection ponds and diversion pipes/drains on the northern edges of SSCAD • rearrangement of water flows around the KVAR • establishment of access roads onto the surface of the SSCAD and associated roads across the dam surface • reinstatement of environmental controls for historic landfill areas including capping of slumped areas, reprofiling for water management and control of sediment runoff during these activities • concurrent construction activities.

4 Operations during reporting period

Due to the closure of WPS in 2014, the Kerosene Vale Ash Repository has been placed in care and maintenance while ongoing investigations and studies are undertaken to inform the safe closure of the site including contamination investigations, remediation, decommissioning, demolition, rehabilitation.

To ensure ongoing compliance when in care and maintenance, GPM manage a team of contractors to undertake regular, ongoing maintenance activities. The contractors primarily maintain surface water management structures, water treatment plants, road and access points, dust suppression measures, vegetation and weed management, rehabilitation and any other care and maintenance works required.

There was no ash delivered to site or reused during the reporting period. The total ash footprint has remained the same from the previous reporting period. A significant portion of the ash has been covered by soil materials, most of which is vegetated. Whilst this rehabilitation does not yet meet final landform status, the rehabilitation is an effective dust prevention and visual amelioration measure. The rehabilitation activities undertaken during the reporting period is provided in Chapter 7.

A summary of activities during the reporting period is provided in Table 4.1.

Table 4.1 Operations summary

Activity	Previous reporting period	This reporting period	Next reporting period
Ash delivered to site (T)	0	0	0
Ash reused (T)	0	0	0
Total Ash footprint (ha)	131.7	131.7	131.7
Area capped (ha)	Nil	Nil	Nil -capping to occur following final landform shaping. Contingent on RAP approvals
Stabilisation works on KVAR/KVAD (ha)	4.8	Stabilisation of 920 stockpile buttress commenced in July 2025	Subject to availability of materials
Temporary cover application (ha)	13	10	Subject to availability of materials

4.1 Operation hours

The normal hours of operation for the site are between 7 am and 10 pm Monday to Sunday, in accordance with Condition 2.8 of PA 07_0005.

No works occurred at the Project Area outside the normal operating hours during the reporting period.

Abnormal or emergency operation hours were not triggered during the reporting period.

4.2 Site activities

The following operational activities have been undertaken during the reporting period:

- topsoil of KVAR Stage 2, Lidsdale Cut and SSCAD road shoulders
- topsoil and lucerne seeding of Lidsdale Cut Wetlands
- topsoil application of SSCAD concrete dump

- remediation and topsoil of asbestos disposal area for asbestos management
- reshaping of KVAR floor
- interception trench installed on the downstream side of the embankment to investigate the volume of water seeping under the embankment
- recommencement of SSCAD containment ponds construction
- construction of finger roads on SSCAD Cells A and D
- remediation of a sinkhole located above the north pond on the KVAD by backfilling and repair of the capping layer
- care and maintenance activities including road management, surface water management, treatment of contaminated water, mobile plant daily servicing, stockpile management
- installed and maintained erosion and sediment controls
- increased irrigation capacity including installations at old pine forest area, KVAR batters, Lidsdale Cut and Open Asbestos dump
- continued improvement, upgrades and expansion of SCADA system for real time monitoring of site water management parameters
- clean out of Lidsdale cut (east pond)
- irrigation of treated site water on temporary cover areas to gauge responses to site water
- ongoing works to install more irrigation and evaporation units at SSCAD to manage un-treated water from the Site and reduce reliance on discharge to Coxs River via EPL discharge point, LDP3 (Photograph 4.1)
- desludging of the return water canal
- upgrades to the water chemical dosing plants to remove/reduce metal contaminants in discharge water to meet EPL requirements
- class A evaporation pan installed near the SSCAD dam wall
- weed management of various weeds across the Site and vegetation management
- review and revision of existing management plans in consultation with DPHI for care and maintenance operations, including the OEMP (and sub-plans) and CEMP for major upcoming works (Sawyers Swamp Creek relocation, KVAR Stage 2 stability berm, stormwater control dams, spillway adjustments, landform shaping).

Photograph 4.1 Evaporation pond - Cell C

4.3 Ash delivery and placement

Due to the closure of WPS, no ash has been placed at Kerosene Vale Ash Repository within the reporting period. The ash footprint is understood to be approximately 131.7 ha, within the broader 528 ha total area. There have been no changes to the ash footprint areas during the reporting period. Therefore, the management and mitigation measures specified in the OEMP were assessed to be compliant.

4.4 Import of capping material

Modification 1 to Project Approval 07_0005 was granted in August 2018 for the import of capping material from areas outside of the Lithgow local government area to the Kerosene Vale Ash Repository (formerly Wallerawang Ash Dam Area). Capping material continues to be sourced from various locations in the Metropolitan and Central Tablelands regions and comprises of virgin excavated natural material (VENM) and excavated natural material (ENM). A second modification (MOD 2) was approved on 13 October 2023 to allow for an extension of time by ten years to continue transporting capping material to the Site until 2033.

Import of ENM and VENM to the ash repositories continued to be undertaken during the reporting period. Material was sourced from within and outside the Lithgow LGA and included Medlow Bath and Katoomba in the Blue Mountains LGA, Badgerys Creek in the Liverpool LGA and Kemps Creek and Nepean in the Penrith LGA.

Due diligence testing of the ENM/VENM is conducted monthly by an external consultant. The material is tested for a suite of analytes (metals, pH, EC) and hydrocarbons to ensure they meet the NSW EPA Resource Recovery Order (RRO) and Resource Recovery Exemptions (RRE) for ENM and/or the Waste Classification guidelines for VENM. Tests and inspections are undertaken prior to and following import of materials to ensure materials are compliant with requirements of the RRO and RRE. Where materials are not considered to meet these requirements, they are rejected.

Truck numbers are provided in Table 4.2.

Table 4.2 ENM/VENM Truck numbers

Month	Number of trips	Average truck deliveries per day	RRO/RRE Material volume received (tonnes*)	Due Diligence tests undertaken
September 2024	141	5	4,230	6
October 2024	404	13	12,120	6
November 2024	37	1	1,110	5
December 2024	0	0	0	2
January 2025	4	<1	120	0
February 2025	54	2	1,620	4
March 2025	212	7	6,360	10
April 2025	10	0	300	2
May 2025	0	0	0	0
June 2025	0	0	0	0
July 2025	0	0	0	0
August 2025	0	0	0	0

Note: * estimated amounts based on 30 tonnes per delivery

The materials management register, truck movement register, and supporting documentation including the ENM certificates are presented were provided to EMM Consulting from GPM to facilitate the drafting of this AEMR. In reviewing the material provided, EMM identified the following:

- the truck movements to facilitate the import of capping material was significantly within the limit of 100 heavy vehicle loads per day
- all material delivered to the Site from new sources provided due diligence testing of the material

In October 2024, EMM Consulting Pty Ltd (EMM) prepared and issued a memo to the NSW Environment Protection Authority (EPA) and on behalf of GPM requesting to modify the EPL to allow additional material types to be imported to the Site for rehabilitation activities. In response to EPL 21185 variation notice 1645855, a materials management framework document has been developed and is under review by the Site auditor.

4.5 Asbestos disposal areas

4.5.1 Operational asbestos disposal areas

The asbestos disposal areas enables disposal of asbestos and asbestos-contaminated materials arising from the demolition of WPS, permitted via EPL (21185). Asbestos waste ceased to be received from the demolition of WPS in December 2022 and the main areas are now capped. Approved areas have been set aside to receive additional asbestos materials, as required. Within the reporting period, small fragments of asbestos and a broken sheet (0.1m^2) of friable asbestos were identified on site and disposed of in the approved asbestos disposal areas by qualified asbestos personnel.

Within the reporting period, two areas of approximately 2500m^2 were remediated by qualified asbestos personnel, with an application of 500mm cover and geofabric.

4.5.2 Historic disposal areas

The areas around the Lidsdale Cut which potentially stretch across the property boundary to the west are currently under investigation as part of the Detailed Site Investigation under the supervision of an NSW EPA Auditor. These areas have the potential to contain historical waste landfills containing fly ash, asbestos, metals and other waste materials. Other areas within Lidsdale Cut have been identified to contain waste ash and other materials and are actively managed through reshaping and profiling to create stable landforms.

Photograph 4.2 Lidsdale Cut Asbestos Landfill aerial

5 Environmental management performance

GPM hold Environment Protection Licence (EPL) No. 21185. The licence requires extensive monitoring of water discharges, groundwater, ambient surface water, noise, complaints and associated reporting. More specifically this includes:

- Discharge Monitoring
    - Weekly sampling during wet weather discharges to Coxs River for a wide range of parameters, including metals (e.g., aluminium, cadmium, zinc), nutrients (nitrogen, phosphorus, ammonia), general water quality indicators (pH, turbidity, TSS, dissolved oxygen, conductivity), and other dissolved solids. Continuous flow monitoring (ML/day) is also required.
- Groundwater Monitoring
    - Every six months, representative sampling for dissolved metals (arsenic, cadmium, chromium, copper, manganese, nickel, lead, zinc, selenium, boron), hydrocarbons (benzo[a]pyrene), total dissolved solids, pH, electrical conductivity, and standing water levels.
- Ambient Surface Water Monitoring
    - Monthly sampling upstream and downstream of the site in Coxs River, Sawyers Swamp Creek, Dump Creek, and within SSCAD. Parameters include dissolved metals, nutrients, general water quality indicators (pH, conductivity, DO, turbidity, alkalinity, TDS, TSS, hardness, redox potential), and major ions.
- Flow Monitoring: Continuous measurement of discharge volumes and streamflows using flow meters and loggers to ensure wet-weather-only discharges comply with required flow ratios.
- Noise Monitoring: monitoring to assess compliance with the operational noise criteria of below 40 dB(A) LAeq (15 min) at the nearest sensitive receptor, under specified meteorological conditions is required.
- Dust/Air Monitoring: dust generation must be minimised through operational controls, and any associated complaints must be recorded.
- Complaints Monitoring: A 24/7 complaints line must be operated, with all complaints logged, investigated, and retained for at least 4 years.
- Reporting: An Annual Return must be submitted, including compliance statements, monitoring summaries, and records of pollution complaints.

5.1 Meteorology data

A summary of the measured meteorology data recorded for the site and surrounds has been provided below.

5.1.1 Monitoring data resources

Meteorological measurements are recorded by the onsite automatic weather station (AWS) located within the Project area. The onsite AWS is the primary resource adopted for analysing meteorological conditions at the Project area for the AERM reporting period.

5.1.2 Overview of data for reporting period

A summary of meteorological data has been compiled from the onsite AWS for the period between 1 September 2024 and 31 August 2025 and is presented in Table 5.1.

The onsite AWS recorded a minimum temperature of -4.8°C in June and July, and a maximum temperature of 32.9°C in January.

The highest total monthly rainfall recorded over the period was in November 2024 with 151.6 mm and the lowest recorded monthly rainfall was in October 2024 with 16.2 mm. Total annual rainfall for the reviewed period was 792.8 mm.

Table 5.1 Statistics for temperature and rainfall – Onsite AWS – September 2024 - August-2025

Month	Minimum temperature (°C)	Maximum temperature (°C)	Total rainfall (mm)	Cumulative Rainfall (mm)
Sep-24	-3.3	20.4	30.4	30.4
Oct-24	3.6	23.0	16.2	46.6
Nov-24	5.2	28.5	151.6	198.2
Dec-24	7.5	30.3	100.4	298.6
Jan-25	7.9	32.9	87.2	385.8
Feb-25	5.3	29.3	65.6	451.4
Mar-25	8.8	30.7	41.8	493.2
Apr-25	2.7	22.4	54.8	548.0
May-25	0.0	18.0	58.0	606.0
Jun-25	-4.8	16.5	23.6	629.6
Jul-25	-4.8	12.9	62.2	691.8
Aug-25	-2.6	17.3	101.0	792.8

An annual wind rose created from wind speed and direction data collected at the onsite AWS from September 2024 to August 2025 is presented in Figure 5.1. The winds recorded were predominately from the south-easterly and west-south-westerly direction. Annual average wind speeds were 2.7 m/s, and the annual average frequency of calm conditions (windspeeds less than 0.5 m/s) were 3.4%.

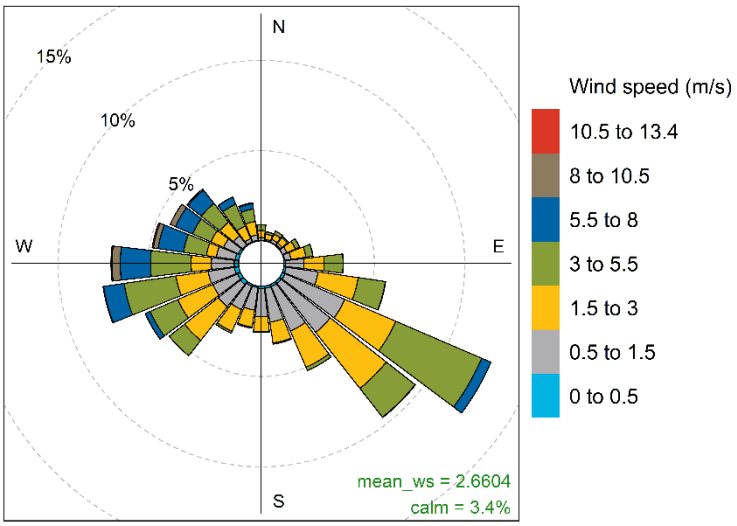


Figure 5.1 Annual wind speed and direction – Onsite AWS – September 2024 – August 2025

Monthly wind roses for the onsite AWS from September 2024 to August 2025 are presented in Figure 5.2. Monthly average wind speeds ranged from 2.1 m/s to 3.4 m/s. The monthly average frequency of calm conditions ranged from 0.9% to 11%. The predominant wind direction patterns recorded during the spring and Autumn months (i.e. September to May) were from the south-easterly direction. The dominance of the south-eastly winds reduced during summer, with an increase in winds from the south-west and the north-west.

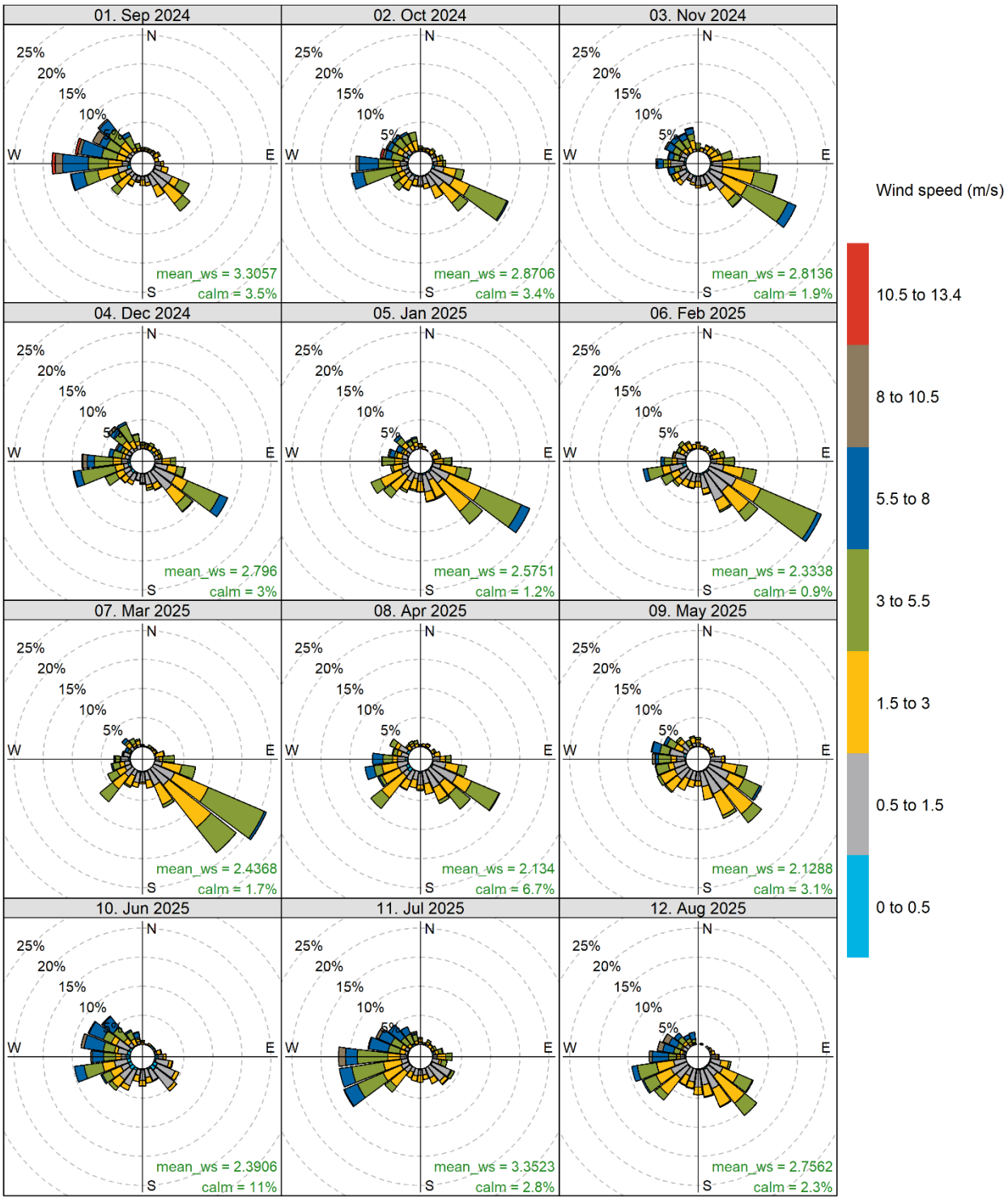


Figure 5.2 **Monthly wind speed and direction – Onsite AWS – September 2024 - August 2025**

5.2 Noise monitoring

5.2.1 Environmental management

An Operational Noise Management Sub-plan (ONMP) is included in the OEMP and has been developed in accordance with Condition 6.5 of PA 07_005. The ONMP was originally developed for the KVAR Stage 2 area, however the measures and mitigation measures have continued to be adopted for the entire Project Area post the completion of ash disposal at KVAR Stage 2.

The ONMP outlines identified measures to minimise and mitigate noise impacts on surrounding land uses from the proposed works. The level of noise generated during the proposed works program will depend on the location of the receiver, the type and duration of works and intervening topography, between the noise emission source and receiver.

The nearest identified residential receivers are located to the west of the private haul road and ash repository site, in the residential community of Kerosene Vale. The residential receivers are located approximately 300 metres (m) from the private haul road and are identified in Table 5.2 and depicted in Figure 5.3.

Table 5.2 Noise monitoring locations

Monitoring location	Distance to Haulage Road (m)
Location A - 60 Skelly Road, Kerosene Vale	300
Location B – Corner Sawyers Road and Skelly Road, Kerosene Vale	270
Location C – End of Neubeck Street, Kerosene Vale	145

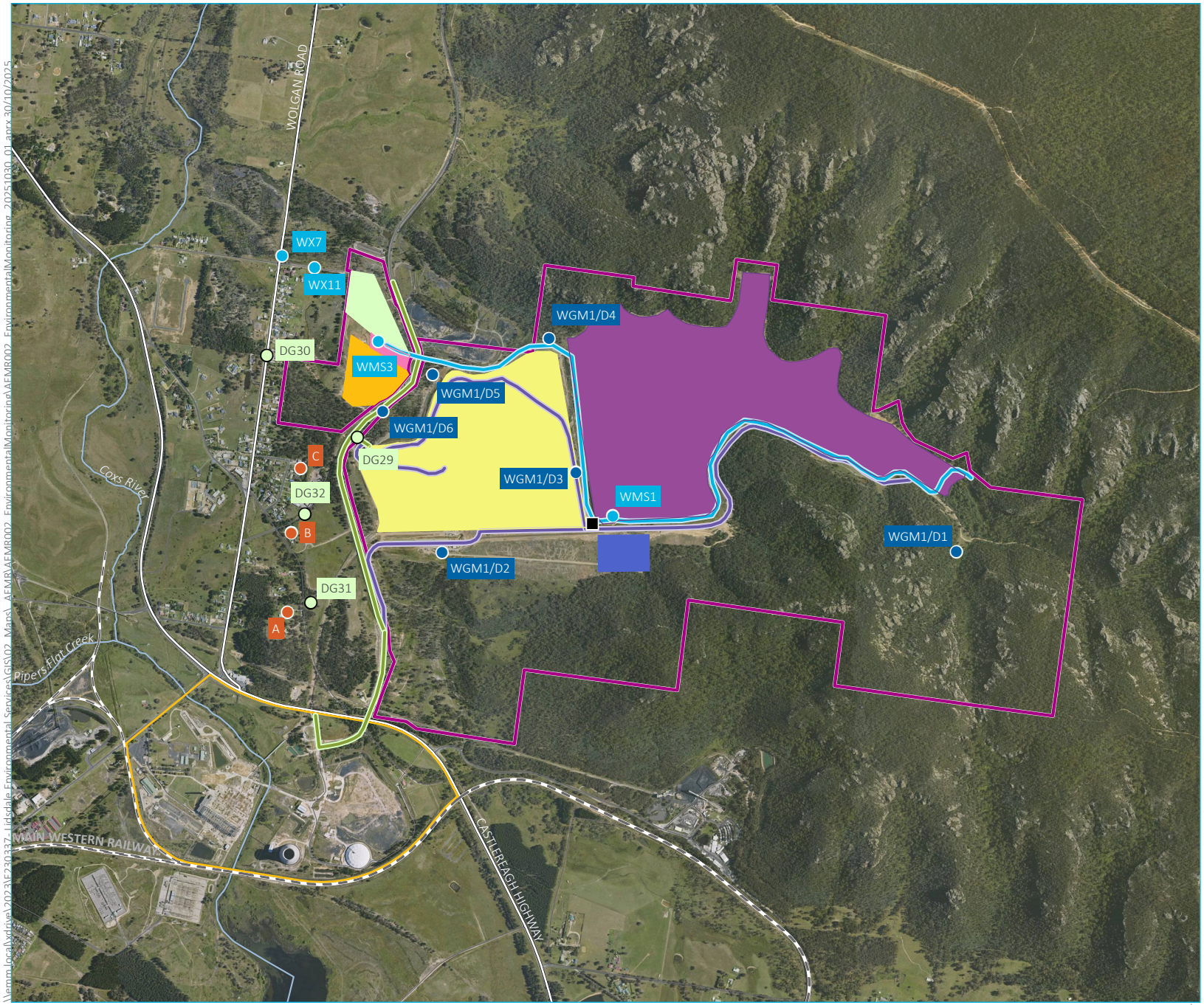
During the reporting period compliance monitoring was undertaken as per the requirements outlined in the ONMP. The relevant noise criteria from the Project Approval and EPL is summarised below:

> The cumulative operational noise from the ash placement area and ash haulage activity shall not exceed a $LA_{eq\ (15\ minutes)}$ of 40 dBA at the nearest most affected sensitive receiver during normal operating hours as defined in condition 2.8.
>
> The criterion applies under the following meteorological conditions:
>
> a) Wind speeds up to 3 m/s at 10 m above ground; and/or
>
> b) Temperature inversion conditions of up to 3°C/100 m (or alternatively stability category F temperature inversion conditions) and source to receiver gradient winds up to 2 m/s at 10 m height above ground.

Meteorological data was obtained from the Marrangaroo (Defence) Bureau of Meteorology (BoM) automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured noise levels. Vertical temperature gradient and/or sigma theta data required to determine temperature inversion conditions was not available from this AWS. As the Kerosene Vale Ash Repository area operates solely during the day and evening periods, it was assumed that temperature inversion conditions were not present during monitoring.

5.2.2 Environmental performance

Minor earthworks and maintenance activities were undertaken during the reporting period which may have the potential to cause noise impacts to sensitive receivers (as identified in Figure 5.3). Due to the closure of the WPS, no ash trucks have been hauling to the ash placement area during the reporting period. Trucks delivering capping and other engineering fill materials are active during normal working hours.



KEY

- Site boundary
- Wallerawang Power Station site
- Private access track
- Private haul road
- Sawyers Swamp Creek
- Automatic weather station
- Groundwater Monitoring
- Noise monitoring
- Surface Water
- Dust gauge

Site layout

- 2018 proposed asbestos disposal area
- Demolition landfill south of SSCAD
- KVAR / KVAD
- Lidsdale cut northern landfill
- Lidsdale cut southern landfill
- Lidsdale cut
- Sawyers Swamp Creek ash dam

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse

Source: EMM (2025); DCSSS (2023); GA (2009); MetroMap (2025)

0 0.5 1 km

GDA2020 MGA Zone 56

N

\\emm.local\ydrive\2023\E230337_Lidsdale Environmental Services\GIS\02_Maps_AEMR\AEMR002_EnvironmentalMonitoring\AEMR002_EnvironmentalMonitoring_20251030_01 anrx 30/10/2025

Environmental Monitoring Locations

Kerosene Vale Ash Repositories
Annual Environmental Management Report
Figure 5.3

EMM
creating opportunities

Noise monitoring was undertaken by EMM over the reporting period during the day and evening periods of 12-13 September 2024 (Quarter 3 – 2024), 16-17 October 2024 (Quarter 4 - 2024), 3-4 February 2025 (Quarter 1 - 2025) and 3-4 April 2025 (Quarter 2 -2025).

A summary of the noise generating activities during each of the reporting periods is provided below in Table 5.3.

Table 5.3 Noise generating activities during the reporting period

Noise monitoring (day and evening)	Noise generating activities
Quarter 3 – 2024	Trucks travelling along the haul road to site were audible during the day at Location B, generating a site only LAeq of less than 25 dB, and Location C, generating a site only LAeq of 30 dB. Noise from site was not audible at Location C during either period. Noise from road traffic and animals was primarily responsible for generating measured noise levels during the evening period.
Quarter 4 – 2024	Trucks travelling along the haul road to site were audible during the day at Location A, generating a site only L_{Aeq} of 35dB and Location B and C, generating a site only L_{Aeq} of less than 30 dB. Noise from road traffic, animals, and nearby conveyors were primarily responsible for generating measured noise levels during the evening period.
Quarter 1 – 2025	Trucks travelling along the haul road to site and dozer tracks were audible during the day at Location A, generating a site only L_{Aeq} of 30 dB. Trucks were audible during the day at Location B but was not measurable due to local heavy plant noise. Noise from site was not audible at Location C during either period. Noise from road traffic was primarily responsible for generating measured noise levels during the evening period. Noise from animals and insects was also noted.
Quarter 2 – 2025	Trucks travelling along the haul road to site were audible during the day at Location A, generating a site only LAeq of 32 dB, Location B, generating a site only LAeq of 27 dB, and Location C, generating a site only LAeq of less than 25 dB. Noise from road traffic, animals, and nearby conveyors were primarily responsible for generating measured noise levels during the evening period.

Based on site observations and information reviewed, potential noise impacts from the operation and construction activities at the project are considered to have been effectively mitigated and managed. No noise complaints were received during the reporting period. Monitoring reports are provided in Appendix B.

5.2.3 Reportable incidents

No reportable incidents have been recorded against operation noise for the reporting period.

5.2.4 Further improvements

No exceedances of noise criteria were recorded during the reporting period, as such there no further improvements required.

The scope of the noise monitoring is commensurate with the level of activity at the Site.

5.3 Ecological monitoring

Ecological monitoring is required, as part of condition 3.7 of the Project Approval, following a realignment of Sawyers Swamp Creek (SSC). The realignment of SSC will now be completed in two stages:

- Stage 1 - minor works to facilitate construction of the KVAR northern buttress whilst maintaining flow passage for SSC

- Stage 2 - realignment of creek associated with the final landform of the site as a whole. which is dependent upon detailed site investigation associated with contamination studies

Stage 1 SSC realignment, along the northern side of the KVAR, was initially planned to be undertaken during the reporting period to facilitate structural stabilisation works for the Stage 2 KVAR. The realignment is intended to reduce sediment loads and increase filtration/treatment of runoff from the Project Area through establishment of a riparian zone, resulting in "an overall beneficial effect on long term water quality within SSC".

EMM notes that a progressive rehabilitation plan has been developed in consultation with the relevant agencies and submitted to DPHI. Following approval of the plan and tendering, the realignment will commence.

As there has been no realignment of SSC, ecological monitoring required under Condition 3.7 of the Project Approval was not required during this reporting period.

5.4 Air quality monitoring

5.4.1 Environmental management

The Air Quality Monitoring Program, as outlined in the OEMP Air Quality sub-plan (section 6.6), identifies site specific actions to manage dust generated through transportation, stockpiling and placement of materials. These measures include the use of an extensive sprinkler system and water cart applications to control dust from operations within the Project Area and depositional dust gauge monitoring occurs for dust/airborne particulates.

Dust management is included in the responsibilities associated with all activities, as per the Air Quality Monitoring Program, including:

- wash-down of roadways, haul road/s and vehicle access roads
- use of perimeter sprays at the ash placement area
- mobile sprinkler system
- final and temporary capping of ash and other materials
- general maintenance of the Project Area.

i Dust suppression

A dedicated water sprinkler and surface irrigation system is in operation for the site. Water application rates are managed to ensure there are no visible dust emissions from the Project Area.

Water carts are available onsite to undertake additional dust suppression as required. The water used during dust suppression is sourced from the treated water system, no additional clean water is used in this application. Over 165 Megalitres (ML) of water has been used for irrigation/water cart over the AEMR period.

Additionally, the haul road to the Site is sealed and a truck wash facility is available.

ii Dust deposition monitoring

Air quality was monitored at four locations during the AEMR reporting period. The data is collected from the dust gauges and reviewed to ensure compliance with the Project Approval conditions.

The collected data provides an indicative assessment of potential air quality impacts from Project Area, and it should be noted that data collected from these locations include dust from all land use practices in the local area.

5.4.2 Environmental performance

i Dust deposition monitoring

Dust gauge data obtained for the reporting period is reviewed to confirm emissions have complied with annual compliance criteria.

Annual average depositional dust data for each of the four dust deposition gauges presented over the AEMR reporting period is presented in Figure 5.4 to Figure 5.7. All dust gauges had levels of insoluble solids and rolling annual averages below the OEMP threshold.

Two instances of contamination were noted during the reporting period:

- DG29 exceeded the OEMP threshold for total solids per sampling period for February 2025 due to sample contamination. The contamination was attributable to a large spider trapped in the sample bottle.
- DG32 exceeded the OEMP threshold for total solids per sampling period for January 2025, however the exposure period was 35 days, which is greater than the required 30±2 days. When adjusted to 30 days, the Total Solids totalled 4g/m2/month. Further, the sample bottle was found to be contaminated with glass shards from the glass funnel.

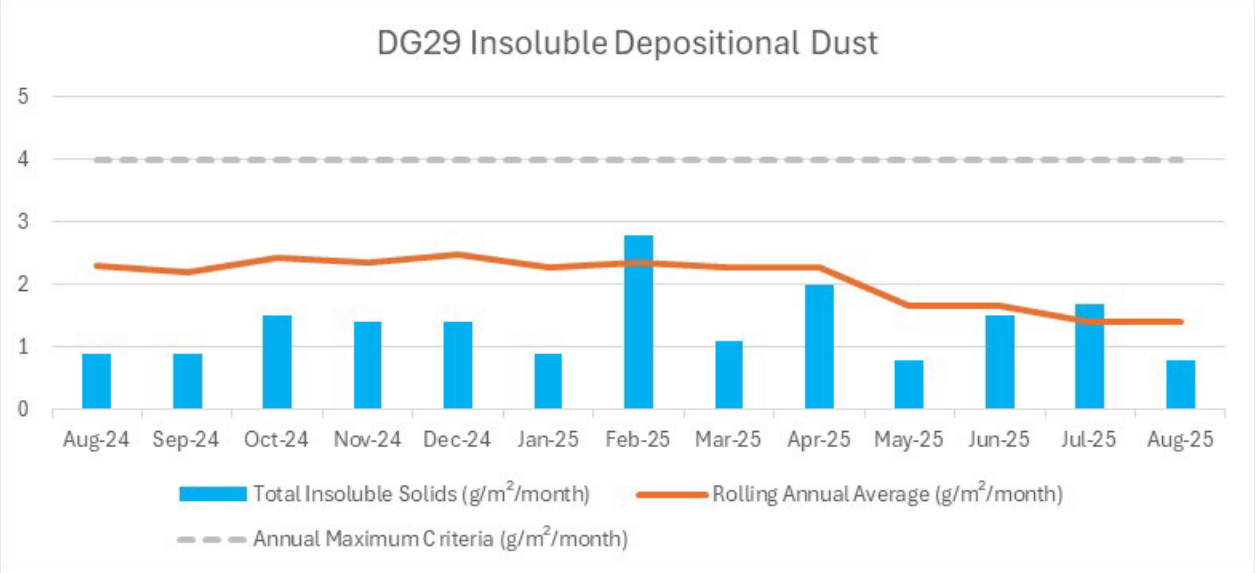


Figure 5.4 Depositional dust summary – Dust Gauge 29

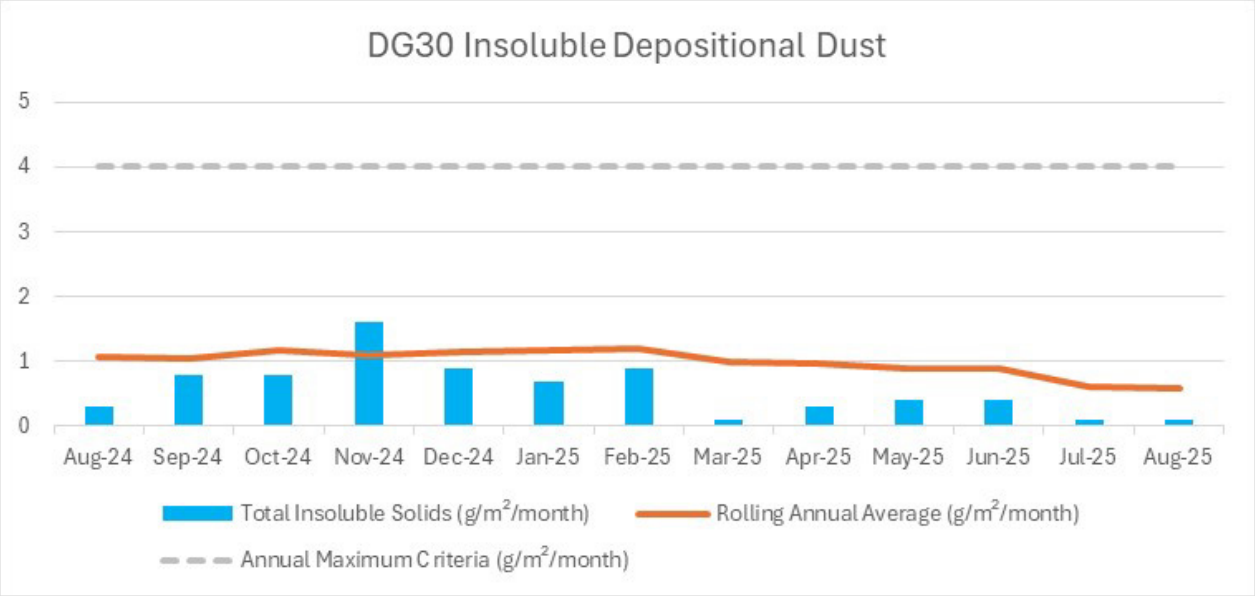


Figure 5.5 **Depositional dust summary – Dust Gauge 30**

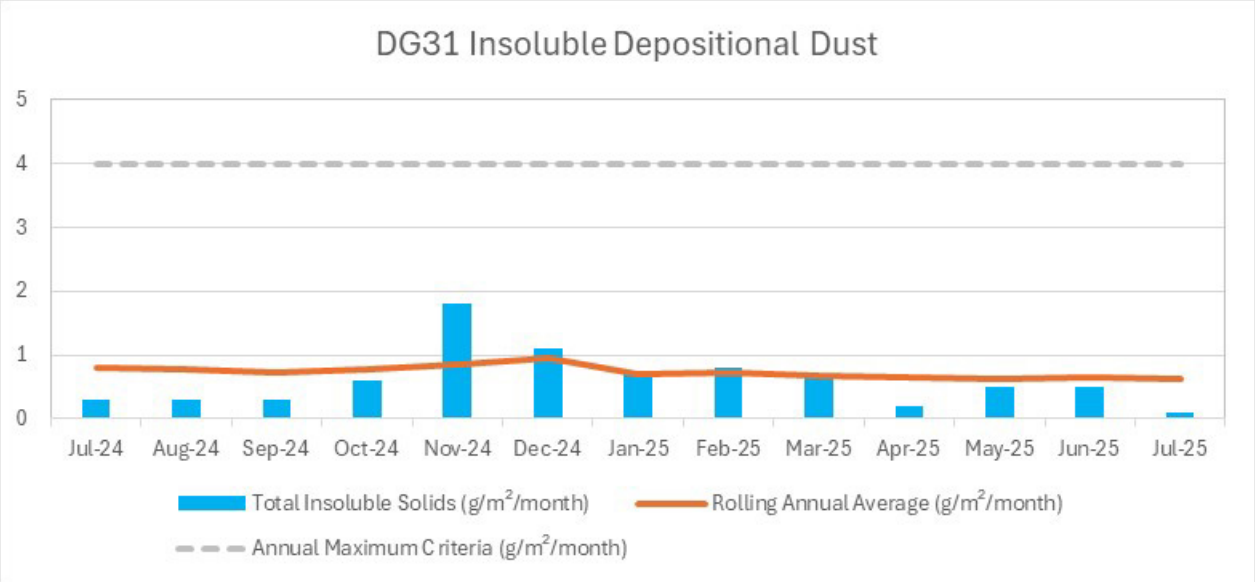


Figure 5.6 **Depositional dust summary – Dust Gauge 31**

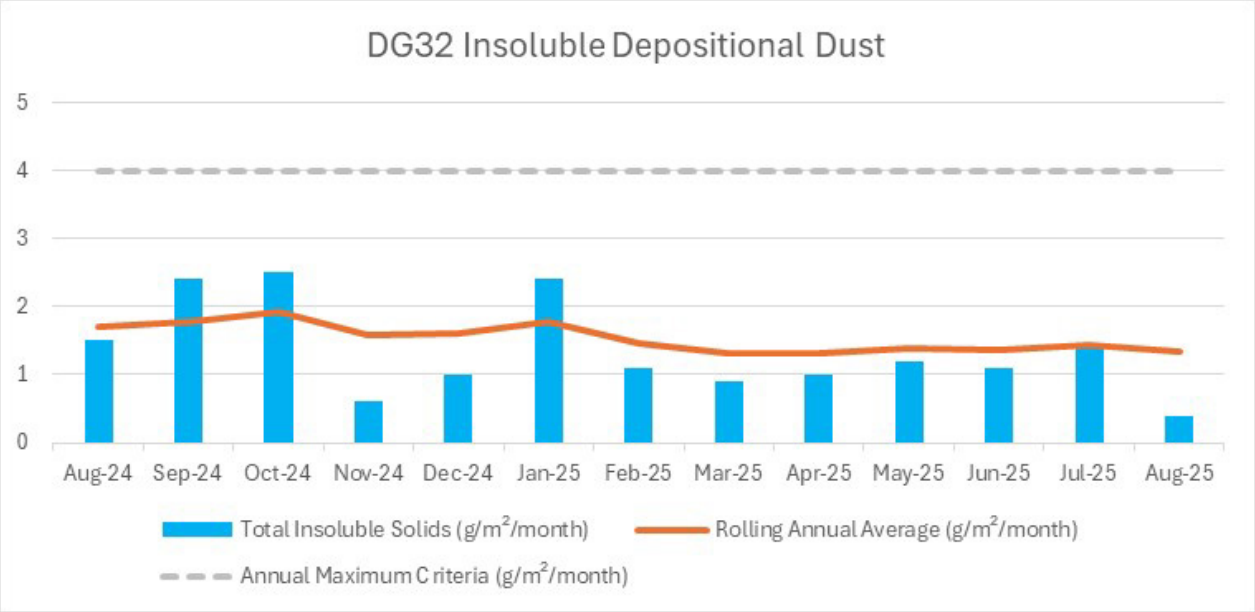


Figure 5.7 Depositional dust summary – Dust Gauge 32

5.4.3 Reportable incidents

There were no reportable incidents in relation to air quality management for the reporting period.

5.4.4 Further improvements

No exceedances of air quality criteria were recorded during the reporting period, as such there no further improvements required.

5.5 Waste

5.5.1 Environmental management

Waste disposal practices are managed in accordance with EPL 21185 and the OEMP Waste management sub-plan (section 6.8 of the OEMP). Waste materials are assessed, classified, managed, and disposed of in accordance with Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes (EPA 1999).

GPM and associated contractors are not to cause, permit or allow any waste generated outside the ash repository to be received at the ash repository for storage, treatment, processing, reprocessing or disposal, including no wastes other than those as stated on the licence approval to be kept on the site. Waste generated by site personnel shall (including maintenance wastes such as oils and greases) are collected on a regular basis and recycled or disposed of to an appropriate licenced facility.

All staff and contractors on Site are informed of the waste management procedures. Further guidance and detail on specific waste streams and applicable management measures are identified in the OEMP Waste Management sub-plan (section 6.8).

i Asbestos

In accordance with EPL 21185, asbestos waste from the demolition of Wallerawang Power Station may be received and disposed of in the approved asbestos disposal areas (as per the development consents MP07-0005).

Asbestos waste from the WPS demolition project was largely complete as of December 2022 and some areas have been capped in accordance with approved plans.

No material was received for disposal during the reporting period.

5.5.2 Environmental performance

Nil other wastes were received and placed at the Kerosene Vale Ash Repository during the reporting period. The activities within the Project Area were deemed to have met compliance obligations for waste management for the reporting period.

5.5.3 Reportable incidents

No reportable incidents have been recorded against waste management for the reporting period.

5.5.4 Further improvements

No further waste management improvements are proposed.

5.6 Heritage

5.6.1 Environmental management

An Environmental Assessment was performed by Parsons Brinckerhoff (2008b) for KVAR Stage 2 and included a preliminary archaeology and heritage assessment. The assessment concluded that the KVAR Stage 2 works pose no threat to the Aboriginal archaeological or heritage values and would not result in any further impact on Aboriginal archaeological potential. Based on these findings, the following statements of commitment, in regard to heritage sites, were made:

- Disturbance to the eastern portion of the ash repository shall be limited to reduce the potential for inadvertent disturbance of the Aboriginal heritage values of the area.
- In the event that any heritage sites or items be discovered during operation, all works likely to affect the area are to cease immediately. The GPM Environmental representative is to be notified immediately and relevant stakeholders including the Office of Environment and Heritage (OEH) Regional Archaeologist, the Bathurst Local Aboriginal Land Council, or the NSW Heritage Office, so that an appropriate course of action can be determined.

The OEMP outlines the management methods and guidance to protect Aboriginal and non-Aboriginal heritage sites in accordance with CoA's 2.37-2.38.

All construction and earthworks personnel are informed on their obligations in respect of the protection of Aboriginal and non-indigenous heritage sites and items as part of the Site induction.

5.6.2 Environmental performance

No known Aboriginal or non-indigenous heritage sites were impacted during the reporting period, and no additional sites were discovered or identified.

5.6.3 Reportable incidents

No reportable incidents have been recorded against heritage management for the reporting period.

5.6.4 Further improvements

No additional heritage management improvements are proposed for the next reporting period.

6 Water management

This chapter addresses surface and groundwater management over the AEMR Period. It includes descriptions of:

- the water management system
- water management actions over the period
- environmental performance
- reportable incidents and further improvements.

An Annual Water Quality Review (AWQR) which addresses the surface and groundwater monitoring and reporting requirements is established in the OEMP. The AWQR is provided in Appendix C.

6.1 Environmental management

This section provides an overview of the water management system and describes water management actions and water monitoring undertaken over the AEMR Period.

6.1.1 Water management system

Surface water at the site is described using the following nomenclature:

- **Sawyers Swamp Creek Ash Dam (SSCAD)** is an ash dam that was formed in the Sawyers Swamp Creek valley. It is divided into four sections (A, B, C and D) and has a total area of 82 ha. Each section is separated by earthen embankments. Section A comprises an open water body that is referred to as the SSCAD Pond and has areas of exposed ash. Sections B, C and D are referred to as the Upper Dam. A perched groundwater system exists within the placed ash (the perched SSCAD groundwater system).

  The SSCAD Pond is a large water body and is a central feature of the site's overall water management system. It receives contaminated water from the KVAR/KVAD water management area and the SSCAD embankment drainage system. This assists in minimising incidental surface and groundwater discharges from the site. SSCAD Pond also receives runoff from direct rainfall, a clean water catchment and overflows from the SSCAD Upper Dam (Section B, C and D).

  Water accumulation in the SSCAD Pond is managed via irrigation to exposed ash areas (when possible) and at times via controlled discharges to the Coxs River at a licensed discharge point located within the Power Station site (referred to as LDP3). Controlled discharges are treated in the LDP3 Treatment System which adjusts pH and reduces metal concentrations. Controlled discharges at LDP3 are regulated by EPL no. 21185, which has restrictions on when discharge can occur.

  During wet conditions, clean water runoff and groundwater inflows from the vegetated escarpments located to the north of SSCAD accumulate on the surface of Section B, C and D. Water quality testing has identified this water as being clean (as it has not infiltrated through the ash). Accordingly, during wet conditions, this water is pumped from Section B into Sawyers Swamp Creek. This practice has been successful in preventing overflows of clean water from the Upper Dam into SSCAD Pond. It is noted that GPM are currently constructing gravity operated systems that will minimise the volume of clean water that accumulates on Sections B and C (Figure 6.1). Gravity drainage works in Section D were completed in early 2024.

- **KVAR/KVAD water management area** is located to the west (downgradient) of SSCAD. KVAD is the Power Station's original ash dam which used to be an open cut mine void and KVAR is the dry ash compacted stockpile situated on top of the capped KVAD water management area. The combined area now has an associated water management system. A perched groundwater system exists within the KVAR (the perched KVAR groundwater system). Surface water runoff and seepage from this area drains to several water storage areas. Captured water that is known to be contaminated is pumped to the SSCAD Pond.

- **Sawyers Swamp Creek Diversion** is a clean water system that manages streamflow from Sawyers Swamp Creek and runoff from catchment areas to the south of SSCAD. The system diverts clean water around SSCAD and the KVAR/KVAD water management area. The diversion joins what is thought to be the original Sawyers Swamp Creek channel to the north-west of the Project Area.

- The following ancillary areas are located within the site or are relevant to the Site's overall water management system:

    - **Investigation Area** is a 24-ha area located in the western portion of the site, downgradient from the KVAR/KVAD water management area. Parts of this area have been disturbed by mining that is understood to have occurred prior to the 1950s. There are known deposits of coal ash, chitter and a rubbish dump in this area. Vegetation has re-established within most of the investigation area. GPM are investigating the potential for surface and groundwater contamination to occur from this area as part of the VMP process (see Section 10.1)

    - **Upgradient clean water catchments** refer to clean water catchment areas that are upgradient of either the SSCAD or the Sawyers Swamp Creek Diversion. Runoff from these catchments has potential to interact with the water management system via either direct inflows or system overflows during certain high flow events. Incidental discharge from the water management system (discussed above) may also enter the Sawyers Swamp Creek Diversion at several locations.

    - **Downgradient clean water areas** refer to parts of the site that are not known to have been previously disturbed by mining operations or ash placement and drain away from the water management system.

    - **Dump Creek** is a first order watercourse that is located to the west of the Site. Parts of the Investigation Area are within the Dump Creek Catchment. There is also potential for some groundwater from the Site to flow to the north-west towards Dump Creek.

Figure 6.1 shows the abovementioned features.

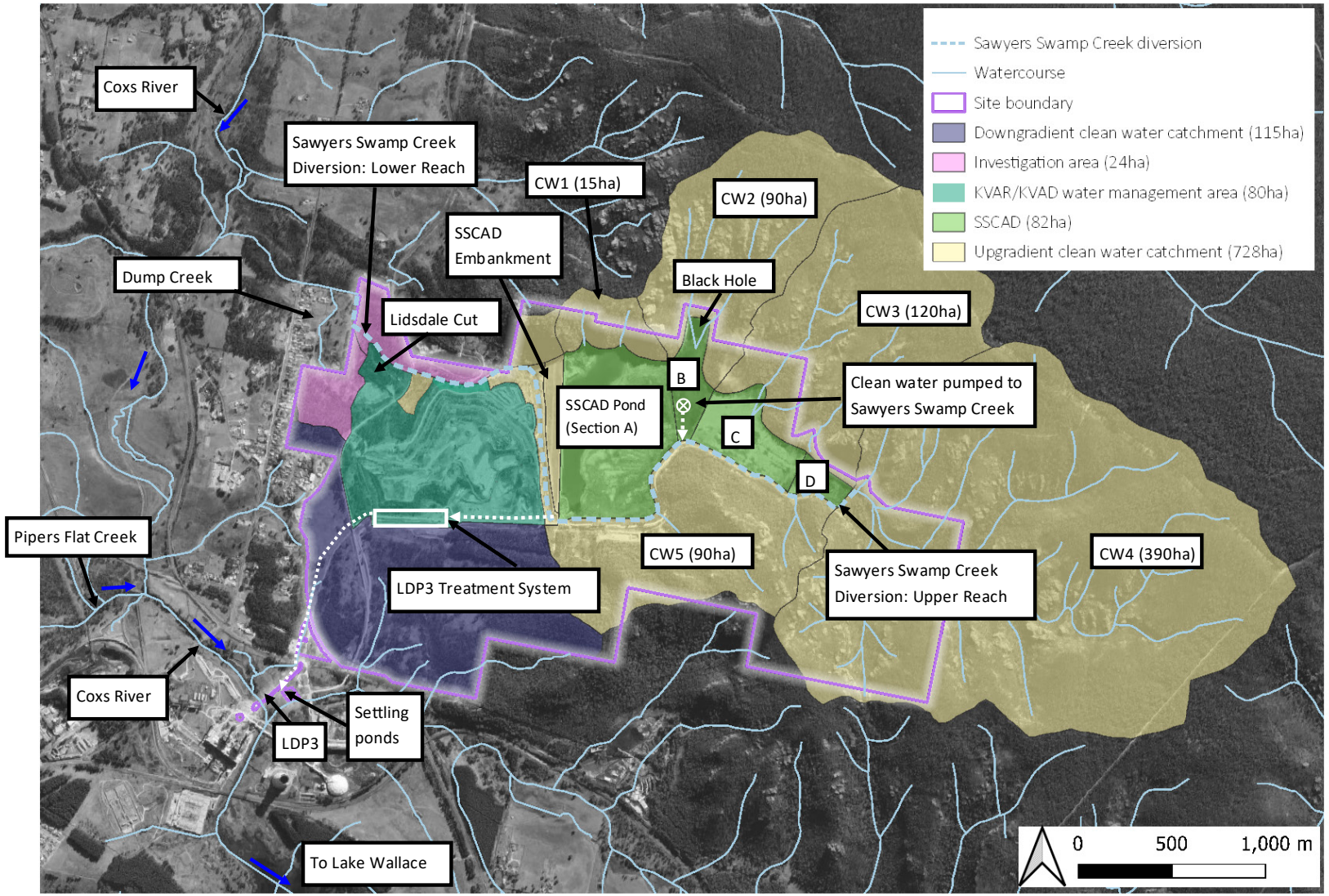


Figure 6.1 Water management features

6.1.2 Water management actions over the period

During the AEMR reporting period, GPM and the EPA have had ongoing discussions regarding water management improvements at the site. GPM have been and continue to progressively improve the water management system to:

- comply with dam safety management obligations
- improve the capture and containment of contaminated water
- improve the treatment of water discharged at LDP3
- reduce the volume of contaminated water that requires management
- improve clean water separation and stormwater management.

These improvements require numerous works at various locations within the Site. Many works have been completed to date which have resulted in significant improvements, with further improvements expected overtime.

During the AEMR Period, a review of progress against the Action Plan was included in Water Quality Monitoring Reports that were submitted to the EPA in March and September 2025. These plans provided an update on the progress of the improvement works, including anticipated implementation timeframes.

The water management actions for the AEMR reporting period are provided in Table 6.1.

Table 6.1 Water management system operations

Water management area	Description of operations during the Current Period
KVAR/KVAD Water Management Area	• All known seepage and subsurface drainage discharges from KVAD were collected in the seepage collection system which reticulates all captured water to Lidsdale Cut. Lidsdale Cut was dewatered to SSCAD, with most water irrigated in a segregated portion of SSCAD Section C as part of the irrigation trial. Sediment build up was removed from Lidsdale Cut Pond to increase water storage capacity. Downdraft evaporator trial continued in the leachate pond at Lidsdale Cut however, mechanical failure of the pump motor occurred due to impact from the aggressive nature of the leachate water quality within Lidsdale Cut. Multiple atomizer sprays are planned to be installed at SSCAD (latter half of 2025) with changes to submersible pump fixtures modified from the initial trial system. • The majority of stormwater runoff from KVAD and KVAR was managed into the stormwater system of the Wetland Pond. However, there is no active management of water from the red swamp area (i.e. runoff and seepage from the area still drains into Lidsdale Cut).
SSCAD embankment drainage system	• Seepage from the SSCAD embankment foundation and abutment drains was collected and pumped into the KVAR/KVAD contaminated water system, which is dewatered to SSCAD Cell C evaporation trial.

Water management area	Description of operations during the Current Period
SSCAD Upper Dam	• The gravity diversion works (referred to as CP1) transferred clean water runoff that enters the northern portion of SSCAD Section D into the Sawyers Swamp Creek Diversion. Clean water runoff was also pumped from Black Hole and SSCAD Section C (CP2) into Sawyers Swamp Creek. • Construction of a second system for SSCAD Section C (CP2) was paused during 2024. Works have been commenced during the current AEMR period with construction currently underway. • Management of water within the cut off trench along the toe of diversion dam to capture clean water seepage from diversion dam. • The proposed diversion from the Black Hole to the Sawyers Swamp Creek Diversion was redesigned from a single diversion work to two diversion works that are located slightly upstream of the Black Hole. Works have commenced during the current reporting period with construction currently underway. • As noted above, the trial of irrigating contaminated water from Lidsdale Cut onto the surface of SSCAD Section C continued during the period. It is noted that the irrigation area is segregated from the part of SSCAD Section C where clean water accumulates and is pumped into the Sawyers Swamp Creek Diversion.
SSCAD Pond	• Water accumulation in SSCAD Pond was managed by evaporation from the pond, irrigation of exposed ash in SSCAD Section A and discharges at LDP3 when the water level was above the safe operating level. 185 ML of treated water from SSCAD Pond was discharged at LDP3 in the AEMR Period. The discharges occurred in December 2024 (12 ML) and between late April and August 2025 (173 ML). • An automated system is used to improve irrigation of treated water from SSCAD Pond in the western portion of the Site. Irrigation activities were undertaken intermittently during the current reporting period when the water level in SSCAD was below the safe operating level. • The SSCAD pond level has been on a steady decline since December 2024, dropping from 938.5 m AHD to 937.1 m AHD in July 2025 • Methods of enhanced evaporation are being trialled on site currently.
LDP3	• During the AEMR Period, discharge of treated water at LDP3 occurred in 96 out of 365 days. The total discharge at LDP3 between September 2024 and August 2025 was 185 ML. – the minimum streamflow to discharge ratio of 10:1 was generally maintained, and most discharges occurred at a higher ratio (i.e. the discharge rate was less than 10% of the streamflow rate). – discharges only occurred when the Coxs River streamflow was above 10 ML/day, which is the minimum streamflow rate for which discharge can occur • During 2023, limestone leaky weirs were installed in the Return Water Canal to improve sludge removal efficiencies. During the Period, accumulated sludge was removed from the Return Canal regularly. GPM are investigating an alternative sludge pump removal system which would progressively remove sludge from the Return Water Canal as this has the potential to impact on treatment efficiency of the LDP3 Treatment System. Desludging occurred in the Canal during July 2025.

6.1.3 Water monitoring over the period

The AWQR addresses the surface and groundwater monitoring and reporting requirements established in the OEMP. Table 6.2 provides a summary of these requirements and notes where each requirement is addressed in the AWQR.

Table 6.2 OEMP – water monitoring and reporting requirements

	Description	OEMP reference	Report reference
Surface water			
Monitoring	Monthly monitoring will be undertaken at the following locations: <u>Coxs River:</u> • **WX12** – upstream of Sawyers Swamp Creek confluence • **S1** – downstream of Sawyers Swamp Creek confluence <u>Sawyers Swamp Creek:</u> • **SS5** – upstream of SSCAD • **S6** – downstream of SSCAD, upstream of SSCAD embankment and KVAR / KVAD water management area • **S5** – downstream of SSCAD, SSCAD embankment and the eastern part of KVAR / KVAD water management area • **WX5** – downstream of SSCAD, SSCAD embankment and KVAR / KVAD water management area, adjacent to Lidsdale Cut • **WX7** – downstream of the Site <u>Dump Creek:</u> • **WX11** – immediately upstream of the confluence with Sawyers Swamp Creek <u>Water Management System:</u> • **BLKH** – located in the Black Hole which is a waterbody that has formed adjacent to placed ash in SSCAD section B. • **SSCAD Pond** – a large water body located to the east of the SSCAD embankment. • **Lidsdale Cut** – a former open cut mine. Contaminated water from the KVAR / KVAD Water Management Area is reticulated to Lidsdale Cut. It is noted that additional monitoring within the water management system will be undertaken if specified in the surface water quality sub-plan. This monitoring is referred to as Operational Monitoring and will be used to inform the operation of the water management system and therefore does not need to be reported in the AEMR.	Section 4.1 – Surface water quality sub-plan	Chapter 4
Analysis	Surface water quality results will be compared to: • Guideline Values (GVs) for a slightly-to-moderately disturbed upland river system. • Water quality trends at each sampling location (where available) since July 2019. Earlier data is not considered to be relevant due to the water quality in Sawyers Swamp Creek being strongly influenced by discharges from Springvale Colliery that occurred between 2013 and July 2019. The results will be interpreted by a suitably qualified professional who will describe any deviations from GVs and changes to water quality trends.	Section 4.1 – Surface water quality sub-plan	Chapter 4
Reporting	An Annual Surface Water Quality Review (ASWQR) will be prepared as part of the AEMR. The ASWQR will include: • a description of weather and streamflow conditions over the AEMR period (the period) • a description of the water management system that was operated over the period • all water quality data and analysis.	Section 4.1 – Surface water quality sub-plan	Chapter 4

	Description	OEMP reference	Report reference
Groundwater			
Monitoring	6-monthly groundwater quality and level monitoring at thirteen locations: • WGM1/D1 ^ • WGM1/D2 *^ • WGM1/D3 *^ • WGM1/D4 *^ • WGM1/D5 ^ • WGM1/D6 *^ • WH_MW02 * • WH_MW03 * • WI_MW03 * • WJ_MW03 * • WK_MW01 * • WK_MW04 * • WK_MW06 * ** Sites nominated in EPL21185* *^ Current OEMP monitoring and reporting site* *Note that shallow seepage bore sites GW10, GW11, A9(AP09) and A17 (AP17) are not included in the OEMP but should continue to be sampled on a 6-monthly basis* *6-monthly groundwater level monitoring at 13 locations:* • WWD1A • WWD1B • WWD2A • WWD2B • WWD5A • WWD5B • WWD6A • WWD6B • WWD10 • WWD12 • WWD13 • WWD14A • WWD14B	Appendix B – Groundwater sub-plan	Chapter 5
Analysis	Groundwater quality results will be compared to: • water quality trends at each location (where available) using recent data (since 2019). Earlier data is not considered to be relevant due to the water quality being influenced by discharges from Springvale Colliery that occurred between 2013 and July 2019 • the baseline data (Appendix A) as per the baseline condition as assessed in the Environmental Assessment • the ANZECC 2000 Irrigation and Ecosystem Protection guidelines used as a reference point.	Section 5.1 – Groundwater sub-plan	Chapter 5
Reporting	The groundwater quality monitoring data and associated analysis is to be reported in the AEMR.	Section 5.1 – Groundwater sub-plan	Chapter 5

6.2 Environmental performance

6.2.1 Surface water

During the reporting period, a number of recommended actions from Environmental Representative inspections were actioned. These included cleaning drains, repairing erosion channels, stabilising inlet works, and installing or formalising drainage controls to manage runoff and prevent erosion. Sediment removal and batter chute establishment were prioritised during low-flow periods, with ongoing monitoring during rainfall to assess effectiveness and identify further control needs. Water quality results are being verified against CEMP/SWMP criteria, while reviews of creek sediment sources, drainage design, and clean water diversions (including CPESC input) remain ongoing.

The review of surface water quality data documented in the AWQR concluded that:

- Water quality trends in Lidsdale Cut and the Sawyers Swamp Creek Ash Dam (SSCAD) are consistent with recent AEMR periods (i.e. 2018 to the current period). Lidsdale Cut and SSCAD are part of the Site's contaminated water management system and hold water that is known to be ash affected.

- Dump Creek, which contributes to Sawyers Swamp Creek, outside of wet weather generally has standing water but no visible flow. The water quality over the AEMR period was variable with pH, salinity and metal concentrations, in some samples, exceeding Default Guideline Values (DGVs). Water quality results over the AEMR period, similar to Sawyers Swamp Creek, indicated poor water quality conditions during drier months, where groundwater seepage to the creek is in a higher proportion than better quality surface water.

- Sawyers Swamp Creek was observed to have perennial streamflow therefore ambient water quality conditions were influenced by what portions of groundwater and surface water contributed during the period. Due to the predominately wet conditions in the AEMR period, water quality downstream of the Site in Sawyers Swamp Creek was generally consistent with the understood surface water characteristics.

- The water quality in the Coxs River is not affected by the inflows from Sawyers Swamp Creek.

In August 2022 GPM issued a Water Management Assessment (EMM 2022c) to the NSW Environment Protection Authority (EPA). This assessment included an Action Plan that described water management system improvements that were either underway or proposed. The plan included a description of each improvement, expected outcome once implemented and an estimated completion timeframe. GPM continue to progressively improve the water management system through implementing the Action Plan commitments. During the AEMR Period, a review of progress against the Action Plan was included within the two Water Quality Monitoring Reports that were submitted to the EPA in March 2025 and September 2025.

6.2.2 Groundwater

The review of groundwater quality data documented in the AWQR concluded that:

- groundwater quality trends during the AEMR Period were generally consistent with recent AEMR periods (i.e. 2018 to the current period)

- groundwater quality at monitoring bore WGM1/D3 (located between SSCAD and the KVAR/KVAD), may be degraded, however this is consistent with previous results, relative to water quality trends at upgradient bores

- groundwater quality at monitoring bore WGM1/D6 (located downgradient of KVAR/KVAD) is consistent with ash affected water

- elevated concentrations of arsenic were reported at WK_MW06 in November 2024 which is consistent with previous results at this location but is an anomaly compared to other groundwater monitoring locations. In May 2025 the concentration of arsenic decreased to within range of other groundwater monitoring bores.

- groundwater quality at monitoring bore WGM1/D5 (located downgradient of KVAR/KVAD) has changed. The increases in concentrations of metals and EC may be indicative of KVAD seepages.

- The groundwater level trends were consistent with historical trends and generally reflect the CRD.

Potential groundwater contamination sources, pathways and receptors are being investigated as part of the Voluntary Management Proposal process that GPM has negotiated with the EPA.

6.2.3 Reportable incidents

No reportable incidents have been recorded against water management for the reporting period.

6.2.4 Further improvements

No additional water management improvements are proposed for the next reporting period.

7 Landscape and revegetation

7.1 Environmental management

The current scope of landscape and revegetation environmental management is provided in the Landscape and Revegetation sub-plan of the OEMP (section 6.7). The current Landscape and Revegetation Plan is based on an overall requirement to integrate the ash repository into the existing landscape with current activities focussing on care and maintenance of the site. Approximately 10 ha have been shaped and had topsoil applied, seeded and are actively growing. These areas are considered to be land under active rehabilitation.

Further site investigations and environmental studies will be undertaken to inform the safe closure of the Site with the overarching final landform and rehabilitation objectives ensuring the site is safe, stable and non-polluting, and fit for intended land use/s.

7.2 Environmental performance

7.2.1 Rehabilitation

Rehabilitation activities were undertaken during the 2024-2025 reporting period, these included:

- KVAR stage 2 topsoiling and hydromulching
- Lidsdale Cut topsoiling and hydromulching
- SSCAD road shoulder topsoiling and hydromulching (Photograph 7.2)
- Topsoiled and lucerne seeded Lidsdale Cut Wetlands (Photograph 7.3)
- Topsoiled SSCAD concrete dump
- Remediated and topsoiled asbestos landfill for asbestos management (Photograph 4.2)
- Installed and maintained erosion and sediment controls

Photograph 7.1 Aerial view of rehabilitation status at the KVAR

Photograph 7.2 SSCAD Finger Roads and Containment Pond 3 and 4

Photograph 7.3 SSCAD and wetland ponds

7.2.2 Stabilisation

Stabilisation activities during the AEMR reporting period have included ensuring the ongoing stability of the ash repositories, reshaping the landforms to provide reduced slope angles. Instability of the repositories is caused by steep batter slopes, saturation of exposed ash areas without capping, tree falls from fire and high winds and animal burrows. GPM has engaged technical specialists to design reinforcement options and a final landform and water drainage system to improve long term stability and thereby facilitate final capping and rehabilitation of the site. Works continued in the 2024-25 period and will continue into 2026 to establish a reinforcement berm against the entire KVAR/KVAD which will ensure stability of the repository in the long term. During the reporting period section 5 (otherwise known as Stage 2B) of the stability berm were constructed on the eastern face of the KVAR.

GPM will continue to investigate suitable supply of material for the reinforcement and also investigate soil stabilisation techniques to enhance stability and reduce reliance on a mass earth wall solution.

7.2.3 Weed control

A summary of works completed during the reporting period is included in Table 7.1

The growth of weeds has been an ongoing problem that GPM has continued to resolve through active weed management. Weed treatment throughout the reporting period has targeted pampas grass, blackberry, St John's wort, Sifton bush, purple top, broom, stink wort, cineraria, hemlock, radiata pine, tussock and various broadleaf weeds. Weed spraying is undertaken by a licensed contractor and only conducted during low wind conditions to reduce the potential for impacts from spray drift. Mechanical (manual) removal of vegetation (Pampas Grass) is also undertaken where access permits. A summary of weed control treatments applied is provided in Table 7.1.

Table 7.1 Summary of landscaping, revegetation and weed control during the reporting period

Reporting month	Landscaping, revegetation and rehabilitated area	Weed control
September 2024	Topsoiled and hydromulched KVAR, Lidsdale Cut and SSCAD road shoulders. **Total Area**– 4.0 ha	Multiple areas and zones across the site.
October 2024	Topsoiled and hydromulched of KVAR, and topsoil and manual seed spread by care and maintenance on the closed asbestos dump and access road shoulders. **Total area**– 1.0 ha	Multiple areas and zones across the site with species targeted including - Pin Cushion, St John's wort, Broom, Patterson's curse, Biddy Bush, Brassica, Fleabane, Cape weed, Great Mullien, Thistle, Purple Top, Stinking roger, Opium Poppy, fat hen and nettle.
November 2024	Topsoiled and hydromulched KVAR**.** **Total area**– 0.8 ha	Species targeted include - Paterson's Curse, Blackberry, St John's wort, Brassica, Fat hen, Thistle Purple top, Blue Heliotrope, Fleabane, Biddy bush, Great Mullien & broadleaf.
December 2024	Nil	Species targeted include - St John's wort, Blackberry, Biddy bush, Brassica, Stinking roger and various broadleaf.
January 2025	Nil	Species targeted include – Sticky Nightshade (serious weed brought into site located on Badgerys creek material) and Pampas Grass.
February 2025	Topsoil and lucerne seeded Lidsdale Cut Wetlands **Total area**– 1.0 ha	Species targeted include – Pampas Grass, Cineraria, Blue Heliotrope, Sifton Bush, Common morning Glory, Sticky Nightshade and Stick wort.
March 2025	Nil	Species targeted include – Blackberry, Biddy Bush, broadleaf and stink wort.
April 2025	Nil	Species targeted include – Blackberry, Sifton bush, purple top, stinkwort, marshmallow plant, Stinking Rodger, Sticky nightshade and various broadleaf.
May 2025	Topsoiled and hydromulched KVAR**.** **Total area**– 0.7 ha	Species targeted include – blackberry, Sifton bush, marshmallow plant, brassica, sticky nightshade, flax leaf fleabane, nodding thistle, saffron thistle, spear thistle, Mexican poppy thistle, Patterson's curse and various broadleaf.
June 2025	Topsoiled SSCAD concrete dump and asbestos dump. Area was remediated and topsoiled for asbestos management. **Total Area**– 2.5 ha	Minimal weed spraying activities were carried out during the month of June.
July 2025	Nil	Minimal weed management occurred during the month of July due to mid-winter season. Species targeted include – serrated tussock, Brassica and various broadleaf.
August 2025	Nil	Species targeted include – Radiata pine seedlings, Patterson's curse, thistle, skeleton weed, flaxed leaf fleabane and various broadleaf.

In the next AEMR reporting period GPM will continue to investigate suitable long-term revegetation that excludes tree species as part of the longer-term site management activities, in line with the HHERA conducted as part of the site declaration VMP.

7.2.4 Final landform

No final rehabilitation has occurred due to ongoing contamination investigations and preparation of the final RAP under the VMP. Until these investigations are completed a final landform cannot be completed. Works during the reporting period have focussed on containment of the exposed ash areas and asbestos landfill areas to ensure these areas are safe and stable. These containment measures have focussed on shaping the exposed areas and locations with limited cover with imported soil materials (VENM and ENM) to form stable landforms and thus limiting the potential for human health and environmental impacts from the site. Completion of these activities on exposed ash areas in the KVAR stage 2 area and commencement of a stability containment berm has continued throughout the reporting period with these works now largely complete across the entire approval area.

Temporary cover in the form of grasses and mulches has been applied to the newly shaped areas.

7.3 Reportable incidents

No reportable incidents have been recorded against landscape and revegetation management for the reporting period.

7.4 Further improvements

Care and maintenance activities will continue to be undertaken within the Project Area to ensure landscape and revegetation areas progress across the site.

8 Community engagement

8.1 Community consultation group

The requirement for a community consultation group was triggered with the declaration of the site as an area of significant contamination under the *Contaminated and Management Act*, and the preparation of the VMP.

The community consultation group allows community members access to the progress of the remediation and KVAR and allows suggestions on how the site may be used once all remediation is complete. To encourage community members to be involved in the Community Consultation Group, in 2023, advertisements were placed in local newspapers, hand delivered to Lidsdale residents, placed on the GPM website, included in news stories on the local television station and posters placed in local shops in Lidsdale, Wallerawang and Portland. As a result, several local residents registered to be included on the committee. There were Community Consultation Group Meetings held during the reporting period. These meetings took place on 20 November 2024 and 19 March 2025 16 July 2025.

8.2 Environmental Review Group

An Environmental Review Group was formed during the AEMR period with the first meeting taking place on 3 June 2025. The ERG consists of representatives from GPM, EMM, DPHI, NSW EPA, Lithgow Council, Water NSW and NSW Fisheries. A second ERG meeting took place on 12 August 2025. The ERG will meet each quarter in the next reporting period.

Minutes of the meetings are provided to participants following the meeting.

8.3 Website information

Copies of the following documents are made publicly available on the GPM website (https://gpmco.com.au/environment/):

- Environment Protection Licence (EPL21185)
- Operational Environmental Management Plan (EnergyAustralia, 2018)
- Annual Environmental Management Reports (2021- 2024)
- Environment Protection Licence 21185
- Pollution Incident Response Management Plan

Links to the Planning Portal are available on the GPM website for the following:

- Environment Assessment
- Project Approval 07_0005 (MOD2)

8.4 Community complaints procedure

GPM maintains a Community Information and Complaints Line for the public to report incidents, complaints or enquiries with contact details available on GPM's website.

GPM records the details of all complaints received in a Complaints Register. The register records:

- the date and time of the complaint

- the means by which the complaint was made (e.g. telephone, email, mail, in person)
- any personal details of the complainant that were provided, or if no details were provided a note to that effect
- the nature of the complaint
- the time taken to respond to the complaint
- any investigations and actions taken by GPM and/or the Contractor in relation to the complaint
- any follow-up contacts with, and feedback from, the complainant
- if no action was taken by GPM the Contractor in relation to the complaint, the reason(s) why no action was taken.

The Site Manager and the Facility Environment Manager ensure that the community relations protocols are communicated to all project personnel involved in the complaints process and that appropriate training covering the protocols is established in site inductions.

The key elements of the on-site complaints' management protocol include the following:

- All persons wishing to register a complaint to operations personnel will be politely directed to the site Manager, in line with GPM complaints procedure.
- The Site Manager will deal with the complaint and take down particulars of the complaint as per the criteria listed on the complaints register. Action will then be taken to resolve the issue whilst ensuring that all correspondence relating to the issue is documented. All attempts will be made to resolve the issue on the same day, however if this is not possible, the complainant will be updated regularly on the progress of the matter where practical.

8.5 Community complaints

No community complaints were received during the reporting period.

9 Compliance assessment

Since taking over the site, GPM have engaged a number of consultants and contractors to understand the history and current status to inform the safe closure of the site including decommissioning, demolition, rehabilitation. GPM has engaged an independent environmental representative (ER) under condition Schedule 2 Condition 6.1. The ER undertakes monthly inspections to ensure that all environmental programs are being implemented and that approval conditions are being complied with. The ER monthly report is prepared and provided to DPHI.

As part of each AEMR, a Compliance Assessment against the CoA is conducted. The 2024-2025 Compliance Assessment is available in Appendix A. The Compliance Assessment found the site was Compliant with the CoA for the AEMR Reporting Period.

9.1 Environmental representative inspections

The Environmental Representative (ER) for the Site is David Bone; EMM Consulting. Monthly reports are provided to DPHI within one month of undertaking each site inspection. A total of 12 reports were submitted to DPHI during the reporting period.

9.2 Incidents and non-compliances

There were no reportable incidents or non-compliances with the Conditions of Approval within the AEMR reporting period.

As stated in section 5.4, there were two instances of elevated dust results within the reporting period, however as these were associated with contaminated sample bottles and the annual results remained well below average, no further action was required.

On 4 May 2025 offsite water discharge from LDP3 to Coxs River from the water treatment plant occurred when the streamflow was less than 10 ML/day, which is a non-compliance with EPL 21185 condition L2.5. The discharge occurred for approximately 2 hours and 15 minutes and was reported to the EPA as a non-compliance event. An incident report was provided to the EPA on 20 May 2025. A training package was provided to the operator of the water treatment plant on 29 May 2025 for all operators to complete, to help mitigate against the likelihood of future non-compliances associated with water discharges offsite. Whilst this discharge event was a non-compliance with the conditions of EPL21145, the water quality results for sediment and pollution were within EPL discharge limits. Accordingly, this discharge event did not result in a non-compliance against the CoA.

Non-compliances with EPL 21185 are reported to the EPA in the Annual Return

9.3 Associated studies and investigations

To date, GPM has commissioned the following site studies and investigations:

- Continued engagement of a NSW EPA accredited site auditor to provide independent reviews of investigation, remediation, and validation work undertaken by GPM's consultants
- soil testing of historical mining stockpiled materials within and adjacent to GPM landholding
- monthly compliance review and monthly site inspections by the ER
- a progressive rehabilitation plan for Stage 1 SSC realignment has been developed in consultation with the relevant agencies and submitted to DPHI
- site closure planning consultants appointed to develop closure strategy for the site

- Water Quality Discharge Assessments under the EPL were completed
- Water Management Assessments (including a Site Action Plan), submitted to the EPA
- six-monthly Water Quality Monitoring Reports prepared and submitted to EPA
- numerical water model for the site
- installation of additional groundwater monitoring points and real time data logging
- upgrades of the water treatment plant and water management telemetry across the site
- update of the site weed management program
- assistance with the Department of Agriculture's reinstatement of copper wing butterfly habitat study
- biodiversity surveys of the GPM land holding
- routine dam safety audits of the SSCAD
- independent fortnightly work practice site safety audits.

In addition to the above studies and investigations, GPM has conducted its review of the OEMP and CEMP and is in the process of incorporating and addressing DPHI comments.

10 Future studies

10.1 Contamination declaration

Contamination within the Project Area was notified to the EPA by GPM under section 60 of the CLM Act on 10 March 2021. Following review of available information, the EPA advised (on 27 June 2022), that the contamination is significant enough to warrant regulation under the CLM Act.

On 22 August 2022, the EPA issued GPM with a Contaminated Land Declaration Notice which declares the site as significantly contaminated land under division 2 the *Contaminated Land Management Act 1997*. GPM has submitted a VMP to the EPA that establishes a proposed investigation and remediation approach. Key elements in determining the extent of remediation required will be the ultimate end use of the property, the extent of any contamination beyond the Project Area boundary and long-term stability of the contaminants so they are contained in perpetuity.

The following sequence of events were proposed:

- A Sampling, Analysis and Quality Plan (SAQP) was developed to outline the protocols for sampling, analysis, monitoring and reporting to inform the scope of the DSI, in accordance with the NEPM (ASC NEPM 2013) and NSW EPA (2020) guidelines.

- The Detailed Site Investigation (DSI) was undertaken with the objective of identifying the nature and extent of contamination. Intrusive soil investigations have been undertaken at the site for the to meet the objective of the DSI with conversion of multiple boreholes to groundwater wells for groundwater assessment and ongoing groundwater monitoring. The DSI report included relevant data from the Initial Groundwater Characterisation Report (EMM 2023c) and the Surface Water Characterisation Report. The Draft DSI was issued to the Site Auditor on 6 May 2025.

- A Human Health and Ecological Risk Assessment (HHERA) has been prepared to identify specific soil and groundwater acceptance criteria for the site and for the remediation works. The draft HHERA was issued to the Site Auditor 30 June 2025.

- A Remedial Options Assessment (ROA) and Remedial Action Plan(s) (RAP) will be prepared in the next reporting period to inform remediation requirements. The site Auditor's endorsement of/or confirmation that she/he has no objection to the ROA and RAP will be obtained and the EPA's approval of the RAP will be obtained.

GPM will continue to liaise with the EPA regarding the VMP in the next AEMR reporting period.

Appendix A

Conditions of Approval Compliance Assessment

EMM
creating opportunities

Administrative Conditions

Terms of Approval

Condition of Approval 1.1

The Applicant must carry out the project:

a) In compliance with the conditions of this approval;

b) In accordance with all written directions of the Secretary;

c) Generally in accordance with the EA; and

d) Generally in accordance with the Project Area.

Compliance Assessment Observations and Comments

Based on the review undertaken, the Kerosene Vale Ash Repository operations have been carried out in accordance with the above requirements. No written directions from the Secretary were received within the reporting period.

Compliance Assessment Finding – Compliant

Condition of Approval 1.2

Consistent with the requirements in this approval, the Secretary may make written directions to the Applicant including in relation to:

a) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this consent, including those that are required to be, and have been, approved by the Secretary; and

b) the implementation of any actions or measures contained in any such document referred to in condition 1.2a.

Compliance Assessment Observations and Comments

DPHI were provided the Operational Environmental Management Plan (OEMP) and Construction Environmental Management Plan (CEMP) for review during the reporting period. Comments were received from DPHI on these plans and are currently under revision.

Compliance Assessment Finding – Compliant

Condition of Approval 1.3

The conditions of this approval and directions of the Secretary prevail to the extent of any inconsistency, ambiguity or conflict between them and the document/s listed in condition 1.1c). In the event of an inconsistency, ambiguity or conflict between any of the document/s listed in condition 1.1c), the most recent document prevails to the extent of the inconsistency, ambiguity or conflict.

Compliance Assessment Observations and Comments

Noted.

Compliance Assessment Finding – Compliant

Limits of Approval

Condition of Approval 1.4

This approval shall lapse five years after the date on which it is granted, unless the works that are the subject of this approval are physically commenced on or before that time.

Compliance Assessment Observations and Comments

Works physically commenced in September 2020, therefore Condition 1.4 is satisfied, and there is no expiry date for the consent.

Compliance Assessment Finding – Compliant

Statutory Requirements

Condition of Approval 1.5

The Applicant shall ensure that all licences, permits and approvals are obtained as required by law and maintained as required with respect to the project. No condition of this approval removes the obligation for the Applicant to obtain, renew or comply with such licences, permits or approvals.

Compliance Assessment Observations and Comments

The project operates in accordance with the requirements of Generator Property Management Pty Limited EPL 21185. There are no Water Access Licences, AHIPS, Council Consents, or other licences held by GPM for the Site.

Compliance Assessment Finding – Compliant

Specific Environmental Conditions

Ash Management

Condition of Approval 2.1

The Applicant shall prepare a long-term ash-management strategy including a program for investigation and assessment of alternative ash management measures with a goal of 40% reuse of ash by 31 December 2013. The report shall be submitted to the Secretary within six months of the commencement of operations. The Applicant shall report on the status and outcomes of its investigations to the Secretary every two years from the commencement of the operation of the project, unless otherwise agreed by the Director-General.

Compliance Assessment Observations and Comments

Not triggered during reporting period.

Compliance Assessment Finding – Not triggered

Condition of Approval 2.2

To facilitate assessment of the viability of coal resources in the project area and provide a finite opportunity for their extraction, the Applicant shall undertake revised staging of ash placement activities as described in the document referred to in condition 1.1c) of this approval

Compliance Assessment Observations and Comments

Ash has not been placed over the coal resource in the project area during the reporting period.

Compliance Assessment Finding – Not triggered

Noise Impacts

Construction hours

Condition of Approval 2.3

Construction activities associated with the project shall only be undertaken during the following hours:

- *a) 7:00am to 6:00pm, Mondays to Fridays, inclusive;*
- *b) 8:00am to 1:00pm on Saturdays; and*
- *c) at no time on Sundays or public holidays.*

Compliance Assessment Observations and Comments

No construction activities have occurred during the reporting period.

Compliance Assessment Finding – Not triggered

Condition of Approval 2.4

Activities resulting in impulsive or tonal noise emission (such as rock breaking or rock hammering) shall be limited to 8:00 am to 12:00 pm, Monday to Saturday and 2:00 pm to 5:00 pm Monday to Friday. The Applicant shall not undertake such activities for more than three continuous hours and must provide a minimum one-hour respite period.

Compliance Assessment Observations and Comments

No activities resulting in tonal or impulsive noise emission have occurred during the monitoring period.

Compliance Assessment Finding – Not triggered

Condition of Approval 2.5

Construction outside the hours stipulated in condition 2.3 of this approval is permitted in the following circumstances:

- *a) where construction works do not cause audible noise at any sensitive receiver; or*
- *b) for the delivery of materials required outside these hours by the Police or other authorities for safety reasons; or*
- *c) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.*

Compliance Assessment Observations and Comments

No construction activities have taken place during the reporting period.

Compliance Assessment Finding – Not triggered

Condition of Approval 2.6

The hours of construction activities specified under condition 2.3 of this approval may be varied with the prior written approval of the Secretary. Any request to alter the hours of construction specified under condition 2.3 shall be:

a) considered on a case-by-case basis;

b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours; and

c) accompanied by any information necessary for the Secretary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of sensitive receivers in the vicinity of the site.

Compliance Assessment Observations and Comments

No construction activities have taken place during the reporting period.

Compliance Assessment Finding – Not triggered

Construction Noise

Condition of Approval 2.7

The construction noise objective for the Applicant is to manage noise from construction activities (as measured by LA10 (15minute) descriptor) so as not to exceed the background LA90 noise level by more than 10dB(A) at any sensitive receiver.

Any activities that have the potential for noise emissions that exceed the objective must be identified and managed in accordance with the Construction Noise Management Plan (as referred under condition 6.3B) of this approval). The Applicant shall implement all reasonable and feasible noise mitigation measures with the aim of achieving the construction noise objective.

Compliance Assessment Observations and Comments

No construction activities have taken place during the reporting period.

Compliance Assessment Finding – Not triggered

Operational hours

Condition of Approval 2.8

Operational activities associated with the project shall only be undertaken from 7:00am to 10:00pm Monday to Sunday.

Compliance Assessment Observations and Comments

Operational activities were only undertaken between 7:00am and 10:00pm Monday to Sunday for the duration of the reporting period.

Compliance Assessment Finding – Compliant

Condition of Approval 2.9

Within six months of commencement of operation of the project the Applicant shall prepare and submit to the Secretary a review of the logistical arrangements for ash haulage and placement to determine the feasibility of reducing the hours of operation. If, as a result of the review, it is determined that ash haulage and placement times can commence later and/or finish earlier, the Applicant shall aim to observe the reduced hours whenever possible.

Compliance assessment Observations and Comments

No ash placement occurred during the AEMR reporting period.

Compliance Assessment Finding – Not triggered

Conditions of Approval 2.10

Operations outside the hours stipulated in condition 2.8 of this approval are only permitted in the following emergency situations:

- *a) where it is required to avoid the loss of life, property and/or to prevent environmental harm; or*
- *b) breakdown of plant and/or equipment at the repository or the Wallerawang Power Station with the effect of limiting or preventing ash storage at the power station outside the operating hours defined in condition 2.8; or*
- *c) a breakdown of an ash haulage truck(s) preventing haulage during the operating hours stipulated in condition 2.8 combined with insufficient storage capacity at the Wallerawang Power Station to store ash outside of the project operating hours; or*
- *d) in the event that the National Electricity Market Management Company (NEMMCO), or a person authorised by NEMMCO, directs the Applicant (as a licensee) under the National Electricity Rules to maintain, increase or be available to increase power generation forsystem security and there is insufficient ash storage capacity at the Wallerawang Power Station to allow for the ash to be stored.*

In the event of conditions 2.10b) or 2.10c) arising, the Applicant is to take all reasonable and feasible measures to repair the breakdown in the shortest time possible.

Compliance assessment Observations and comments

No operational activities have taken place outside of the approved hours. These works only relate to activities at the 'repository'. As the WPS has been largely demolished it has not been part of the GPM controlled activities since 2020.

Compliance Assessment Finding – Not triggered

Conditions of approval 2.11, 2.12, 2.13 and 2.14

2.11 – *In the event that an emergency situation as referred to under condition 2.10b) or 2.10c) occurs more than once in any two month period, the Applicant shall prepare and submit to the Secretary for approval a report including, but not limited to:*

- *a) the dates and a description of the emergency situations;*
- *b) an assessment of all reasonable and feasible mitigation measures to avoid recurrence of the emergency situations;*
- *c) identification of a preferred mitigation measure(s); and*
- *d) timing and responsibility for implementation of the mitigation measure(s).*

The report is to be submitted to the Secretary within 60 days of the second exceedance occurring. The Applicant shall implement all reasonable and feasible mitigation measures in accordance with the requirements of the Secretary.

2.12 - *The Applicant shall notify the EPA prior to undertaking any emergency ash haulage or placement operations outside of the hours of operation stipulated in condition 2.8 of this approval and keep a log of such operations.*

2.13 – *The Applicant shall notify the Secretary in writing within seven days of undertaking any emergency ash haulage or placement operations outside of the hours of operation stipulated in condition 2.8 of this approval.*

2.14 - *The Applicant shall notify nearby sensitive receivers (as defined in the Operational Noise Management Plan required under condition 6.5a) of this approval) prior to 8.00 pm where it is known that emergency ash haulage or placement operations will be required outside of the hours of operation stipulated in condition 2.8 of this approval.*

Compliance Assessment Observations and comments

No emergency situations have occurred during the reporting period, therefore conditions 2.11- 3.14 were not triggered.

Compliance Assessment Finding – Not triggered

Operational noise

Conditions of Approval 2.15

The cumulative operational noise from the ash placement area and ash haulage activity shall not exceed an LAeq (15 minute) of 40 dB(A) at the nearest most affected sensitive receiver during normal operating hours as defined in condition 2.8 of this approval.

This noise criterion applies under the following meteorological conditions:

- *wind speeds up to 3 m/s at 10 metres above ground; and/or*
- *temperature inversion conditions of up to 3oC/100 m and source to receiver gradient winds of up to 2 m/s at 10 m above ground level.*

This criterion does not apply where the Applicant and the affected landowner have reached a negotiated agreement in regard to noise, and a copy of the agreement has been forwarded to the Secretary and the EPA.

Compliance Assessment Observations and comments

Measured noise levels during the 2024-25 reporting period indicate Kerosene Vale Ash Repository is compliant with operational noise criteria (See section 6.3 and Appendix C).

Compliance Assessment Finding – Compliant

Condition of Approval 2.16

The Applicant shall implement measures to ensure noise attenuation of trucks. These measures may include, but are not limited to, installation of residential class mufflers, engine shrouds, body dampening, speed limiting, fitting of rubber stoppers to tail gates, limiting the use of compression breaking, and ensuring trucks operate in a one-way system at the ash repository where feasible.

Compliance Assessment Observations and Comments

No fly ash trucks have been hauling to the ash placement area during the reporting period, due to the closure of WPS.

Measured noise levels during the 2024-25 AEMR reporting period indicate Kerosene Vale Ash Repository is compliant with operational noise criteria (See section 6.3 and Appendix C).

Compliance Assessment Finding – Compliant

Condition of Approval 2.17

The Applicant shall liaise with the owner/operator of Angus Place Coal Mine with the aim of preparing a protocol which provides for a co-operative approach for the management and mitigation of noise impacts associated with coal and ash truck movements along the private haul road.

Compliance Assessment Observations and Comments

In 2015, Angus Place Coal Mine was placed into Care and Maintenance. As a result, no coal truck movements have occurred on the private haul road. In addition, no ash truck movements have occurred along the private haul road during the reporting period due to the closure of Wallerawang Power Station.

Compliance Assessment Finding – Not triggered

Condition of Approval 2.18

Where noise monitoring (as required by conditions 3.2 or 3.3 of this approval) identifies any non-compliance with the operational noise criterion specified under condition 2.15 of this approval the Applicant shall prepare and submit to the Secretary for approval a report including, but not limited to:

- *a) an assessment of all reasonable and feasible physical and other mitigation measures for reducing noise at the source including, but not limited to –*
  - *i) construction of a noise barrier along the haulage road*
  - *ii) alternative ash haulage routes, and*
  - *iii) alternative methods of ash conveyance to the repository; and*
- *b) Identification of the preferred measure(s) for reducing noise at the source;*
- *c) Feedback from directly affected property owners and the EPA on the proposed noise mitigation measures; and*
- *d) Location, type, timing and responsibility for implementation of the noise mitigation measure(s).*

The report is to be submitted to the Secretary within 60 days of undertaking the noise monitoring which has identified exceedances of the operational noise criterion specified under condition 2.15, unless otherwise agreed to by the Secretary. The Applicant shall implement all reasonable and feasible mitigation measures in accordance with the requirements of the Secretary.

Compliance Assessment Observations and Comments

The requirement for a noise investigation report was not triggered. Measured noise levels during the 2024-25 AEMR reporting period indicate Kerosene Vale Ash Repository is compliant with operational noise criteria (See section 6.3 and Appendix C).

Compliance Assessment Finding – Not triggered

Additional Noise Mitigation Measures

Condition of Approval 2.19

Compliance Assessment Observations and Comments

The requirement for a noise investigation report and additional noise mitigation measures was not triggered. Measured noise levels during the 2024-25 AEMR reporting period indicate Kerosene Vale Ash Repository is compliant with operational noise criteria (See section 6.3 and Appendix C), therefore the Conditions of Approval relating to Additional Noise Mitigation Measures are not applicable.

Compliance Assessment Finding – Not triggered

Land Acquisition Criteria

Condition of Approval 2.20, 2.21, 2.22,2.23, 2.24, 2.25

Compliance Assessment Observations and Comments

The requirement for a noise investigation report or land acquisition was Not triggered during the reporting period. No landholders have applied for approval to subdivide their land according to the land acquisition rights, therefore the Conditions of Approval relating to Land Acquisition Criteria are not applicable.

Compliance Assessment Finding – Not triggered

Sawyers Swamp Creek Realignment

Condition of Approval 2.26

The Applicant shall prepare and submit to the Secretary for approval a Rehabilitation Plan addressing the restoration of the in-stream area (i.e. bed and bank) of Sawyers Swamp Creek and the associated riparian corridor at least two months prior to the realignment of the creek, unless otherwise agreed by the Secretary. The Plan shall be developed in consultation with, and to the satisfaction of, Fisheries NSW and shall include, but not necessarily be limited to:

- *a) the objectives and outcomes that would be sought through the implementation of the Plan;*
- *b) performance criteria for the realigned creek and associated riparian zone against which the impact of the project on the ecological health of Sawyers Swamp Creek will be assessed;*
- *c) methodology used in developing the realignment planform;*
- *d) details of the final creek realignment including bank, meander, depth and slope characteristics (including pool-riffle sequences), flow and channel capacity characteristics, scour potential, and in-stream vegetation;*
- *e) timing of the creek realignment;*
- *f) a description of the proposed riparian zone and restoration works along the entire length of the creek realignment, including details of plant species to be used in rehabilitation;*
- *g) details of any proposed riparian and in-stream controls to be implemented in the reach upstream of the alignment to ensure the effectiveness of the proposed creek realignment and rehabilitation;*
- *h) a description of the initial and ongoing weed control measures;*
- *i) the methodology and timing of post realignment monitoring of the hydrology and ecological health of the aquatic and riparian vegetation as required under conditions 3.6 and 3.7 of this approval, respectively;*
- *j) mitigation measures to be implemented in the event of an identified decline in ecosystem health as a direct result of the realignment of the creek or construction or operation of the project, including a timetable for implementation;*
- *k) program for ongoing maintenance of the realigned creek system and associated riparian zone;*
- *l) any compensatory measures to offset the impacts of the project on the aquatic habitat and local waterways, if and as required by Fisheries NSW and*
- *m) provisions for periodic reporting of monitoring results to Fisheries NSW.*

The Applicant shall not commence any construction work that would result in the disturbance of Sawyers Swamp Creek until the Rehabilitation Plan has been approved by the Secretary.

Compliance Assessment Observations and Comments

The Sawyers Swamp Creek Realignment Progressive Rehabilitation Plan has been submitted to DPHI for review during the reporting period.

Compliance Assessment Finding – Not triggered

Condition of Approval 2.27, 2.28 and 2.29

2.27 *The rehabilitation and restoration of Sawyers Swamp Creek and associated riparian zone are to be consistent with the Works and Watercourse Design Guideline (DWE, April 2007) and Guidelines for Controlled Activities: Vegetation Management Plans (DWE, February 2008).*

2.28 *A riparian zone consisting of local native plant species shall be established and maintained in and adjacent to Swayers Swamp Creek, for the entirety of the site and be a minimum width of 20 m on both sides of the creek. Seed and propagule sources are to be from local botanical provenance and same general habitat.*

2.29 *The riparian zone referred to under condition 2.28 of this approval shall be maintained for a period of at least five years after final planting.*

Compliance Assessment Observations and Comments

The requirements of 2.27, 2.28 and 2.29 have been incorporated into the Sawyers Swamp Creek Realignment Progressive Rehabilitation Plan, which was submitted to DPHI for review during the reporting period.

Compliance Assessment Finding – Compliant

Surface water quality

Condition of Approval 2.30

The Applicant shall take all reasonable and feasible measures to prevent discharge of sediments and pollutants from the construction and operation of the project entering waterways.

Note: Section 120 of the Protection of the Environment Operations Act 1997 prohibits the pollution of water except where expressly provided by an Environmental Protection Licence.

Compliance Assessment Observations and Comments

Prior to discharging offsite, water is treated at the onsite water treatment facilities, then discharged via the Licensed Discharge Point (LDP3) to the Coxs River. During the AEMR period, there was one instance of discharge to the Coxs River when streamflow was less than 10ML/day. This incident occurred on 4 May 2025 for approximately 2.15 hours and was reported to the EPA as a non-compliance incident. Whilst this discharge event was a non-compliance with the conditions of EPL 21145, the water quality results for sediment and pollution were within EPL discharge limits. Accordingly, this discharge event did not result in a non-compliance against CoA 2.30.

The Onsite Water Treatment facility was upgraded in January 2023, with further commissioning activities recommended to improve water management on the Site, including irrigation of SSCAD pond, irrigation of contaminated water onto Section C of SSCAD and mechanical evaporation units on SSCAD pond. See Table 3.1 of the AEMR for details of the water management system operation during the AEMR reporting period.

Compliance Assessment Finding – Compliant

Condition of Approval 2.31

Earthworks not associated with the realignment of Sawyer Swamp Creek shall not be undertaken within 50m of the creek where reasonable and feasible.

Compliance Assessment Observations and Comments

Sawyer Swamp Creek is a heavily disturbed waterway. The entire Project Area is within 50m of Sawyer Swamp Creek; therefore, it is not reasonable or feasible for earthworks to be conducted greater than 50m away from the Creek.

Compliance Assessment Finding – Compliant

Condition of Approval 2.32

All equipment, machinery and vehicles associated with the construction and operation of the project shall be operated and maintained in a manner that minimises the potential for oil and grease spills/leaks.

Compliance Assessment Observations and Comments

PRJH Mining supply GPM with a Lidsdale Site Operations Monthly Report detailing site safety, operations, environmental and maintenance aspects of site management. The maintenance records include general site operations and inspections of monitoring stations, site water usage, pre-start inspections, records of incidents /near misses, training and safety inspections. Spill kits are available on plant and equipment for the management of unexpected spills. *Monthly PRJH Client Service Reports may be viewed upon request.*

Compliance Assessment Finding - Compliant

Air Quality

Condition of Approval 2.33

The Applicant shall construct and operate the project in a manner that minimises dust impacts generated by construction works and operational activities, including wind-blown and traffic generated dust, on the receiving environment. All activities on the site shall be undertaken with the objective of preventing visible emissions of dust from the site. Should such visible dust emissions occur at any time, the Applicant shall identify and implement all practicable dust mitigation measures, including cessation of relevant works, as appropriate, so that emissions of visible dust cease.

Compliance Assessment Observations and Comments

Dust management is a key focus for the Site. Dust mitigation measures include:

- use of perimeter sprays at the ash placement area
- water carts (12,000L and 20,000 L capacity) on site during all operations 8 am to 5 pm Mondays to Sundays
- final capping of ash, and
- general maintenance and rehabilitation of the ash placement area

Depositional dust results for the period were below the annual assessment criteria at all gauges during the AEMR reporting period.

Compliance Assessment Finding – Compliant

Condition of Approval 2.34

The Applicant shall ensure that the load carrying compartment(s) of all ash haulage trucks are covered at all times except when loading or unloading ash material.

Compliance Assessment Observations and Comments

No issues with load coverings were recorded for the 2024-25 reporting period. All loads which enter site are monitored by security cameras and gatehouse staff.

Compliance Assessment Finding - Compliant

Lighting Emissions

Condition of Approval 2.35

The Applicant shall take all practicable measures to mitigate off-site lighting impacts from the project and ensure all external lighting associated with the project complies with Australian Standard AS4282 1997 – Control of the Obtrusive Effects of Outdoor Lighting.

Compliance Assessment Observations and Comments

No mobile lighting plants are utilised at Kerosene Vale operations. In the event that Lighting Plants are utilised, the lights must face south or east, operators must ensure the horizontal distance of the illuminated area is not less than 40m and must be extinguished by 10pm.

Compliance Assessment Finding - Compliant

Construction Traffic and Transport Impacts

Condition of Approval 2.36

The Applicant shall ensure that construction vehicles associated with the project:

a) minimise the use of local roads (though residential streets and town centres) to gain access to the site;

b) adhere to any nominated haulage routes identified in the Construction Traffic Management Plan as referred to in condition 6.3a) ofthis approval; and

c) adhere to a Construction Vehicle Code of Conduct prepared to manage driver behaviour along the local road network to address traffic impacts (and associated noise) along nominated haulage routes.

Compliance Assessment Observations and Comments

A Construction and Operational Transport Management Plan was submitted to DPHI during the reporting period as part of the CEMP and OEMP revisions. It is anticipated that these plans will be approved and implemented in the 2025-2026 AEMR reporting period.

Compliance Assessment Finding - Compliant

Capping Material Transport Impacts

Condition of approval 2.36A

The Applicant must:

a) not import more than 100 heavy vehicle loads of capping material to the site per day;

b) cover all heavy vehicle loads of capping material;

c) not transport capping material on local roads in the Lithgow local government area;

d) notify the Department before commencing the importation of capping material from sources outside of the Lithgow local government area; and

e) not import capping material to the site for more than 10 years following the date of approval of Modification application 07_0005 Mod 2.

Compliance, Assessment and Observation

Import of capping materials has complied with condition a). to e) during the reporting period.

Compliance Assessment Finding – Compliant

Condition of Approval 2.36B

The Applicant must implement warning signage on the Castlereagh Highway on the approaches to the Castlereagh Highway/Wallerawang Power Station Haul Road intersection prior to importing capping material to the site from sources outside of the Lithgow local government area to the satisfaction of TfNSW.

Compliance, Assessment and Observation

A Construction and Operational Transport Management Plan was submitted to DPHI during the reporting period as part of the CEMP and OEMP revisions. It is anticipated that these plans will be approved and implemented in the 2025-2026 AEMR reporting period. Signage is erected on the approaches to the Castlereagh Highway.

Compliance Assessment Finding – Compliant

Heritage Impacts

Condition of Approval 2.37

The Applicant shall ensure that all construction personnel are educated on their obligations in respect of the protection of Aboriginal and non-indigenous heritage sites and items.

Compliance Assessment Observations and Comments

The PRJH Mining Works Procedure Manual includes Environmental Management Controls for Cultural Heritage and applies to all personnel. Heritage obligations (Aboriginal and non-indigenous heritage) are included in the GPM Induction for all personnel entering and conducting works on the Site.

Compliance Assessment Finding - Compliant

Condition of Approval 2.38

If any previously unidentified heritage sites or items (Aboriginal and/or non-indigenous) are discovered during construction works or operational activities, all work likely to affect the heritage sites or item(s) is to cease immediately and the discovery of the objects shall be reported to OEH or the Department as relevant.

Compliance Assessment Observations and Comments

No previously unidentified heritage sites or items were discovered during the reporting period.

Compliance Assessment Finding – Not triggered

Waste Management

Condition of Approval 2.39

All waste materials shall be assessed, classified, managed and disposed of in accordance with the EPA's Waste Classification Guidelines (or its latest version).

Compliance Assessment Observations and Comments

Site waste generation is minimal and disposed of at appropriately licenced landfills or recycling facilities.

Compliance Assessment Finding - Compliant

Condition of Approval 2.40

All waste materials removed from the site shall only be directed to a waste management facility lawfully permitted to accept the materials.

Compliance Assessment Observations and Comments

All waste material removed from the site was disposed of at appropriately licenced landfills or recycling facilities during the reporting period.

Compliance Assessment Finding - Compliant

Condition of Approval 2.41

The Applicant shall not cause, permit or allow any waste generated outside the site to be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence under the Protection of the Environment Operations Act 1997, if such a licence is required in relation to that waste.

Compliance Assessment Observations and Comments

No wastes generated outside the Kerosene Vale Ash Repository site are allowed to enter the area. To prevent the unlawful access to the repository area, regular security patrols are conducted across the site. Both PRJH Mining and GPM security personnel are required to report if they encounter any rubbish or wastes outside those that are allowed during routine operations. No wastes of this nature were observed during monthly environmental compliance inspections during the reporting period.

Compliance Assessment Finding - Compliant

Environmental Monitoring

Construction Noise Monitoring

Condition of Approval 3.1

The Applicant shall prepare and implement a Construction Noise Monitoring Program to confirm the predictions of the noise assessment detailed in the document referred to under condition 1.1b) of this approval and assess compliance against the construction noise criterion stipulated in condition 2.7 of this approval. The noise monitoring program shall be prepared in consultation with, and to the satisfaction of,the DECC. The monitoring program shall form part of the Construction Noise Management Plan referred to in condition 6.3b) of this approvaland must include monitoring of the construction noise generated during:

a) *The realignment of Sawyers Swamp Creek;*
b) *Construction of the stabilisation berm;*
c) *Excavation of the former pine plantation area;*
d) *Relocation and construction of surface water management structures; and*
e) *Concurrent construction activities.*

The Applicant shall forward to the EPA and the Secretary a report containing the results of each noise assessment and describingany non-compliance within 14 days of conducting a noise assessment.

Compliance Assessment Observations and Comments

No construction activities took place during the reporting period; therefore Condition 3.1 was not triggered. All activities currently occurring on site are considered to be operational activities as defined by Schedule 2 of the approval.

Compliance Assessment Finding – Not triggered

Condition of Approval 3.2

*Within 60 days of the commencement of operation of the project, unless otherwise agreed to by the Director-General, the Applicant shall submit for the approval of the Secretary an **Operational Noise Review** to confirm the operational noise impacts of the project. The Operational Noise Review must be prepared in consultation with, and to the satisfaction of, the EPA. The Review shall:*

a) *Identify the appropriate operational noise objectives and level for sensitive receivers;*
b) *Describe the methodologies for noise monitoring including the frequency of measurements and location of monitoring sites;*
c) *Document the operational noise levels at sensitive receivers as ascertained by the noise monitoring program;*
d) *Assess the noise performance of the project against the noise criterion specified in condition 2.15 of this approval and the predictednoise levels as detailed in the report referred to under condition 1.1b) of this approval; and*
e) *Provide details of any entries in the Complaints Register (as required under condition 5.4 of this approval) relating to noise impacts.*

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, theApplicant shall prepare a report as required by condition 2.18 of this approval.

Compliance Assessment Observations and Comments

The Operational Noise Review (Parsons Brinckerhoff, 2009) was submitted to the DPE on 16 September 2009, and the Department acknowledged its satisfaction that Conditions of Approval 3.2 had been met on 18 September 2009.

Compliance Assessment Finding - Compliant

Ongoing Operational Noise Monitoring

Condition of Approval 3.3

The Applicant shall prepare and implement an Operational Noise Monitoring Program to assess compliance against the operational noise criterion stipulated in condition 2.15 of this approval, throughout the life of the project. The noise monitoring program shall be prepared inconsultation with, and to the satisfaction of, the EPA.

The noise monitoring program shall be prepared in accordance with the requirements of the NSW Noise Policy for Industry (EPA, 2017) (or its latest version) and must include, but not be limited to:

a) Monitoring during ash placement in the far western area of the site adjacent to the haul road; and

b) Monitoring of the effectiveness of any noise mitigation measures implemented under condition 2.18 of this approval, against the noise criterion specified in condition 2.15 of this approval.

Noise from the project is to be measured at the most affected point on or within the residential boundary, or at the most affected point within 30 metres of a dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise criterion stipulated in condition 2.15 of this approval. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance and the modifying factors shall also be applied to the measured noise levels where applicable in accordance with the NSW Noise Policy for Industry (EPA, 2017) (or its latest version).

The Applicant shall forward to the EPA and the Secretary a report containing the results of any non-compliance within 14 days ofconducting a noise assessment.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, the Applicant shall prepare a report as required by condition 2.18 of this approval.

The monitoring program shall form part of the Operational Noise Management Plan referred to in condition 6.5a) of this approval.

Compliance Assessment Observations and Comments

A Noise Monitoring Program is detailed in the Operational Noise Management Plan, which is a sub-plan of the OEMP. This plan is currently under review and revision between GPM and DPHI. GPM continue to implement the required noise monitoring assessments. No non-compliances were identified during the reporting period, and no community complaints were received during the AEMR reporting period.

Compliance Assessment Finding - Compliant

Groundwater Monitoring

Condition of Approval 3.4

The Applicant shall prepare and implement a Groundwater Monitoring Program to monitor the impacts of ash placement activities on local groundwater quality and hydrology. The program shall be developed in consultation with, and to the satisfaction of, WaterNSW, and shall describe the location, frequency, rationale and procedures and protocols for collecting groundwater samples, as well as the parameters analysed and methods of analysis. The monitoring program shall be ongoing for the life of the project and include, but not be limited to:

a) monitoring at established bore sites (or replacement bore sites in the event that existing sites are damaged or lost) as described in the document referred to under condition 1.1b) of this approval; and

b) a schedule for periodic monitoring of groundwater quality, depth and flow at all monitoring sites, at an initial frequency of no less than once every month for the first 12 months of operation.

The monitoring program shall form part of the Groundwater Management Plan referred to in condition 6.5b) of this approval.

Compliance Assessment Observations and Comments

A Groundwater Monitoring Program is detailed in the Operational Groundwater Management Plan, which is a subplan to the OEMP. This plan is currently under review and revision between GPM and DPHI. Groundwater monitoring requirements are also within EPL 21185. Groundwater quality, levels and trends for the AEMR reporting period are reported in Section 6.2.2 and Appendix D.

Compliance Assessment Finding - Compliant

Surface Water Quality Monitoring

Condition of Approval 3.5

The *Applicant is to implement a surface water quality monitoring program to monitor the impacts of the ash placement activities on, and the realignment of, Sawyers Swamp Creek. The Program shall be developed in consultation with and to the satisfaction of Fisheries NSW and Water NSW, and shall describe the location, frequency, rationale and the procedures and protocols for collecting water samples as well as theparameters analysed and methods of analysis. The program shall include, but not necessarily be limited to:*

a) monitoring at the four-existing water quality monitoring sites as described in the document referred to under 1.1b) of this approval;

b) monitoring downstream of the realigned section of Sawyers Swamp Creek;

c) monitoring at groundwater discharge points into Sawyers Swamp Creek;

d) wet weather monitoring with a minimum of two events recorded within the first 12 months of both the operation of the project andpost realignment of Sawyers Swamp Creek; and

e) a schedule for periodic monitoring of surface quality at all sites throughout the life of the project, at an initial frequency of no less than once every month for the first 12 months and must include, but not be limited to, dissolved oxygen, turbidity, total phosphorusand total nitrogen.

The monitoring program shall form part of the Surface Water Management Plan referred to in condition 6.5c) of this approval.

Compliance Assessment Observations and Comments

A Surface Water Monitoring Program is detailed in the Operational Surface Water Management Plan, which is a subplan to the OEMP. This plan is currently under review and revision between GPM and DPHI. Surface water monitoring requirements are also within EPL 21185. Water management and the results of surface water monitoring throughout the AEMR reporting period is provided in Section 6.2.2 and Appendix D.

Compliance Assessment Finding - Compliant

Sawyers Swamp Creek Realignment Monitoring

Condition of approval 3.6 and 3.7

3.6 - *The Applicant is to implement a **Hydrological Monitoring Program** to assess and quantify the impacts and effectiveness of the realigned section of Sawyers Swamp Creek in consultation with and to the satisfaction of Fisheries NSW. Monitoring is to be undertaken for a period of five (5) years upon completion of the creek realignment and is to include scour and erosion monitoring. The program must include sampling before and after the realignment works and include a sampling site downstream of the realigned section of creek. In the first 12 months following completion of the realignment, monitoring is to be undertaken at least every three (3) months upon completion of the creek realignment and after any wet weather/bankful flow event.*

The monitoring program shall form part of the Rehabilitation Plan for the project as referred to in condition 2.26 of this approval.

3.7 - *The Applicant shall prepare an **Ecological Monitoring Program**, in consultation with, and to the satisfaction of, Fisheries NSW, to monitor and quantify the impacts of the realignment of Sawyers Swamp Creek on the ecology and ecosystems of the creek and the associated riparian environment. The Program shall include, but not necessarily be limited to:*

a) a sampling, data collection and assessment regime to establish baseline ecological health and for ongoing monitoring of ecological health of the in-stream environment during construction and throughout the life of the project;

b) at least one in-stream sampling period prior to the realignment of Sawyers Swamp Creek and at least two (2) sampling periods following the realignment of Sawyers Swamp Creek; and

c) an assessment regime for monitoring the ecological health of the riparian environment for a period of at least five (5) years after final planting.

The monitoring program shall form part of the Rehabilitation Plan for the project as referred to in condition 2.26 of this approval.

Compliance Assessment Observations and Comments

Sawyers Swamp Creek was not realigned within the reporting period. The Sawyers Swamp Creek Realignment Progressive Rehabilitation Plan has been submitted to DPHI for review during the reporting period.

Compliance Assessment Finding – Compliant

Air Quality Monitoring

Condition of Approval 3.8

*The Applicant shall prepare an **Air Quality Monitoring Program**, in consultation with, and to the satisfaction of, the EPA. The Program shall include but not necessarily be limited to, monitoring for dust at the monitoring sites identified in the document referred to under condition1.1b) of this approval. The air quality monitoring program shall be ongoing for the life of the project, including final rehabilitation and stabilisation of the site. The monitoring program shall form part of the Air Quality Management Plan referred to in condition 6.5d) of this approval.*

Compliance Assessment Observations and Comments

An air quality monitoring program is detailed in the Operational Air Quality Management Plan, a sub-plan of the OEMP. This plan is currently under review and revision between GPM and DPHI.

Depositional dust results for the period were below the annual assessment criteria at all gauges during the AEMR reporting period, except during 2 instances of sample contamination. No community complaints pertaining to dust were received during the AEMR reporting period. These results indicate that the Site is effectively managing dust levels.

Compliance Assessment Finding - Compliant

Compliance Monitoring and Tracking

Condition of Approval 4.1

Prior to each of the events listed below, the Applicant shall certify in writing to the satisfaction of the Secretary that it has complied with all conditions of this approval applicable prior to that event:

a) commencement of any construction works on the land subject of this approval; and

b) commencement of operation of the project.

Compliance Assessment Observations and Comments

The DPE indicated its satisfaction that EnergyAustralia NSW had met the relevant pre-operational requirements of this project before commencement in 2009. This included submission of a Pre-Operation Compliance Report, Compliance Tracking Program, and the Operation Environmental Management Plan.

No additional construction works have commenced during the AEMR reporting period; therefore, GPM have not been required to submit any pre-construction compliance reports during this period.

Compliance Assessment Finding – Not triggered

Condition of Approval 4.2

The Applicant shall develop and implement a Compliance Tracking Program for the project, prior to commencing operations, to track compliance with the requirements of this approval and shall include, but not necessarily be limited to:

a) Provisions for periodic review of the compliance status of the project against the requirements of this approval and the Statementof Commitments detailed in the document referred to in condition 1.1c) of this approval;

a. provisions for periodic reporting of the compliance status to the Secretary;

b. a program for independent environmental auditing in accordance with AS/NZ ISO 19011:2003 – Guidelines for Quality and/orEnvironmental Management Systems Auditing;

c. procedures for rectifying any non-compliance identified during environmental auditing or review of compliance;

d. mechanisms for recording environmental incidents and actions taken in response to those incidents;

e. provisions for reporting environmental incidents to the Director-General during construction and operation; and

f. provisions for ensuring all employees, contractors and sub-contractors are aware of, and comply with, the conditions of this approvalrelevant to their respective activities.

The Compliance Tracking Program shall be implemented prior to operation of the project with a copy submitted to the Secretary for approval within four weeks of commencement of the project, unless otherwise agreed by the Secretary.

Compliance Assessment Observations and Comments

Compliance against the Conditions of Approval is audited annually and appended to the AEMR. Monthly inspections are conducted by the Environmental Representatives, and recommended actions to ensure ongoing compliance are provided to GPM in a monthly report. Further, GPM conducts independent compliance inspections of the Site weekly and records in an internal monthly report.

Environmental incidents that may occur at the Kerosene Vale Ash Repository site are reported in accordance with the approved OEMP and are captured within GPM's Incident Register.

Employees, contractors and sub-contractors are made aware of the conditions of approval via site Inductions.

Compliance Assessment Finding – Compliant

Conditions of Approval 4.3 and 4.4

Conditions of Approval 4.3 – Nothing in this approval restricts the Applicant from utilising any existing compliance tracking programs administered by the Applicant to satisfy the requirements of condition 4.2. In doing so, the Applicant must demonstrate to the Secretary how these systems address the requirements and/or have been amended to comply with the requirements of the condition.

Conditions of Approval 4.4 – The Applicant shall meet the requirements of the Secretary in respect of the implementation of any measure necessary to ensure compliance with the conditions of this approval, and general consistency with the documents listed under condition 1.1 of this approval.

Compliance Assessment Observations and Comments

This project has a Minister approved OEMP (EANSW, 2018). GPM are in the process of updating the OEMP which includes review of the existing Compliance Tracking Program. GPM is not aware of any requests to implement any additional measures to ensure compliance with the relevant Conditions of Approvals for the Kerosene Vale Ash Repository.

Compliance Assessment Finding - Compliant

Community Information Complaints Management

Provision of Information

Conditions of Approval 5.1 and 5.2

5.1 - *Prior to the commencement of the project, the Applicant shall establish and maintain a website for the provision of electronic information with the project. The Applicant shall, subject to confidentiality, publish and maintain up-to-date information on this website or dedicated pages including, but not necessarily limited to:*

a) the documents referred to under condition 1.1 of this approval;

b) this project approval, Environment Protection Licence and any other relevant environmental approval, licence or permit requiredand obtained in relation to the project;

c) all strategies, plans and program required under this project approval, or details of where this information can be viewed;

d) information on construction and operational progress;

e) the outcomes of compliance tracking in accordance with the requirements of this project approval.

5.2 – The Applicant shall make all documents required to be provided under condition 5.1 of this approval publicly available.

Compliance Assessment Observations and Comments

Copies of the following documents are made publicly available on the GPM website (https://gpmco.com.au/environment/):

- Environment Protection Licence (EPL21185)
- Operation Environmental Management Plan (EnergyAustralia, 2018)
- Annual Environmental Management Reports (2021- 2024)
- Environment Protection Licence 21185
- Pollution Incident Response Management Plan

Links to the Planning Portal are available for the following:

- Environment Assessment
- Project Approval 07_0005 (MOD2)

Compliance Assessment Finding - Compliant

Complaints and Enquiries Procedure

Condition of Approval 5.3

Prior to the commencement of the project, the Applicant shall ensure that the following are available for community complaints andenquiries during construction and operation:

a) A 24-hour contact number(s) on which complaints and enquiries about construction and operational activities may be registered;

b) A postal address to which written complaints and enquiries may be sent; and

c) An email address to which electronic complaints and enquiries may be sent; and

d) An email address to which electronic complaints and enquiries may be transmitted.

e) The telephone number, postal address and email address shall be published in a newspaper circulating in the local area prior to thecommencement of the project. The above details shall also be provided on the website required by condition 5.1 of this approval.

Compliance Assessment Observations and Comments

The website: https://gpmco.com.au/contact/ lists the following contact details:

Community Information & Complaints Line: 1800 817 711

Postal address: Generator Property Management, PO Box 132 Budgewoi NSW 2262

Email: dedicated enquiry form provided on the GPM Contact page for email enquiries.

Compliance Assessment Finding - Compliant

Condition of Approval 5.4

The Applicant shall record the details of all complaints received through the means listed under condition 5.3 of this approval in an up-to-date Complaints Register. The Register shall record, but not necessarily be limited to:

a) the date and time of the complaint;

b) the means by which the complaint was made (e.g. telephone, email, mail, in person);

c) any personal details of the complainant that were provided, or if no details were provided a note to that effect;

d) the nature of the complaint;

e) the time taken to respond to the complaint;

f) any investigations and actions taken by the Applicant in relation to the complainant; and

g) if no action was taken by the Applicant in relation to the complaint, the reason(s) why no action was taken.

The Complaints Register shall be made available for inspection by the Director-General upon request.

Compliance Assessment Observations and Comments

GPM maintains a Community Information and Complaints Line for the public to report incidents, complaints or enquiries with contact details available on GPM's website. Any complaints received by GPM are recorded in the Complaints Register with all details captured including action to be taken if necessary. If actions were necessary, a review of those actions is undertaken before the work order is closed.

No complaints were received regarding the Kerosene Vale Ash Repositories within the AEMR reporting period.

Compliance Assessment Finding - Compliant

Environmental Management

Environmental Representative

Condition of Approval 6.1

Prior to the commencement of any construction or operational activities, or as otherwise agreed by the Secretary, the Applicant shall nominate for the approval of the Secretary a suitably qualified and experienced Environmental Representative(s) independentof the design, construction and operation personnel. The Applicant shall engage the Environmental Representative(s) during any construction activities, and throughout the life of the project, or as otherwise agreed by the Secretary. The Environmental Representative(s) shall:

a) oversee the implementation of all environmental management plans and monitoring programs required under this approval, and advise the Applicant upon the achievements of these plans/programs;

b) have responsibility for considering and advising the Applicant on matters specified in the conditions of this approval and the Statement of Commitments as referred to under condition 1.1c) in the EA;

c) oversee the implementation of the environmental auditing of the project in accordance with the requirements of condition 4.2 of this approval and all relevant project Environmental Management System(s); and

d) be given the authority and independence to recommend to the Applicant reasonable steps to be taken to avoid or minimise unintended or adverse environmental impacts, and, failing the effectiveness of such steps, to recommend to the Applicant that relevant activities are to be ceased as soon as reasonably practicable if there is a significant risk that an adverse impact on the environment will be likely to occur.

Compliance Assessment Observations and Comments

GPM has nominated John Pola as the Environmental Manager. The Environmental Manager oversees the implementation of all operations of Kerosene Vale Ash Repository through regular client meetings and liaison with the PRJH Mining and other relevant contractors and consultants. The Environment Manager guides the project through site visits, sampling and other regulatory activities to ensure compliance with the environmental requirements of the Conditions of Approvals and all relevant licences.

Compliance Assessment Finding - Compliant

Construction Environmental Management

Conditions of Approval 6.2 and 6.3

Compliance Assessment Observations and Comments

Conditions of Approval 6.2 and 6.3 relate to a Construction Environmental Management Plan (CEMP). A CEMP for KVAR Stage 2B was developed and approved by the DPI in August 2011. Since taking over the Kerosene Vale Ash Repository site, GPM have not undertaken additional construction works on site, therefore Conditions of Approval 6.2 and 6.3 were Not triggered during the AEMR reporting period. A revised CEMP is in review and revision between GPM and DPHI and will be implemented for construction works associated with SSC re-alignment and other works required as a result of the HHERA as part of the VMP.

Compliance Assessment Finding – Not triggered

Operational Environmental Management

Conditions of Approval 6.4 and 6.5

Conditions 6.4 and 6.5 relate to the detailed requirements of the OEMP.

Compliance Assessment Observations and Comments

The OEMP (EnergyAustralia NSW, 2018) was prepared in consultation with the EPA, WaterNSW, DPI-Water, DPI-Fisheries and was approved by the Director on the 21 November 2018. GPM is in the process of reviewing and revision of the OEMP with DPHI.

Compliance Assessment Finding - Compliant

Condition of Approval 6.5A

The Applicant shall update the Operation Environment Management Plan (as referred to in condition 6.4 of this approval) and associated monitoring programs (as referred to in conditions 3.4 to 3.8 inclusive) prior to the importation of capping material to the site from sources outside of the Lithgow local government area, to the satisfaction of the Secretary. The updated plan and associated monitoring programs must reflect all operational activities, monitoring and management practices for the Kerosene Vale Ash Dam and the Sawyers Swamp Creek Ash Dam.

Compliance Assessment Observation and Comments

GPM is in the process of review and revision of the approved OEMP with DPHI to ensure it still reflects the current care and maintenance activities. The revised OEMP includes an Operational Transport Management Plan, consistent with Conditions of Approval 36A, & 6.5A.

Compliance Assessment Findings - Compliant

Revision of Strategies and Plans

Condition of Approval 6.6

The Applicant must review and, if necessary, revise the plans required under this approval within 2 months of:

- *the submission of an audit report in accordance with condition 4.2(c) of this approval;*
- *the submission of an incident report in accordance with condition 7.1 of this approval; or*
- *an approved modification to the conditions of approval, to the satisfaction of the Secretary.*

Compliance Assessment Observation and Comments

GPM are currently reviewing and revising the site OEMP and CEMP in consultation with DPHI to ensure it reflects current care and maintenance activities. The review and revision have taken place throughout the AEMR reporting period. As part of the review and potential update to the OEMP, GPM will be updating the Site's Compliance Tracking Program.

Compliance Assessment Findings - Compliant

Environmental Reporting

Environmental Incident Reporting

Conditions of Approval 7.1 and 7.2

7.1 – The Applicant shall notify the Secretary of any environmental incident within 12 hours of becoming aware of the incident. TheApplicant shall provide full written details of the incident to the Director-General within seven days of the date on which the incident occurred.

7.2 – The Applicant shall meet the requirements of the Secretary to address the cause or impact of any environmental incident, asit related to this approval, reported in accordance with condition 7.1 of this approval, within such period as the Secretary may require.

Compliance Assessment Observations and Comments

There were no reportable environmental incidents during the 2024-2025 AEMR reporting period, and no non-compliances with the Conditions of Approval within the reporting period.

Compliance Assessment Finding - Compliant

Annual Performance Reporting

Condition of Approval 7.3

The Applicant shall, throughout the life of the project, prepare and submit for the approval of the Secretary, an Annual EnvironmentalManagement Report (AEMR). The AEMR shall review the performance of the project against the Operation Environmental Management Plan (refer to condition 6.4 of this approval) and the conditions of this approval. The AEMR shall include, but not necessarily by limited to:

- *a) details of compliance with the conditions of this approval;*
- *b) a copy of the complaints register (refer to 5.4 of this approval) for the preceding twelve-month period (exclusive of personal details), and details of how these complaints were addressed and resolved;*
- *c) identification of any circumstances in which the environmental impacts and performance of the project during the year have not been generally consistent with the environmental impacts and performance predicted in the documents listed under condition 1.1 of this approval, with details of additional mitigation measures applied to the project to address recurrence of these circumstances;*
- *d) results of all environmental monitoring required under conditions 3.3 to 3.8 of this approval, including interpretations and discussion by a suitably qualified person; and*
- *e) a list of all occasions in the preceding twelve-month period when environmental goals/objectives/impact assessment criteria for the project have not been achieved, indicating the reason for failure to meet the criteria and the action taken to prevent recurrence of that type of failure.*

The Applicant shall submit a copy of the AEMR to the Director-General every year, with the first AEMR to be submitted no later than twelve months after the commencement of operation of the project. The Director-General may require the Applicant to address certain matters inrelation to the environmental performance of the project in response to review of the Annual Environmental Report. Any action required to be undertaken shall be completed within such period as the Director-General may require. The Applicant shall make copies of each AEMR available for public inspection on request.

Compliance Assessment Observations and Comments

This AEMR satisfies the requirements of Conditions of Approval 7.3. All historic AEMRs are available on the GPM website.

Compliance Assessment Finding - Compliant

Appendix B
Noise reports

EMM
creating opportunities

Kerosene Vale Ash Repository

Environmental noise monitoring - Q3 2024

Prepared for Generator Property Management Pty Ltd

September 2024

Kerosene Vale Ash Repository

Environmental noise monitoring - Q3 2024

Generator Property Management Pty Ltd

E240681 RP1

September 2024

Version	Date	Prepared by	Reviewed by	Comments
1	30/09/2024	Kirsten Garlick	Amanda Buckeridge	Final
1.1	21/10/2024	Will Moore	Amanda Buckeridge	Update to Section 4.2

Approved by

Amanda Buckeridge
Associate Acoustic Consultant
21 October 2024

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Appendices

Tables

Figures

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Generator Property Management Pty Ltd to conduct a quarterly noise survey of construction activities and operations at Kerosene Vale Ash Repository (KVAR, the site) located near Lidsdale, NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

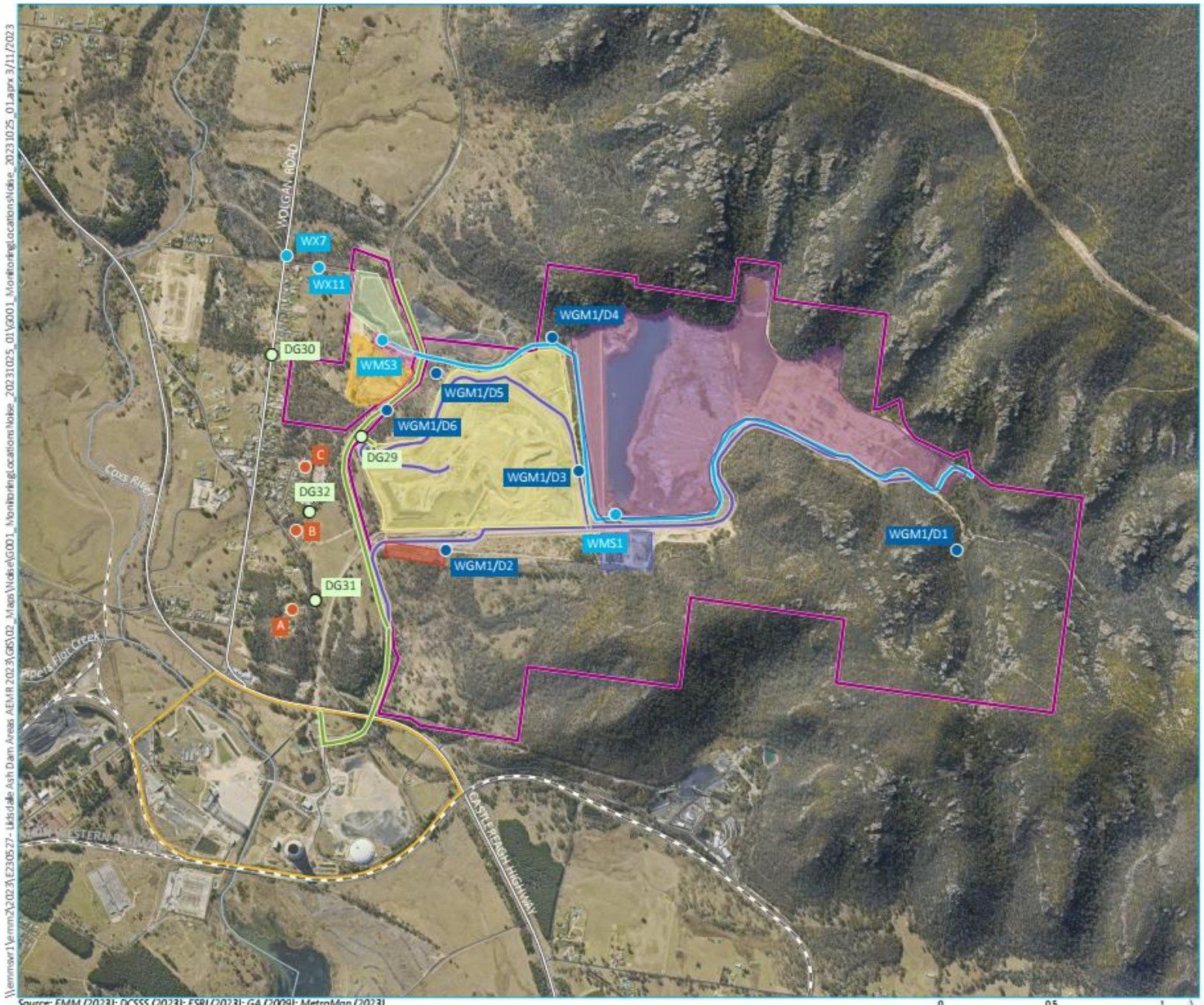
Attended environmental noise monitoring described in this report was done during the day and evening periods of 12 and 13 September 2024 at three monitoring locations.

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

Descriptor	Description	Coordinates (MGA 56)	
		Easting	Northing
Location A	Skelly Road, Lidsdale NSW	229052	6301209
Location B	Corner Sawyers Road and Skelly Road, Lidsdale NSW	228899	6301470
Location C	End of Nuebeck Street, Lidsdale NSW	228982	6301813



Environmental Monitoring Locations

Kerosene Vale Ash Repositories
Figure 1.1

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 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 percent 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, 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 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	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.

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

The current development consent for KVAR is MP07_0005 (MOD 2, October 2023). Section 2 of the consent details specific conditions relating to operational and construction noise generated by KVAR. Relevant sections of that document are reproduced in Appendix B.1.

2.2 Environment protection licence

KVAR holds Environment Protection Licence (EPL) No. 21185 issued by the Environment Protection Authority (EPA) most recently on19 December 2023. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The KVAR Operational Environmental Management Plan (OEMP) was most recently updated in October 2018. Section 6.3 of the OEMP contains a noise and vibration management sub-plan. Appendix A of the OEMP provides the Operational Noise and Vibration Management Plan. Relevant sections of the OEMP are reproduced Appendix B.3.

2.4 Noise limits

2.4.1 Operational noise limits

Operational noise impact limits based on the EPL are shown in Table 2.1.

Table 2.1 Operational noise impact limits, $L_{Aeq,15minute}$ dB

Location	Day	Evening
Location A	40	40
Location B	40	40
Location C	40	40

2.4.2 Construction noise targets

Condition 2.7 of the consent details construction noise objectives as follows:

> The construction noise objective for the project is to manage noise from construction activities (as measured by a $L_{A10,15minute}$ descriptor) so as not to exceed the background L_{A90} noise level by more than 10 dB(A) at any sensitive receiver.

In accordance with condition 3.1 of the consent, construction noise monitoring must occur during the following activities:

a) the realignment of Sawyers Swamp Creek;

b) construction of the stabilisation berm;

c) excavation of the former pine plantation area;

d) relocation and construction of surface water management structures; and

e) concurrent construction activities.

However, due to the difficulty of differentiating noise from construction and operational activities, all noise measured from the site has been assessed against operational noise impact limits as per condition 2.15 of the consent.

2.5 Meteorological conditions

As detailed in the development consent and EPL, noise criteria apply under the following meteorological conditions:

- wind speeds up to 3 m/s at 10 metres height above ground; and/or
- temperature inversion conditions of up to 3°C/100m and source to receiver gradient winds of up to 2 m/s at 10 metres height above ground.

2.6 Additional requirements

The NSW EPA 'Industrial Noise Policy' (INP, 2000) was replaced by the 'Noise Policy for Industry' (NPfI) in October 2017. Noise conditions in the EPL and project approval still reference the INP exclusively, so monitoring has been conducted in accordance with the INP.

For assessment of modifying factors, the NPfI immediately superseded the INP, as outlined in the EPA document 'Implementation and transitional arrangements for the Noise Policy for Industry' (2017). Therefore, assessment and reporting of modifying factors have been done in accordance with Fact Sheet C of the NPfI.

Monitoring and reporting have been done in accordance with the EPA 'Approved methods for the measurement and analysis of environmental noise in NSW' issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirement.

3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the day and evening 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's 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 of 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

Meteorological data was obtained from the Bureau of Meteorology (BOM) automatic weather station (AWS) at Marrangaroo which allowed correlation of atmospheric parameters with measured noise levels. Vertical temperature gradient and/or sigma theta data required to determine temperature inversion conditions was not available from this AWS.

As KVAR operates solely during the day and evening periods, it has been assumed that temperature inversion conditions were not present during monitoring.

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site-only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} levels 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 Kirsten Garlick. Qualifications, experience and demonstration of competence is in accordance with the Approved methods and 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	01070590	27/05/2026	IEC 61672-1:2002
Pulsar 105 acoustic calibrator	96080	26/02/2025	IEC 60942:2003

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1.

Table 4.1 Total measured noise levels, dB – Quarter 3 2024 [1]

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
A	12/09/2024 21:03	52	49	47	45	45	43	41
A	13/09/2024 07:10	63	48	42	40	37	34	32
B	12/09/2024 20:18	55	51	44	42	40	38	36
B	13/09/2024 08:08	56	47	42	39	37	33	30
C	12/09/2024 20:44	51	50	44	41	39	36	34
C	13/09/2024 07:39	62	50	43	41	40	37	34

Notes: 1. Levels in this table are not necessarily the result of activity at 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 Measured atmospheric conditions – Quarter 3 2024

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
A	12/09/2024 21:03	9	1.0	120	4
A	13/09/2024 07:10	7	0.5	145	0
B	12/09/2024 20:18	14	1.2	100	5
B	13/09/2024 08:08	11	<0.5	-	0
C	12/09/2024 20:44	10	1.4	100	4
C	13/09/2024 07:39	7	1.0	130	0

Notes: 1. "-" indicates calm conditions at monitoring location.

4.2 Construction activities

KVAR has advised that normal operations were occurring during monitoring, but none of the construction activities as defined in Section **Error! Reference source not found.** of this report and Condition 3.1 of the consent were occurring at the time of monitoring.

4.3 Site only noise levels

4.3.1 Modifying factors

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

4.3.2 Site noise levels

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 – Quarter 3 2024

Location	Start date and time	Wind speed m/s	Limits apply? [1]	KVAR limit, $L_{Aeq,15minute}$ dB	KVAR level, $L_{Aeq,15minute}$ dB [2]	Exceedance, dB [3]
A	12/09/2024 21:03	1.9	Yes	40	IA	Nil
A	13/09/2024 07:10	3.1	No	40	IA	NA
B	12/09/2024 20:18	0.6	Yes	40	IA	Nil
B	13/09/2024 08:08	3.6	No	40	<25	NA
C	12/09/2024 20:44	1.1	Yes	40	IA	Nil
C	13/09/2024 07:39	2.5	Yes	40	30	Nil

Notes: 1. Noise emission limits do not apply during periods of rainfall or winds greater than 3 metres per second (at a height of 10 metres).

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

3. N/A in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in project approval.

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 section. Statistical 1/3 octave-band analysis of environmental noise was conducted, 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.

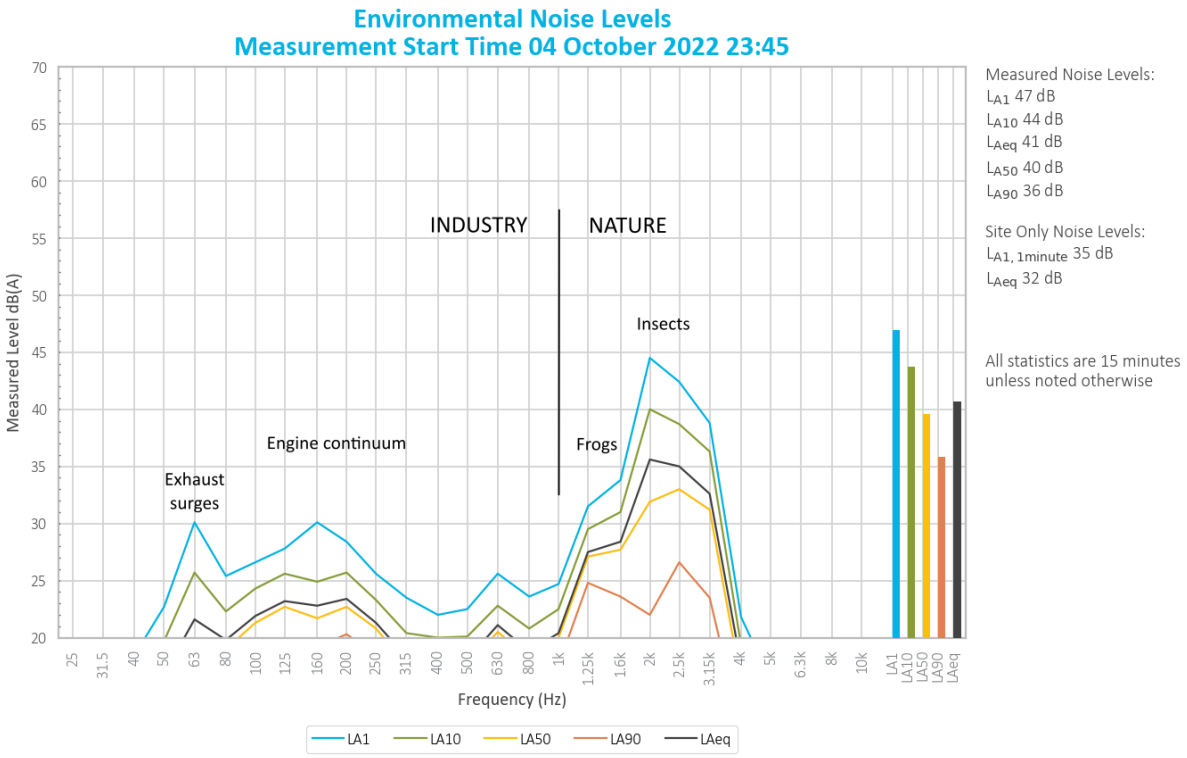


Figure 5.1 Example graph (refer to Section 5.1 for explanatory note)

5.2 Location A – Day

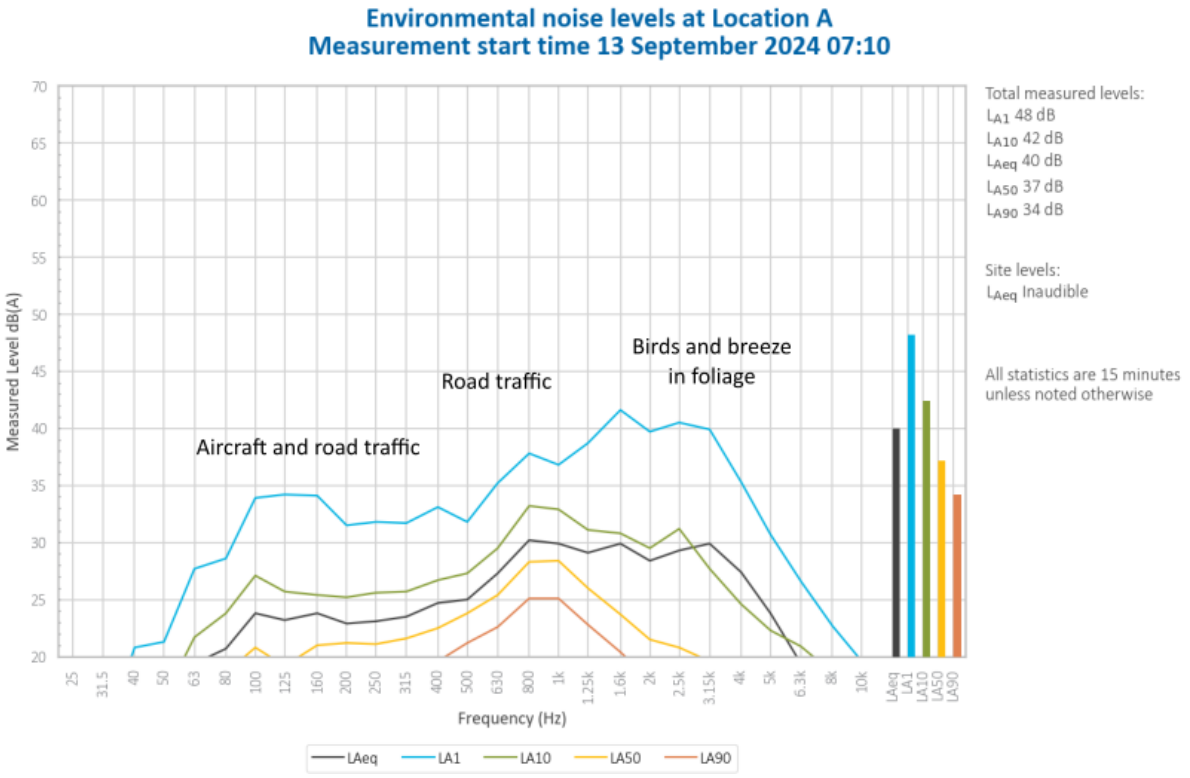


Figure 5.2 Environmental noise levels – Location A

KVAR was inaudible during the measurement.

Road traffic, aircraft and birds primarily generated the total measured noise levels.

Noise from breeze in foliage was also noted.

5.3 Location A – Evening

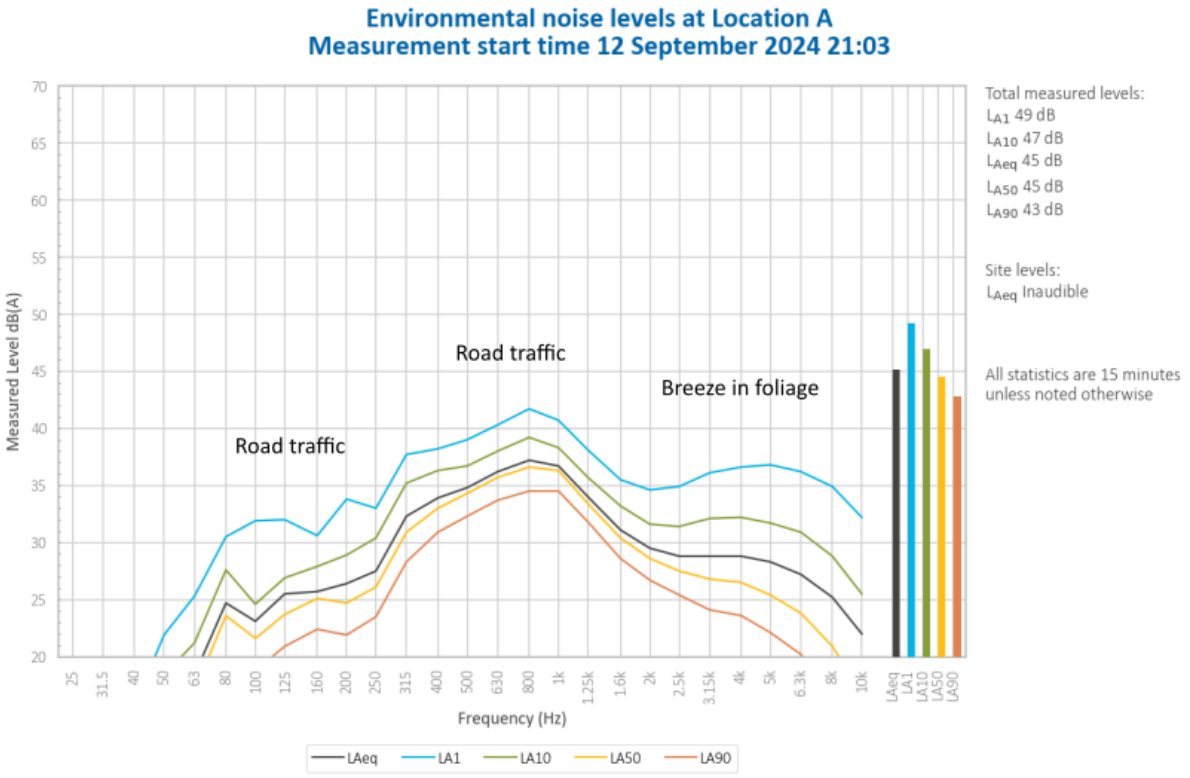


Figure 5.3 Environmental noise levels – Location A

KVAR was inaudible during the measurement.

Road traffic noise primarily generated total measured noise levels.

Breeze in foliage, birds, insects and residential noise were also noted at low levels.

5.4 Location B – Day

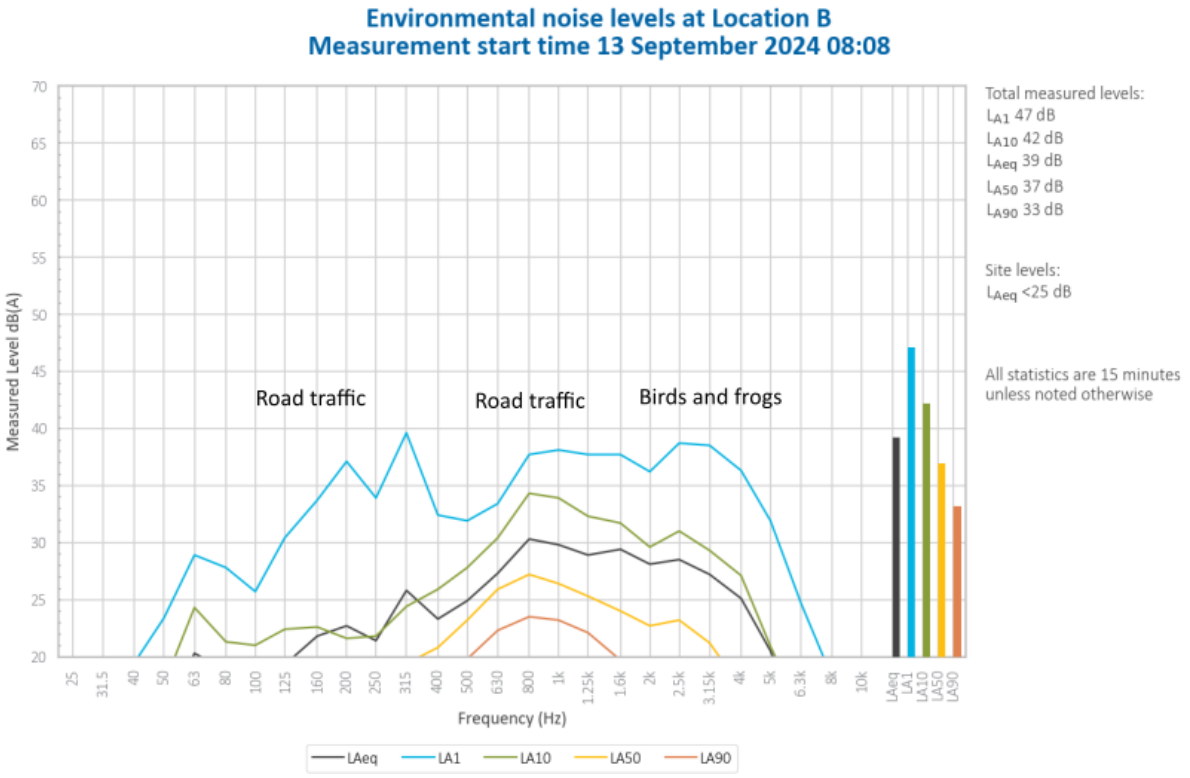


Figure 5.4 Environmental noise levels – Location B

KVAR was audible during the measurement as noise from trucks and reversing alarms which generated a site-only L_{Aeq} of less than 25 dB.

Road traffic, birds and frogs primarily generated total noise levels.

Noise from aircraft was also noted.

5.5 Location B – Evening

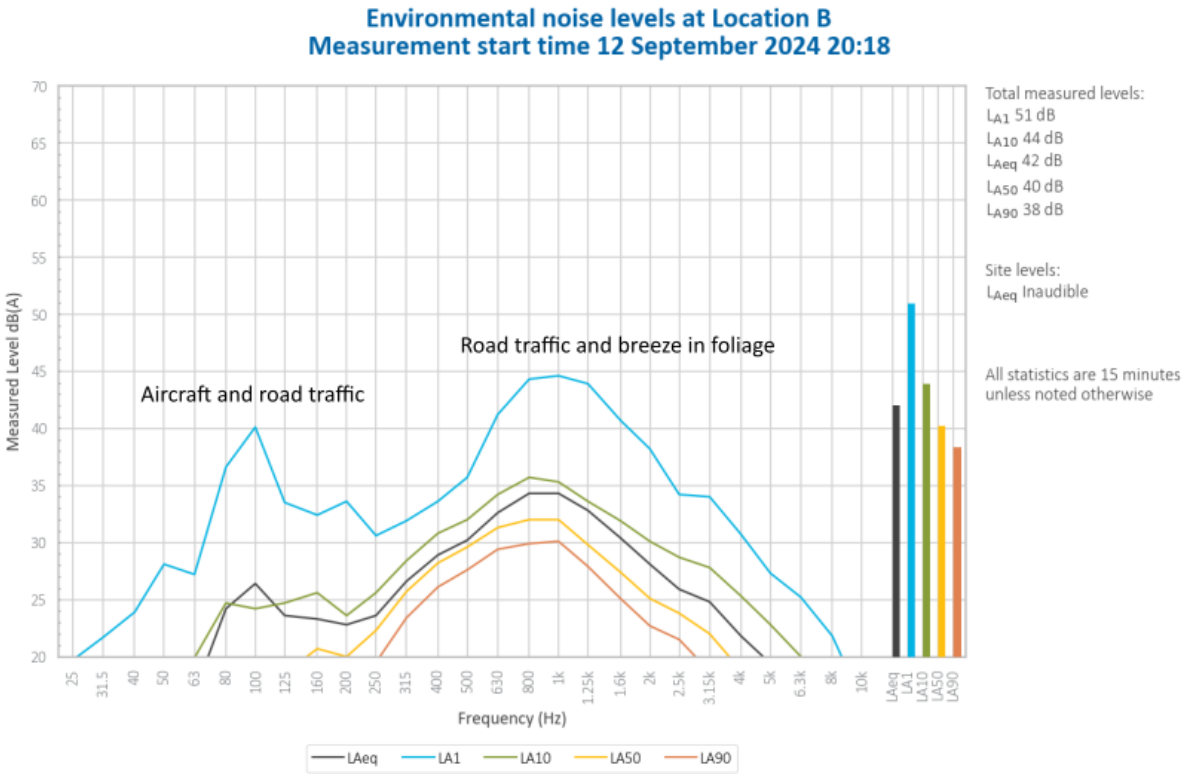


Figure 5.5 Environmental noise levels – Location B

KVAR was inaudible during the measurement.

Road traffic primarily generated total measured noise levels.

Noise from birds, insects, frogs, dogs, breeze in foliage and aircraft were also noted.

5.6 Location C – Day

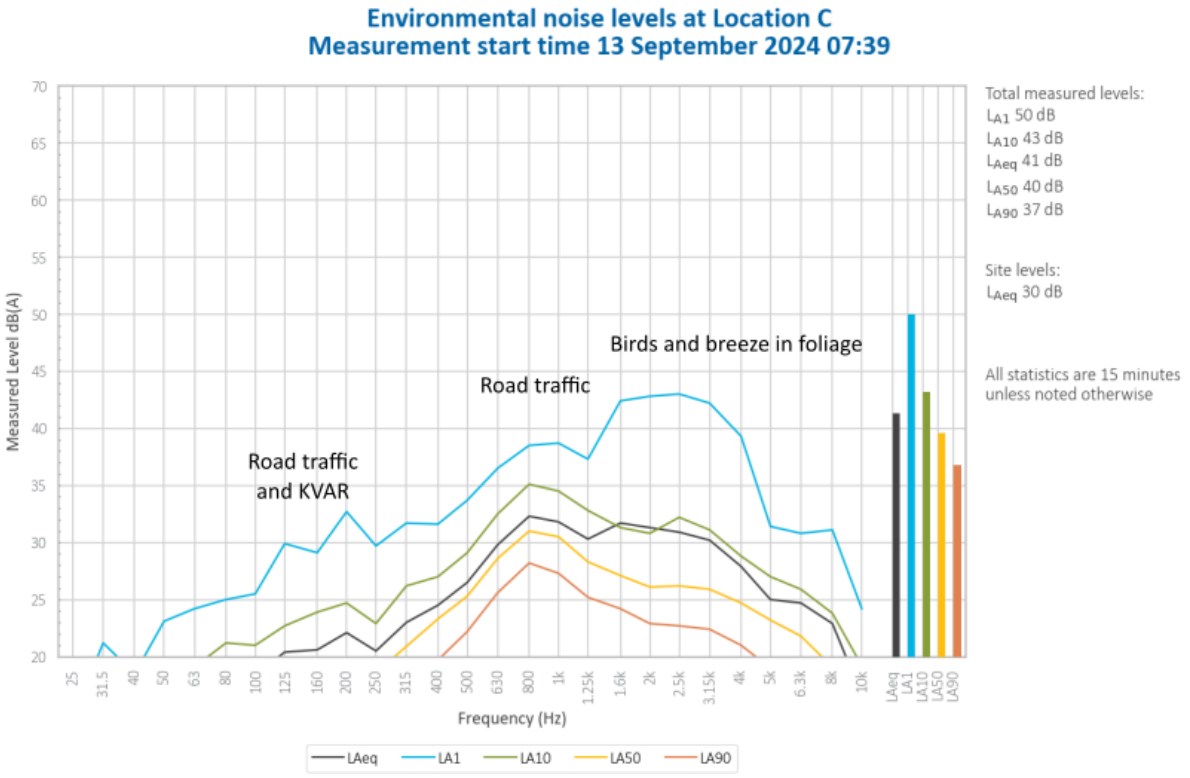


Figure 5.6 Environmental noise levels – Location C

KVAR was audible during the measurement, with noise from trucks generating a site-only L_{Aeq} of 30 dB. Noise from a reverse alarm was also noted.

Noise from birds primarily generated the measured L_{A1} and contributed to the L_{A10} and L_{Aeq}. Road traffic generated all other measured levels.

Noise from dogs and breeze in foliage was also noted.

5.7 Location C – Evening

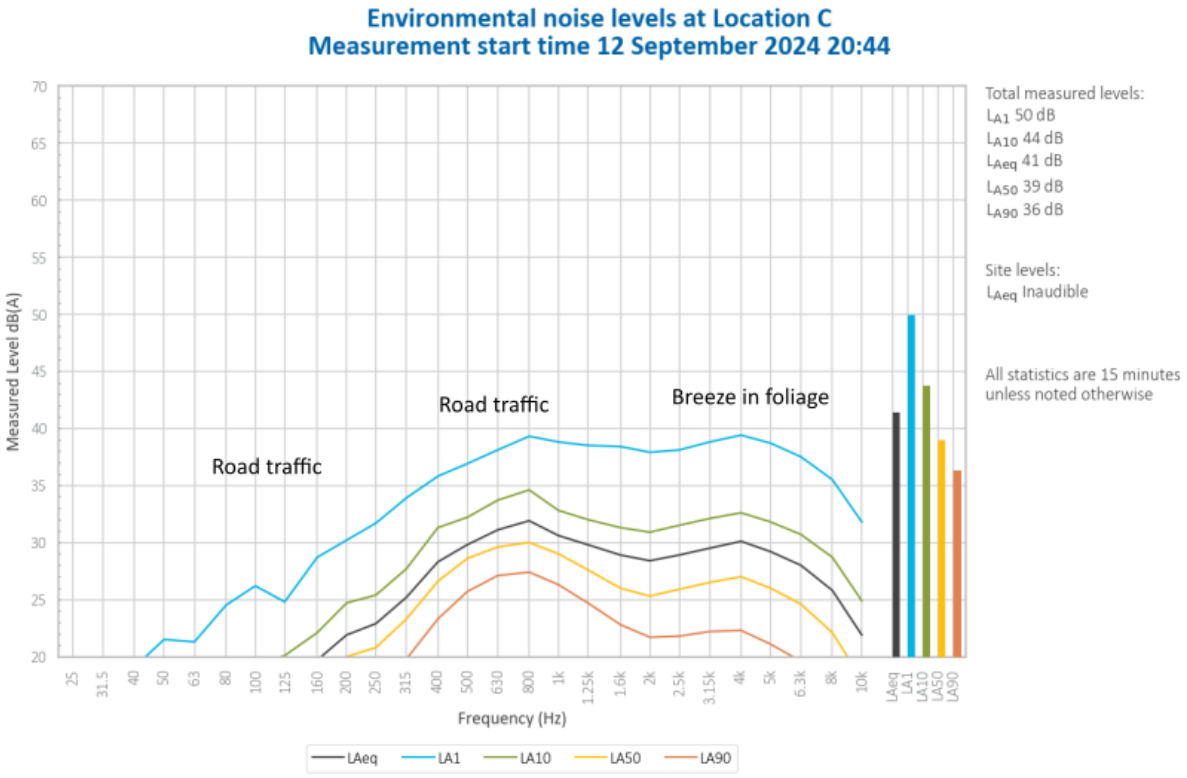


Figure 5.7 Environmental noise levels – Location C

KVAR was inaudible during the measurement.

Noise from road traffic and breeze in foliage generated total measured noise levels.

Noise from insects was also noted.

6 Summary

EMM was engaged by Generator Property Management Pty Ltd to conduct quarterly noise survey of construction activities and operations at KVAR. 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 undertaken during the day and evening periods of 12 and 13 September 2024 at three monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the Quarter 3 2024 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 quarter) as loud

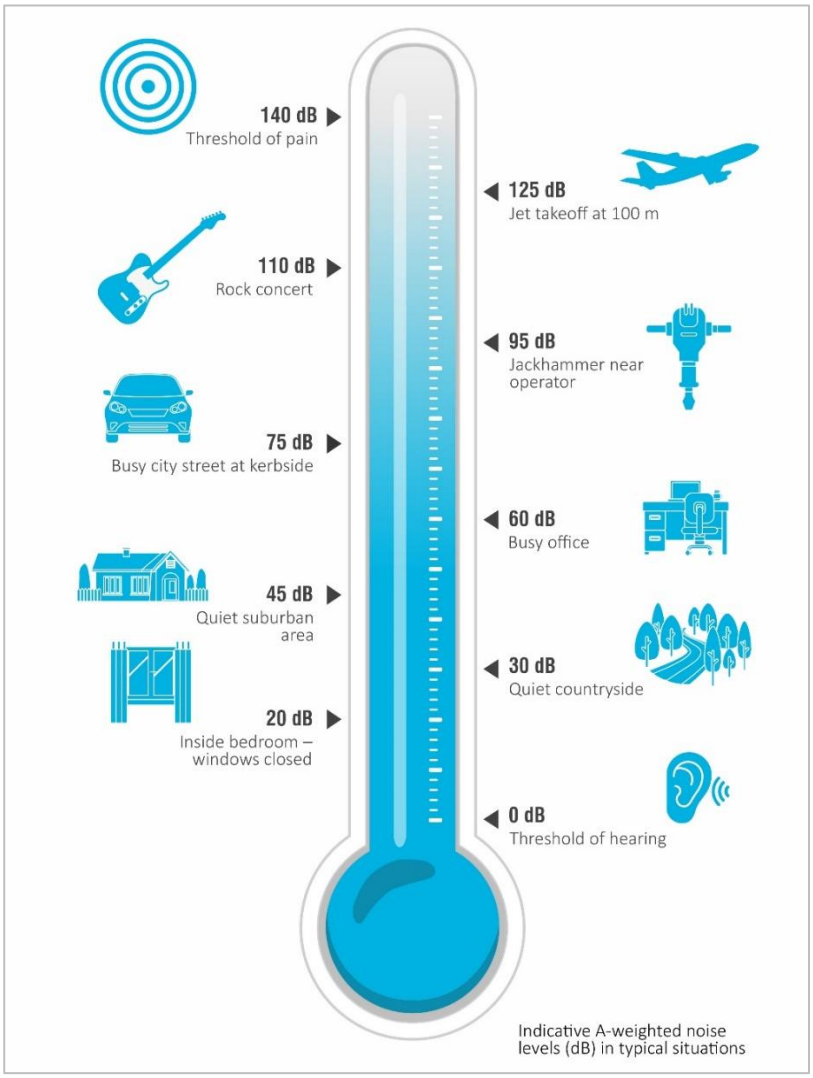

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

Noise Impacts

Construction Hours

2.3 Construction activities associated with the project shall only be undertaken during the following hours:

a) 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;
b) 8:00 am to 1:00 pm on Saturdays; and
c) at no time on Sundays or public holidays.

2.4 Activities resulting in impulsive or tonal noise emission (such as rock breaking or rock hammering) shall be limited to 8:00 am to 12:00 pm, Monday to Saturday and 2:00 pm to 5:00 pm, Monday to Friday. The Proponent shall not undertake such activities for more than three continuous hours and must provide a minimum one-hour respite period.

2.5 Construction outside the hours stipulated in condition 2.3 of this approval is permitted in the following circumstances:

a) where construction works do not cause audible noise at any sensitive receiver; or
b) for the delivery of materials required outside these hours by the Police or other authorities for safety reasons; or
c) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

2.6 The hours of construction activities specified under condition 2.3 of this approval may be varied with the prior written approval of the Secretary. Any request to alter the hours of construction specified under condition 2.3 shall be:

a) considered on a case-by-case basis;
b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours; and
c) accompanied by any information necessary for the Secretary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of sensitive receivers in the vicinity of the site.

Construction Noise

2.7 The construction noise objective for the project is to manage noise from construction activities (as measured by a $L_{A10\ (15\ minute)}$ descriptor) so as not to exceed the background L_{A90} noise level by more than 10 dB(A) at any sensitive receiver.

Any activities that have the potential for noise emissions that exceed the objective must be identified and managed in accordance with the Construction Noise Management Plan (as referred to under condition 6.3b) of this approval). The Proponent shall implement all reasonable and feasible noise mitigation measures with the aim of achieving the construction noise objective.

Operational Noise

2.15 The cumulative operational noise from the ash placement area and ash haulage activity shall not exceed an $L_{Aeq\ (15\ minute)}$ of 40 dB(A) at the nearest most affected sensitive receiver during normal operating hours as defined in condition 2.8 of this approval.

This noise criterion applies under the following meteorological conditions:

a) wind speeds up to 3 m/s at 10 metres above ground; and/or
b) temperature inversion conditions of up to 3°C/100 m and source to receiver gradient winds of up to 2 m/s at 10 m above ground level.

This criterion does not apply where the Proponent and the affected landowner have reached a negotiated agreement in regard to noise, and a copy of the agreement has been forwarded to the Secretary and the EPA.

2.16 The Proponent shall implement measures to ensure noise attenuation of trucks. These measures may include, but are not necessarily limited to, installation of residential class mufflers, engine shrouds, body dampening, speed limiting, fitting of rubber stoppers to tail gates, limiting the use of compression braking, and ensuring trucks operate in a one-way system at the ash repository where feasible.

2.17 The Proponent shall liaise with the owner/operator of Angus Place Coal Mine with the aim of preparing a protocol which provides for a co-operative approach for the management and mitigation of noise impacts associated with coal and ash truck movements along the private haul road.

2.18 Where noise monitoring (as required by conditions 3.2 or 3.3 of this approval) identifies any non-compliance with the operational noise criterion specified under condition 2.15 of this approval the Proponent shall prepare and submit to the Secretary for approval a report including, but not limited to:

a) an assessment of all reasonable and feasible physical and other mitigation measures for reducing noise at the source including, but not limited to -
    i) construction of a noise barrier along the haulage road,
    ii) alternative ash haulage routes, and
    iii) alternative methods of ash conveyance to the repository; and
b) identification of the preferred measure(s) for reducing noise at the source;
c) feedback from directly affected property owners and the EPA on the proposed noise mitigation measures; and
d) location, type, timing and responsibility for implementation of the noise mitigation measure(s).

The report is to be submitted to the Secretary within 60 days of undertaking the noise monitoring which has identified exceedances of the operational noise criterion specified under condition 2.15, unless otherwise agreed to by the Secretary. The Proponent shall implement all reasonable and feasible mitigation measures in accordance with the requirements of the Secretary.

3. ENVIRONMENTAL MONITORING

Construction Noise Monitoring

3.1 The Proponent shall prepare and implement a **Construction Noise Monitoring** Program to confirm the predictions of the noise assessment detailed in the document referred to under condition 1.1 of this approval and assess compliance against the construction noise criterion stipulated in condition 2.7 of this approval. The noise monitoring program shall be prepared in consultation with, and to the satisfaction of, the EPA. The monitoring program shall form part of the Construction Noise Management Plan referred to in condition 6.3b) of this approval and must include monitoring of the construction noise generated during:

a) the realignment Sawyers Swamp Creek;
b) construction of the stabilisation berm;
c) excavation of the former pine plantation area;
d) relocation and construction of surface water management structures; and
e) concurrent construction activities.

The Proponent shall forward to the EPA and the Secretary a report containing the results of each noise assessment and describing any non-compliance within 14 days of conducting a noise assessment.

Operational Noise Review

3.2 Within 60 days of the commencement of operation of the project, unless otherwise agreed to by the Director-General, the Proponent shall submit for the approval of the Secretary an **Operational Noise Review** to confirm the operational noise impacts of the project. The Operational Noise Review must be prepared in consultation with, and to the satisfaction of, the EPA. The Review shall:

a) identify the appropriate operational noise objectives and level for sensitive receivers;
b) describe the methodologies for noise monitoring including the frequency of measurements and location of monitoring sites;
c) document the operational noise levels at sensitive receivers as ascertained by the noise monitoring program;
d) assess the noise performance of the project against the noise criterion specified in condition 2.15 of this approval and the predicted noise levels as detailed in the report referred to under condition 1.1 of this approval; and
e) provide details of any entries in the Complaints Register (as required under condition 5.4 of this approval) relating to noise impacts.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, the Proponent shall prepare a report as required by condition 2.18 of this approval.

Ongoing Operational Noise Monitoring

3.3 The Applicant shall prepare and implement an **Operational Noise Monitoring Program** to assess compliance against the operational noise criterion stipulated in condition 2.15 of this approval, throughout the life of the project. The noise monitoring program shall be prepared in consultation with, and to the satisfaction of, the EPA.

The noise monitoring program shall be prepared in accordance with the requirements of the *NSW Noise Policy for Industry* (EPA, 2017) (or its latest version) and must include, but not be limited to:

a) monitoring during ash placement in the far western area of the site adjacent to the haul road; and
b) monitoring of the effectiveness of any noise mitigation measures implemented under condition 2.18 of this approval, against the noise criterion specified in condition 2.15 of this approval.

Noise from the project is to be measured at the most affected point on or within the residential boundary, or at the most affected point within 30 metres of a dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise criterion stipulated in condition 2.15 of this approval. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance and the modifying factors shall also be applied to the measured noise levels where applicable in accordance with the *NSW Noise Policy for Industry* (EPA, 2017) (or its latest version).

The Applicant shall forward to the EPA and the Secretary a report containing the results of any non-compliance within 14 days of conducting a noise assessment.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, approval, the Applicant shall prepare a report as required by condition 2.18 of this approval.

The monitoring program shall form part of the Operational Noise Management Plan referred to in condition 6.5a) of this approval.

B.2 Environmental protection licence

L5 Noise limits

L5.1 Operational noise from the Kerosene Vale Ash Repository area must not exceed:

40dB(A) LAeq(15 minute) , at the nearest most affected noise sensitive location.

Note: LAeq means the equivalent continuous noise level – the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

L5.2 To determine compliance with condition(s) L4.1 noise must be measured at, or computed for, the most affected location within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural setting) where the dwelling is more than 30 metres from the boundary. A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000)".

L5.3 The noise emission limits identified in this licence apply under the following meteorological conditions:
a) wind speeds up to 3 m/s at 10 metres height above ground; and/or
b) temperature inversion conditions of up to 30C/100m and source to receiver gradient winds of up to 2 m/s at 10 metres height above ground.

Note: The noise emission limits identified in this licence do not apply at a noise sensitive location, where the licensee and the affected noise sensitive location have reached a negotiated agreement in regards to noise, and a copy of that agreement has been provided to the Environment Protection Authority.

L6 Hours of operation

L6.1 Operational activities associated with the Kerosene Vale Ash Repository must only be carried out between the hours of 0700 and 2200 Monday to Sunday.

L6.2 This condition does not apply to the delivery of material outside the hours of operation permitted by condition L6.1, if that delivery is required by police or other authorities for safety reasons; and/or the operation or personnel or equipment are endangered. In such circumstances, prior notification must be provided to the EPA and affected residents as soon as possible or within a reasonable period in the case of emergency.

B.3 Noise management plan

5.2 Environmental monitoring program

An overview of the environmental monitoring activities that have been specified by the respective sub-plans under Section 6 of the OEMP is provided in Table 5-1. Please refer to specific sub-plans under Section 6 for further details.

Table 5-1 Environmental monitoring program

Potential impact	Locations	Parameters	Frequency	Technique	Reporting	Responsibility	OEMP Sub-plan Reference
Noise – Initial 60 day reporting period	4 main locations adopted for a total of 5 monitoring sites: ▪ Skelly Road ▪ Maddox Lane ▪ Neubeck Street ▪ Wolgan Road. (Refer to Figure 5-1)	L_{Aeq}, L_{A10}, L_{A90} and L_{AmaX}	4 separate days – 3 week days and a Sunday	Attended monitoring using hand held sound level meter Monitoring to be continuous throughout full day of operations for each 15 minute period, including 30 mins prior to and following normal operating hours (7am to 10pm). Nearest potentially affected receiver to be monitored at 07.00 and at least once between 20.30 – 22.30.	Report to be submitted to EPA within 1 week of monitoring COMPLETE	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.3 Operational Noise and Vibration Management Plan – Appendix A
Noise - Normal conditions	Minimum of 3 most affected locations as per the 60 day post commissioning assessment. To include periods of ash placement at far western area of the site and where noise mitigation measures are in place. (as per COA 2.15) (Refer to Figure 5-1)	Noise levels shall not exceed an LAeq of 40dB(A) at the nearest most affected receiver	During daytime (7am-6pm) and evening time (6pm-10am) Every 6 months or more frequent if adverse trends are noted	Ongoing attended monitoring using hand held sound level meter.	6 monthly noise monitoring report If non-compliance, report is to be forwarded to DPE and EPA within 14-days of conducting monitoring	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.5 Operational Noise and Vibration Management Plan – Appendix A
Noise - Emergency conditions	At the complainant's property or nearest available representative location.	Noise levels shall not exceed an LAeq of 40dB(A) at the nearest most affected receiver	As required	Attended monitoring using hand held sound level meter	6 monthly noise monitoring report	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.3 Operational Noise and Vibration Management Plan – Appendix A

6.3 Noise and vibration management sub-plan

Targets	▪ Achieve compliance with the noise criterion of L_{Aeq} of 40dB(A) at the nearest most affected receiver during normal operations. ▪ Achieve a significant reduction in the number of noise-related complaints during emergency operations (less than 5 per year, stretch target = zero complaints per year).
Indicators	▪ The number of noise-related complaints. ▪ Noise monitoring data obtained from the sensitive receiver locations ▪ Compliance indicators as assessed by the specialist noise consultant and the Environmental Representative, as required. ▪ Observed and monitored reduction in noise generation due to adaptation where necessary of engineering measures on trucks, the implementation of operating techniques such as limited compression braking and speed limit restrictions.
Supporting documentation	
Appendix A: - KVAR Stage 2 Operations- Operational Noise and Vibration Management Plan Australian Standard AS 2436 – Guide to noise control on construction, maintenance and demolition sites	
Key issues/constraints/strategies	
Wallerawang Ash Repositories activities are not anticipated to result in impacts at the nearest potentially affected receivers. Noise impacts in varying conditions can be assessed and used to predict similar scenarios in the future to determine which measures are most effective and when. Wallerawang Ash Repositories activities are not anticipated to result in perceived vibration-related impacts at the nearest potentially affected receivers. Appendix A provides procedures to be implemented should vibration-related non-conformances occur. A Specialist Consultant will be undertaking the prescribed monitoring and analysis of noise results, as per this plan.	

Appendix C
Calibration certificates

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C.1 Calibration certificates

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.

PAGE 1 OF 1

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North Rocks NSW AUSTRALIA 2151
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Sound Calibrator
IEC 60942:2017
Calibration Certificate

Calibration Number C24154

Client Details	EMM Consulting Level 3, 175 Scott Street Newcastle NSW 2300
Equipment Tested/ Model Number :	Model 105
Instrument Serial Number :	96080

Atmospheric Conditions

Ambient Temperature :	25.5 °C
Relative Humidity :	52.1 %
Barometric Pressure :	100.4 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	93.80	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.

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Kerosene Vale Ash Repository

Environmental noise monitoring - Q4 2024

Prepared for Generator Property Management Pty Ltd

October 2024

Kerosene Vale Ash Repository

Environmental noise monitoring - Q4 2024

Generator Property Management Pty Ltd

E240681 RP2

October 2024

Version	Date	Prepared by	Reviewed by	Comments
1	21/10/2024	Will Moore	Amanda Buckeridge	Final

Approved by

Amanda Buckeridge
Associate Acoustic Consultant
21 October 2024

Level 3 175 Scott Street
Newcastle NSW 2300
ABN: 28 141 736 558

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Appendices

Tables

Figures

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Generator Property Management Pty Ltd to conduct a quarterly noise survey of construction activities and operations at Kerosene Vale Ash Repository (KVAR, the site) located near Lidsdale, NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

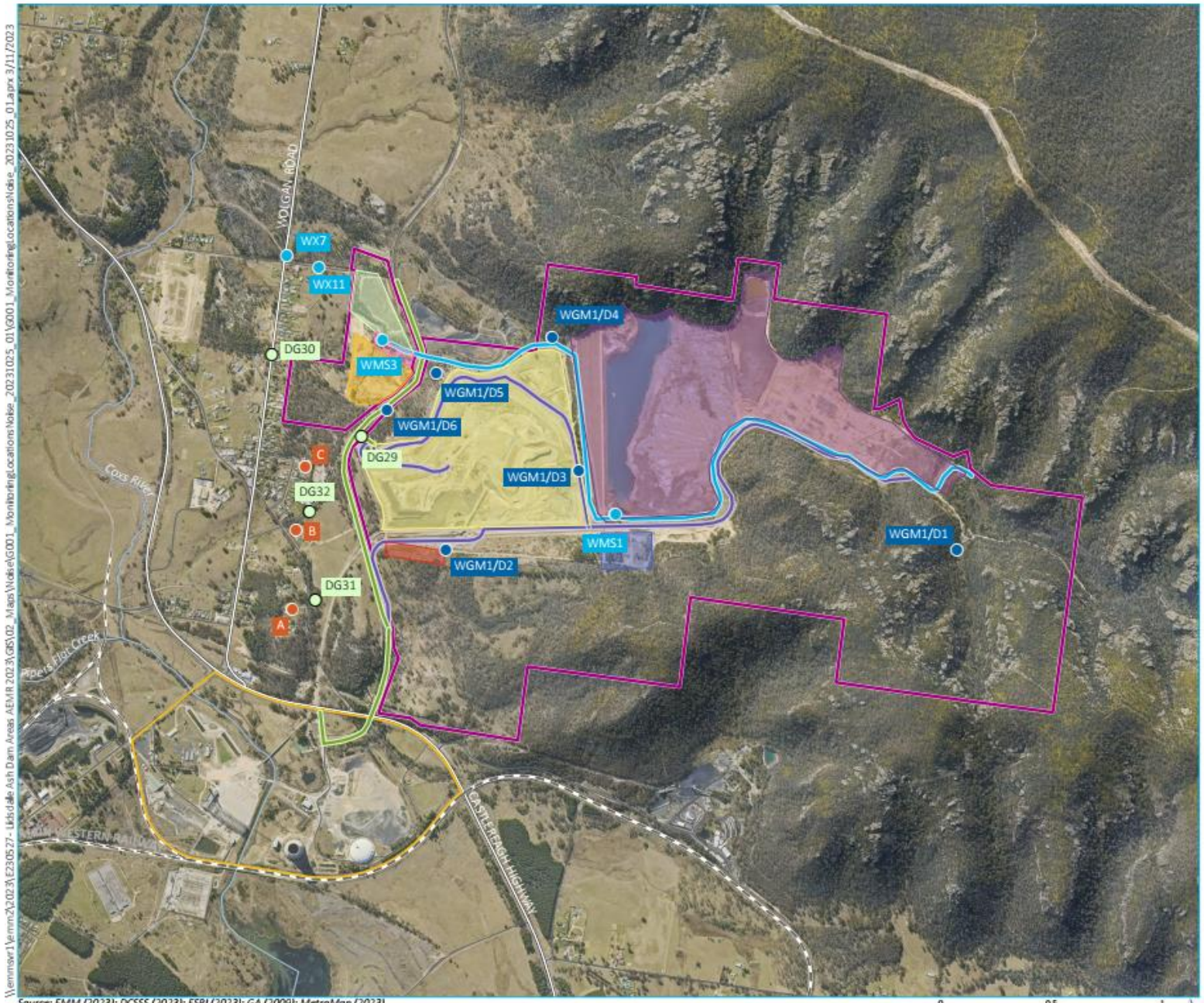
Attended environmental noise monitoring described in this report was done during the day and evening periods of 16/17 October 2024 at three monitoring locations.

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

Descriptor	Description	Coordinates (MGA 56)	
		Easting	Northing
Location A	Skelly Road, Lidsdale NSW	229052	6301209
Location B	Corner Sawyers Road and Skelly Road, Lidsdale NSW	228899	6301470
Location C	End of Nuebeck Street, Lidsdale NSW	228982	6301813



Environmental Monitoring Locations

Kerosene Vale Ash Repositories
Figure 1.1

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 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 percent 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, 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 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	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.

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

The current development consent for KVAR is MP07_0005 (MOD 2, October 2023). Section 2 of the consent details specific conditions relating to operational and construction noise generated by KVAR. Relevant sections of that document are reproduced in Appendix B.1.

2.2 Environment protection licence

KVAR holds Environment Protection Licence (EPL) No. 21185 issued by the Environment Protection Authority (EPA) most recently on19 December 2023. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The KVAR Operational Environmental Management Plan (OEMP) was most recently updated in October 2018. Section 6.3 of the OEMP contains a noise and vibration management sub-plan. Appendix A of the OEMP provides the Operational Noise and Vibration Management Plan. Relevant sections of the OEMP are reproduced Appendix B.3.

2.4 Noise limits

2.4.1 Operational noise limits

Operational noise impact limits based on the EPL are shown in Table 2.1.

Table 2.1 Operational noise impact limits, $L_{Aeq,15minute}$ dB

Location	Day	Evening
Location A	40	40
Location B	40	40
Location C	40	40

2.4.2 Construction noise targets

Condition 2.7 of the consent details construction noise objectives as follows:

> The construction noise objective for the project is to manage noise from construction activities (as measured by a $L_{A10,15minute}$ descriptor) so as not to exceed the background L_{A90} noise level by more than 10 dB(A) at any sensitive receiver.

In accordance with Condition 3.1 of the consent, construction noise monitoring must occur during the following activities:

a) the realignment of Sawyers Swamp Creek;

b) construction of the stabilisation berm;

c) excavation of the former pine plantation area;

d) relocation and construction of surface water management structures; and

e) concurrent construction activities.

However, due to the difficulty of differentiating noise from construction and operational activities, all noise measured from the site has been assessed against operational noise impact limits as per condition 2.15 of the consent.

2.5 Meteorological conditions

As detailed in the development consent and EPL, noise criteria apply under the following meteorological conditions:

- wind speeds up to 3 m/s at 10 metres height above ground; and/or
- temperature inversion conditions of up to 3°C/100m and source to receiver gradient winds of up to 2 m/s at 10 metres height above ground.

2.6 Additional requirements

The NSW EPA 'Industrial Noise Policy' (INP, 2000) was replaced by the 'Noise Policy for Industry' (NPfI) in October 2017. Noise conditions in the EPL and project approval still reference the INP exclusively, so monitoring has been conducted in accordance with the INP.

For assessment of modifying factors, the NPfI immediately superseded the INP, as outlined in the EPA document 'Implementation and transitional arrangements for the Noise Policy for Industry' (2017). Therefore, assessment and reporting of modifying factors have been done in accordance with Fact Sheet C of the NPfI.

Monitoring and reporting have been done in accordance with the EPA 'Approved methods for the measurement and analysis of environmental noise in NSW' issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirement.

3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the day and evening 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's 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 of 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

Meteorological data was obtained from the Bureau of Meteorology (BOM) automatic weather station (AWS) at Marrangaroo which allowed correlation of atmospheric parameters with measured noise levels. Vertical temperature gradient and/or sigma theta data required to determine temperature inversion conditions was not available from this AWS.

As KVAR operates solely during the day and evening periods, it has been assumed that temperature inversion conditions were not present during monitoring.

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site-only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} levels 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 Will Moore. Qualifications, experience and demonstration of competence is in accordance with the Approved methods and 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	01/06/2025	IEC 61672-1:2002
Pulsar 105 acoustic calibrator	78226	26/02/2026	IEC 60942:2003

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1.

Table 4.1 Total measured noise levels, dB – Quarter 4 2024 [1]

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
A	16/10/2024 19:35	53	47	40	37	33	31	30
A	17/10/2024 09:30	55	50	40	38	34	30	27
B	16/10/2024 19:16	55	50	44	39	35	31	28
B	17/10/2024 09:10	54	49	44	41	39	32	27
C	16/10/2024 18:56	56	47	40	36	31	27	25
C	17/10/2024 08:50	75	56	45	47	37	32	27

Notes: 1. Levels in this table are not necessarily the result of activity at 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 Measured atmospheric conditions – Quarter 4 2024

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
A	16/10/2024 19:35	11	<0.5	-	8
A	17/10/2024 09:30	18	<0.5	-	0
B	16/10/2024 19:16	12	<0.5	-	8
B	17/10/2024 09:10	18	<0.5	-	0
C	16/10/2024 18:56	14	<0.5	-	8
C	17/10/2024 08:50	12	0.6	140	0

Notes: 1. "-" indicates calm conditions at monitoring location.

4.2 Construction activities

KVAR has advised that normal operations were occurring during monitoring, but none of the construction activities as defined in Section 2.4.2 of this report and Condition 3.1 of the consent were occurring at the time of monitoring.

4.3 Site only noise levels

4.3.1 Modifying factors

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

4.3.2 Site noise levels

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 – Quarter 4 2024

Location	Start date and time	Wind speed m/s	Limits apply? [1]	KVAR limit, $L_{Aeq,15minute}$ dB	KVAR level, $L_{Aeq,15minute}$ dB [2]	Exceedance, dB [3]
A	16/10/2024 19:35	0.6	Yes	40	IA	Nil
A	17/10/2024 09:30	1.1	Yes	40	35	Nil
B	16/10/2024 19:16	0.6	Yes	40	IA	Nil
B	17/10/2024 09:10	1.1	Yes	40	<30	Nil
C	16/10/2024 18:56	1.1	Yes	40	IA	Nil
C	17/10/2024 08:50	0.0	Yes	40	<30	Nil

Notes: 1. Noise emission limits do not apply during periods of rainfall or winds greater than 3 metres per second (at a height of 10 metres).

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

3. N/A in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in project approval.

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 section. Statistical 1/3 octave-band analysis of environmental noise was conducted, 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.

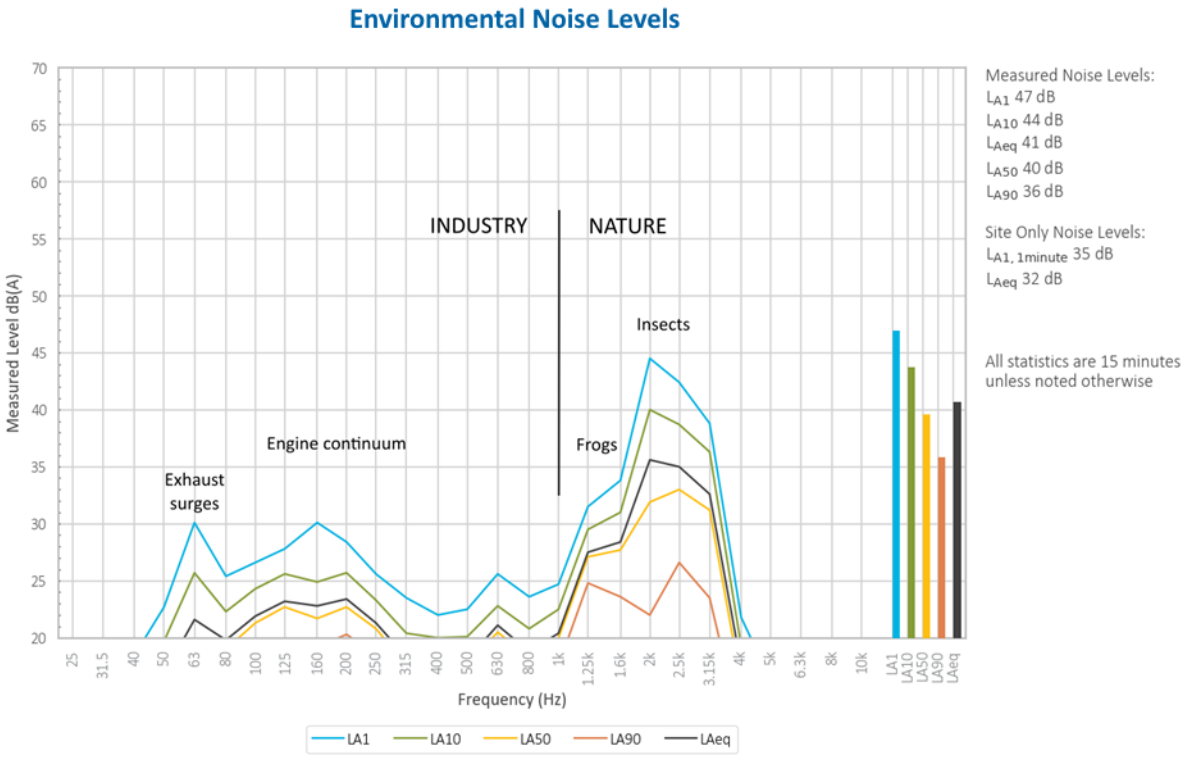


Figure 5.1 Example graph (refer to Section 5.1 for explanatory note)

5.2 Location A – Day

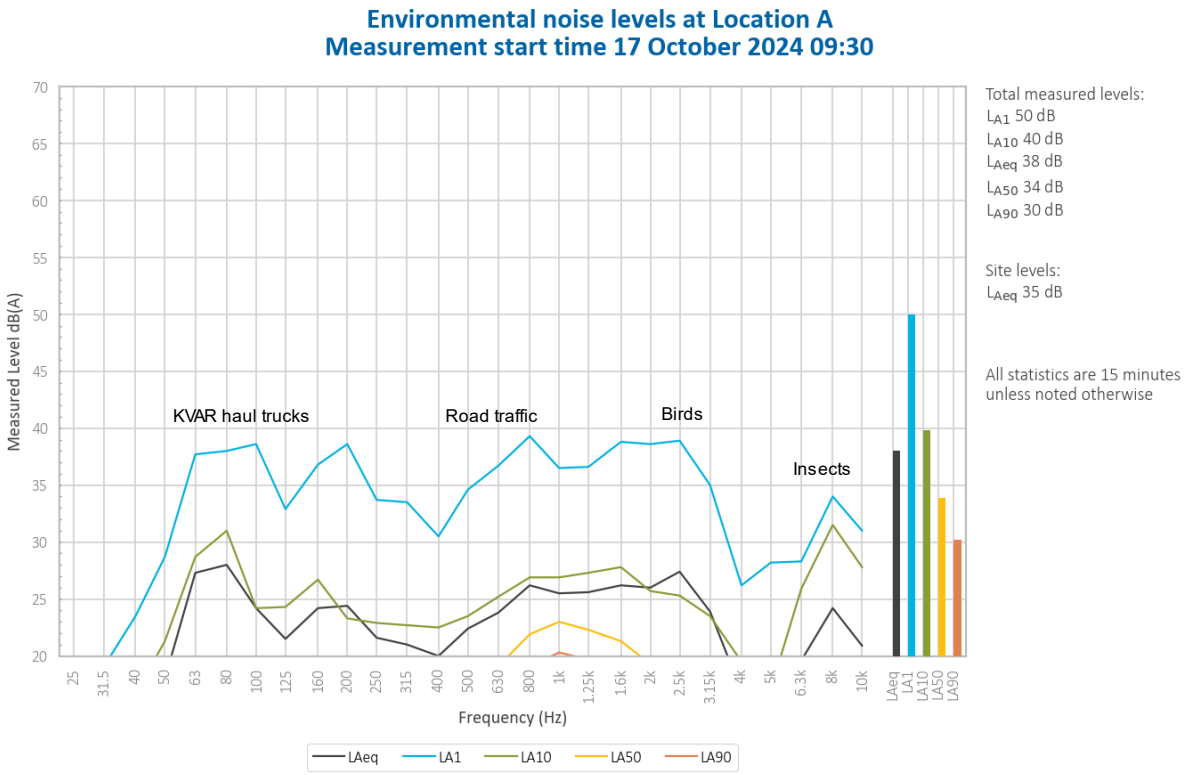


Figure 5.2 Environmental noise levels – Location A

KVAR was audible during the measurement, with noise from trucks generating a site-only L_{Aeq} of 35 dB.

Birds, KVAR trucks and road traffic all contributed to the measured L_{A1}, L_{A10} and L_{Aeq}. Insects contributed to the measured L_{A10}. Road traffic generated the measured L_{A50} and L_{A90}.

5.3 Location A – Evening

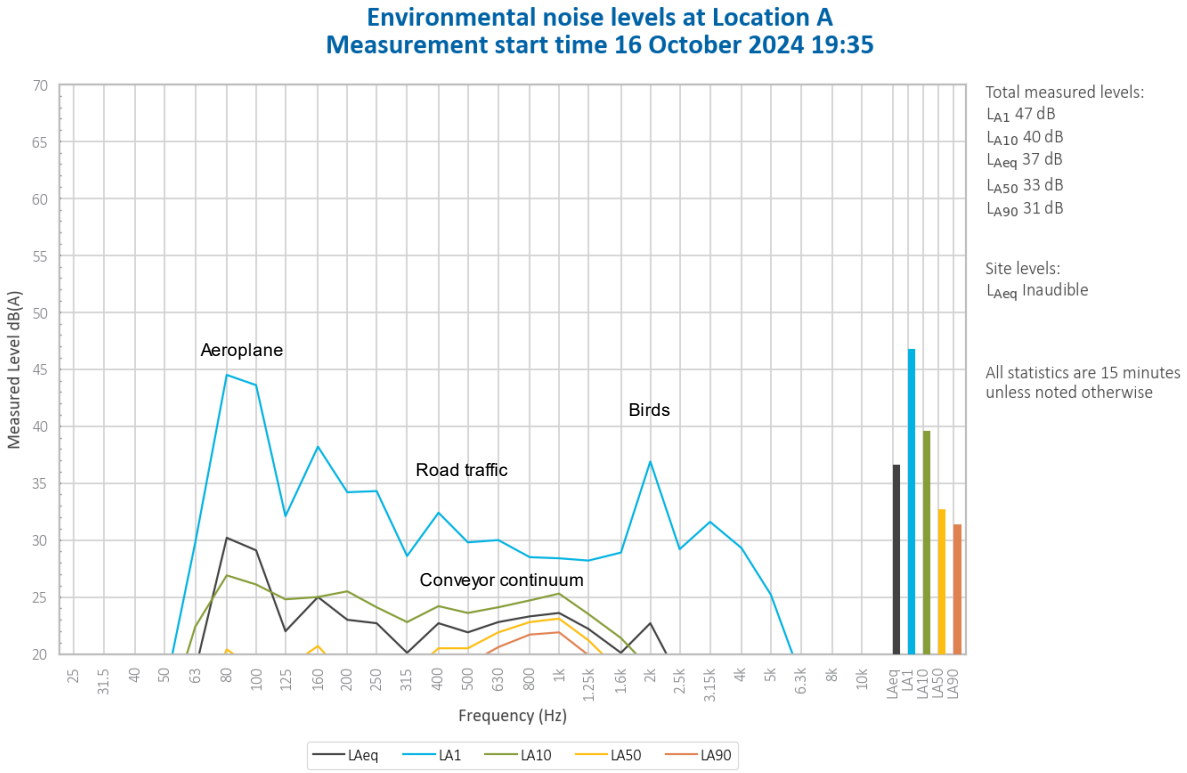


Figure 5.3 Environmental noise levels – Location A

KVAR was inaudible during the measurement.

An aeroplane generated the measured L_{A1} and contributed to the L_{A10} and L_{Aeq}.continuum from the nearby conveyor contributed the measured L_{Aeq} and generated the L_{A50} and L_{A90}.

Noise from birds and road traffic was also noted.

5.4 Location B – Day

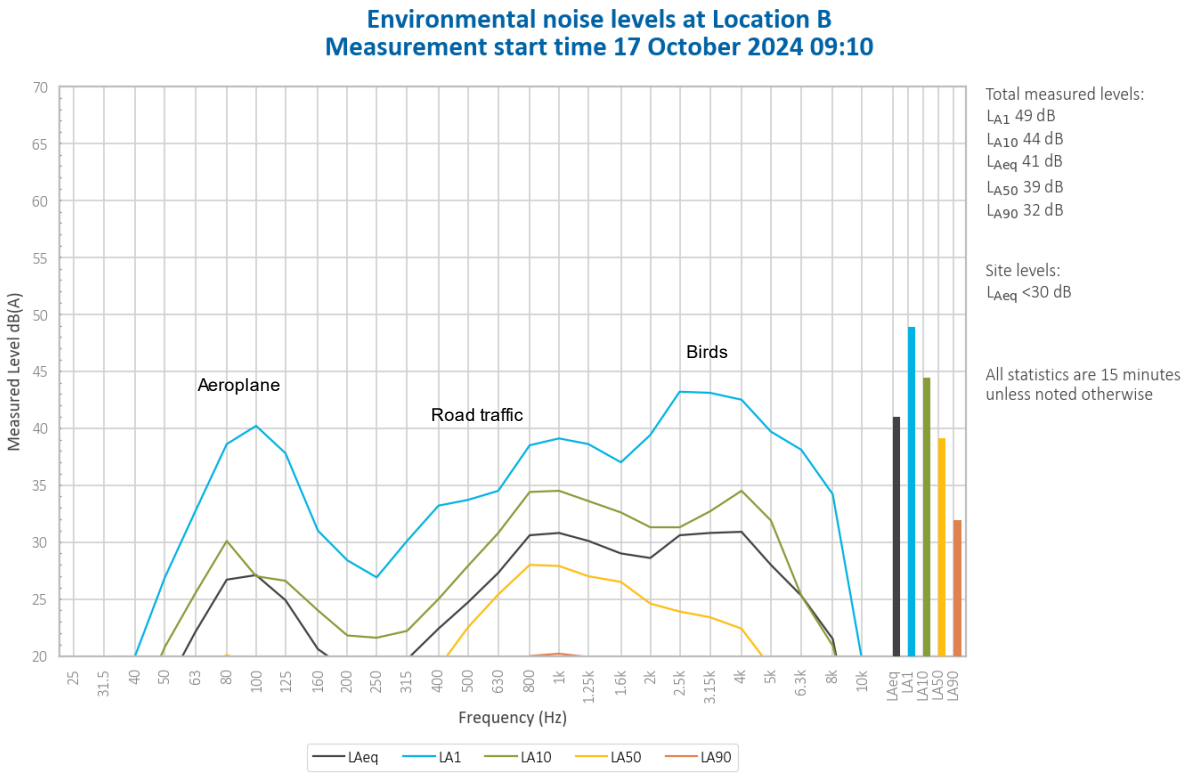


Figure 5.4 Environmental noise levels – Location B

KVAR was audible during the measurement, with noise from trucks generating a site-only L_{Aeq} of less than 30 dB.

Road traffic primarily generated total noise levels. An aeroplane and birds both contributed to the measure L_{A1}. Birds contributed to the L_{A10} and L_{Aeq}.

Noise from a chainsaw was also noted.

5.5 Location B – Evening

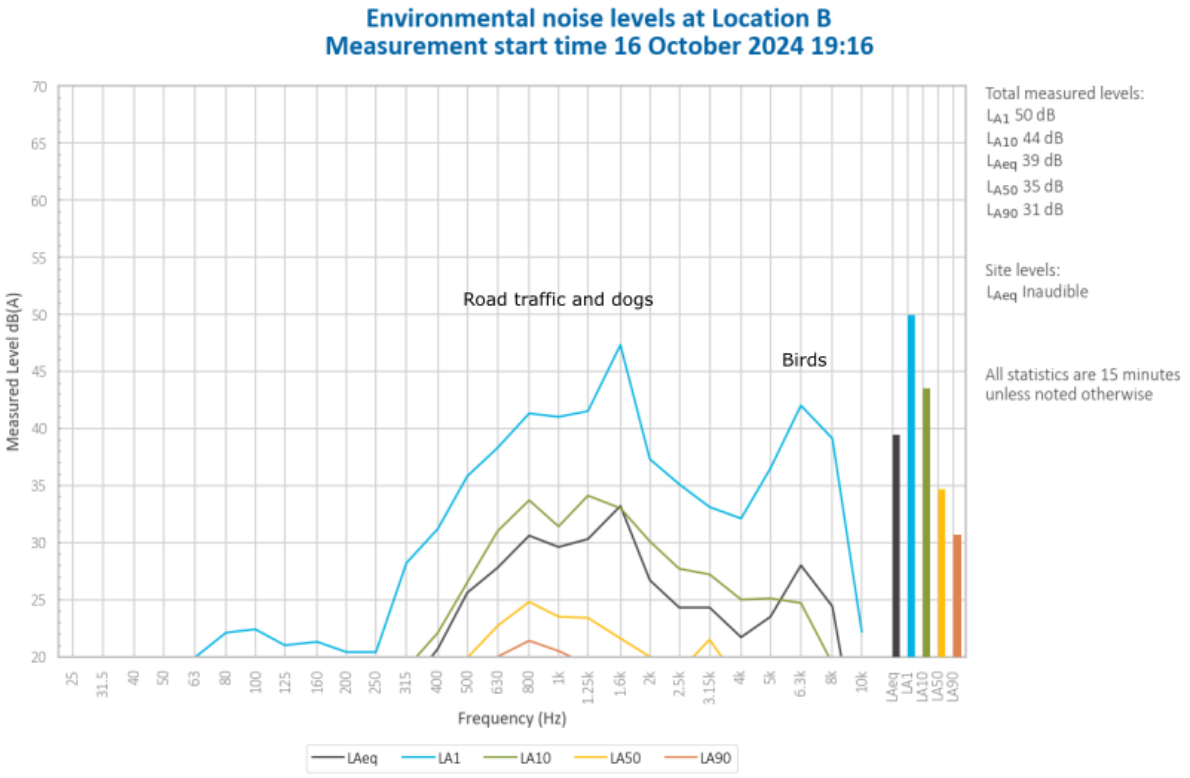


Figure 5.5 Environmental noise levels – Location B

KVAR was inaudible during the measurement.

Road traffic primarily generated total measured noise levels. Dogs contributed to the measured L_{A1} and L_{Aeq} and birds contributed to the L_{A1}.

5.6 Location C – Day

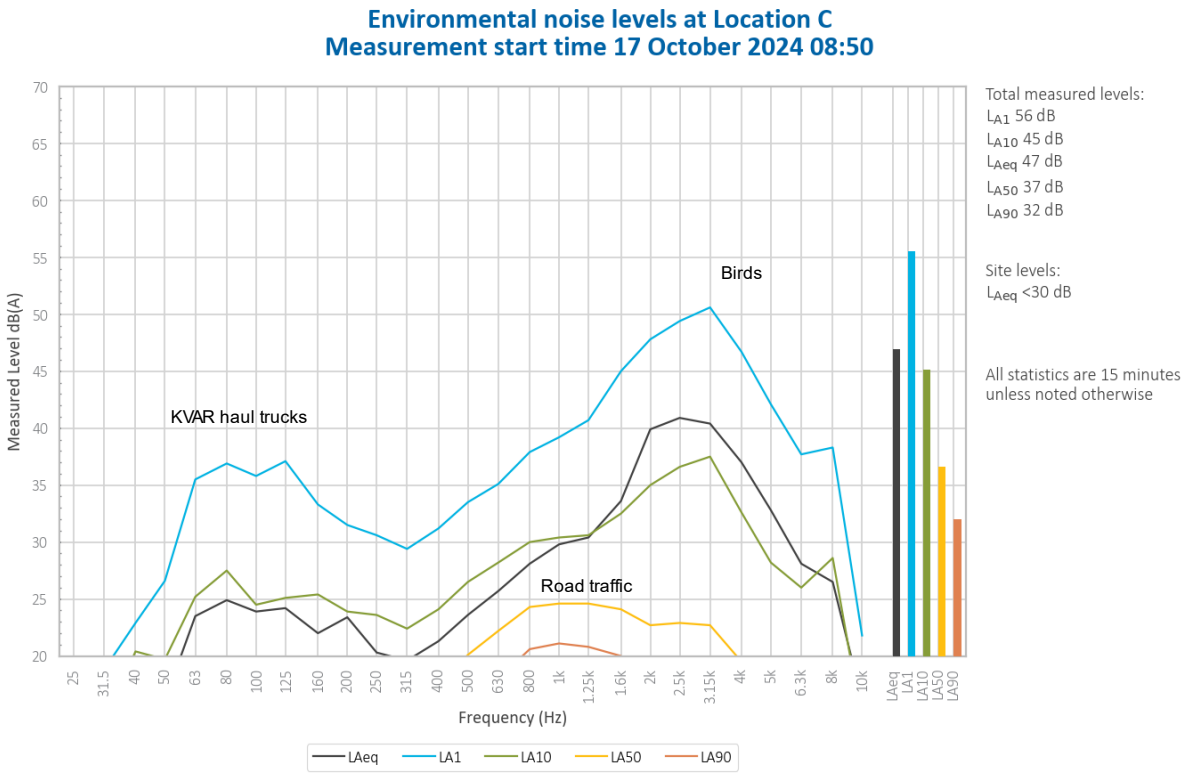


Figure 5.6 Environmental noise levels – Location C

KVAR was audible during the measurement, with noise from trucks generating a site-only L_{Aeq} of less than 30 dB. Noise from a reverse alarm was also noted.

Birds generated the measured L_{A1}, L_{A10} and L_{Aeq}. Road traffic generated the measure L_{A50} and L_{A90}.

5.7 Location C – Evening

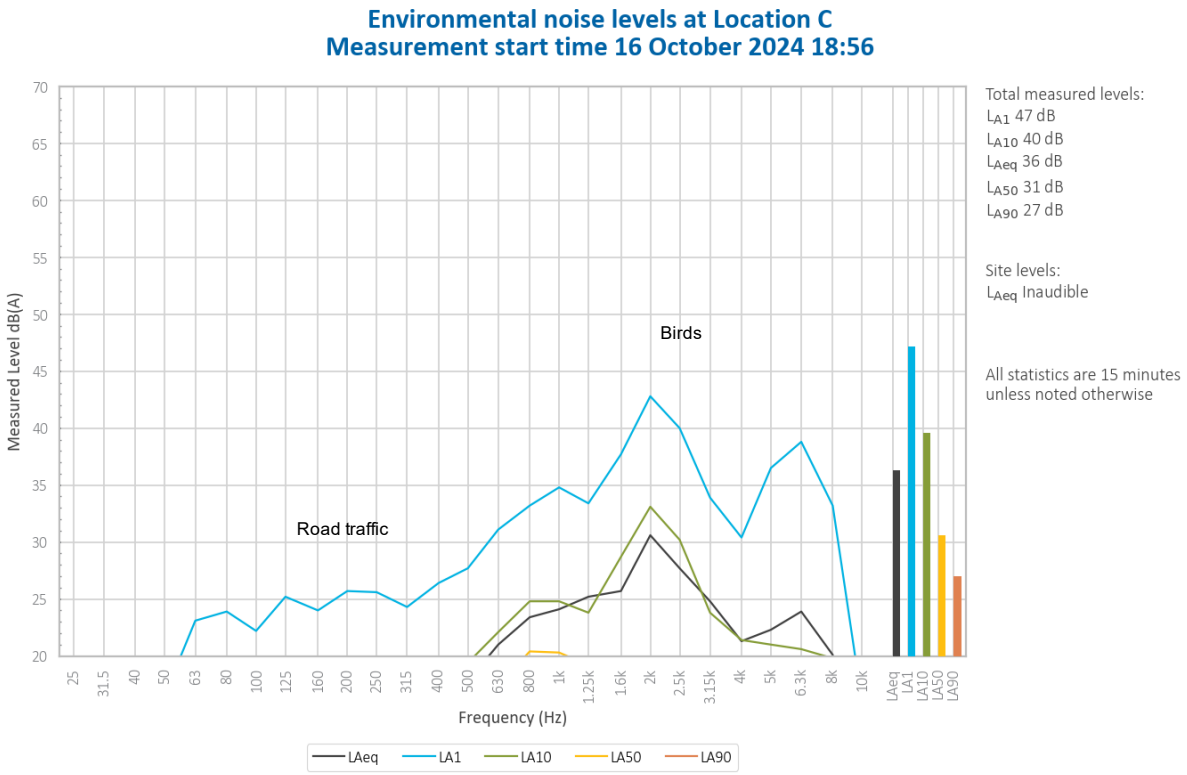


Figure 5.7 Environmental noise levels – Location C

KVAR was inaudible during the measurement.

Birds primarily generated total measured levels. Road traffic generated the measured L_{A50} and L_{A90}.

Noise from dogs was also noted.

6 Summary

EMM was engaged by Generator Property Management Pty Ltd to conduct quarterly noise survey of construction activities and operations at KVAR. 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 undertaken during the day and evening periods of 16/17 October 2024 at three monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the Quarter 4 2024 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 quarter) as loud

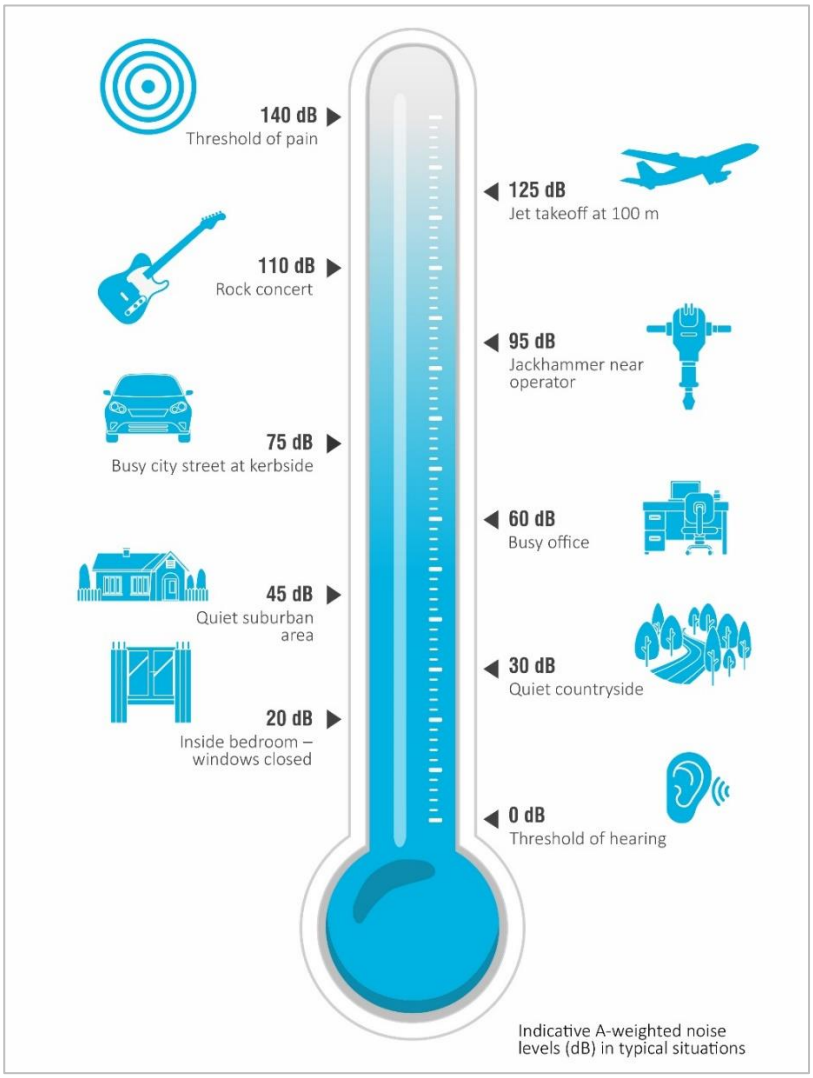


Figure A.1 Common noise levels

Appendix B
Regulator documents

EMM
creating opportunities

B.1 Development consent

Noise Impacts

Construction Hours

2.3 Construction activities associated with the project shall only be undertaken during the following hours:

a) 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;
b) 8:00 am to 1:00 pm on Saturdays; and
c) at no time on Sundays or public holidays.

2.4 Activities resulting in impulsive or tonal noise emission (such as rock breaking or rock hammering) shall be limited to 8:00 am to 12:00 pm, Monday to Saturday and 2:00 pm to 5:00 pm, Monday to Friday. The Proponent shall not undertake such activities for more than three continuous hours and must provide a minimum one-hour respite period.

2.5 Construction outside the hours stipulated in condition 2.3 of this approval is permitted in the following circumstances:

a) where construction works do not cause audible noise at any sensitive receiver; or
b) for the delivery of materials required outside these hours by the Police or other authorities for safety reasons; or
c) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

2.6 The hours of construction activities specified under condition 2.3 of this approval may be varied with the prior written approval of the Secretary. Any request to alter the hours of construction specified under condition 2.3 shall be:

a) considered on a case-by-case basis;
b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours; and
c) accompanied by any information necessary for the Secretary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of sensitive receivers in the vicinity of the site.

Construction Noise

2.7 The construction noise objective for the project is to manage noise from construction activities (as measured by a $L_{A10\ (15\ minute)}$ descriptor) so as not to exceed the background L_{A90} noise level by more than 10 dB(A) at any sensitive receiver.

Any activities that have the potential for noise emissions that exceed the objective must be identified and managed in accordance with the Construction Noise Management Plan (as referred to under condition 6.3b) of this approval). The Proponent shall implement all reasonable and feasible noise mitigation measures with the aim of achieving the construction noise objective.

Operational Noise

2.15 The cumulative operational noise from the ash placement area and ash haulage activity shall not exceed an $L_{Aeq\ (15\ minute)}$ of 40 dB(A) at the nearest most affected sensitive receiver during normal operating hours as defined in condition 2.8 of this approval.

This noise criterion applies under the following meteorological conditions:

a) wind speeds up to 3 m/s at 10 metres above ground; and/or
b) temperature inversion conditions of up to 3°C/100 m and source to receiver gradient winds of up to 2 m/s at 10 m above ground level.

This criterion does not apply where the Proponent and the affected landowner have reached a negotiated agreement in regard to noise, and a copy of the agreement has been forwarded to the Secretary and the EPA.

2.16 The Proponent shall implement measures to ensure noise attenuation of trucks. These measures may include, but are not necessarily limited to, installation of residential class mufflers, engine shrouds, body dampening, speed limiting, fitting of rubber stoppers to tail gates, limiting the use of compression braking, and ensuring trucks operate in a one-way system at the ash repository where feasible.

2.17 The Proponent shall liaise with the owner/operator of Angus Place Coal Mine with the aim of preparing a protocol which provides for a co-operative approach for the management and mitigation of noise impacts associated with coal and ash truck movements along the private haul road.

2.18 Where noise monitoring (as required by conditions 3.2 or 3.3 of this approval) identifies any non-compliance with the operational noise criterion specified under condition 2.15 of this approval the Proponent shall prepare and submit to the Secretary for approval a report including, but not limited to:

a) an assessment of all reasonable and feasible physical and other mitigation measures for reducing noise at the source including, but not limited to -
    i) construction of a noise barrier along the haulage road,
    ii) alternative ash haulage routes, and
    iii) alternative methods of ash conveyance to the repository; and
b) identification of the preferred measure(s) for reducing noise at the source;
c) feedback from directly affected property owners and the EPA on the proposed noise mitigation measures; and
d) location, type, timing and responsibility for implementation of the noise mitigation measure(s).

The report is to be submitted to the Secretary within 60 days of undertaking the noise monitoring which has identified exceedances of the operational noise criterion specified under condition 2.15, unless otherwise agreed to by the Secretary. The Proponent shall implement all reasonable and feasible mitigation measures in accordance with the requirements of the Secretary.

3. ENVIRONMENTAL MONITORING

Construction Noise Monitoring

3.1 The Proponent shall prepare and implement a **Construction Noise Monitoring** Program to confirm the predictions of the noise assessment detailed in the document referred to under condition 1.1 of this approval and assess compliance against the construction noise criterion stipulated in condition 2.7 of this approval. The noise monitoring program shall be prepared in consultation with, and to the satisfaction of, the EPA. The monitoring program shall form part of the Construction Noise Management Plan referred to in condition 6.3b) of this approval and must include monitoring of the construction noise generated during:

a) the realignment Sawyers Swamp Creek;
b) construction of the stabilisation berm;
c) excavation of the former pine plantation area;
d) relocation and construction of surface water management structures; and
e) concurrent construction activities.

The Proponent shall forward to the EPA and the Secretary a report containing the results of each noise assessment and describing any non-compliance within 14 days of conducting a noise assessment.

Operational Noise Review

3.2 Within 60 days of the commencement of operation of the project, unless otherwise agreed to by the Director-General, the Proponent shall submit for the approval of the Secretary an **Operational Noise Review** to confirm the operational noise impacts of the project. The Operational Noise Review must be prepared in consultation with, and to the satisfaction of, the EPA. The Review shall:

a) identify the appropriate operational noise objectives and level for sensitive receivers;
b) describe the methodologies for noise monitoring including the frequency of measurements and location of monitoring sites;
c) document the operational noise levels at sensitive receivers as ascertained by the noise monitoring program;
d) assess the noise performance of the project against the noise criterion specified in condition 2.15 of this approval and the predicted noise levels as detailed in the report referred to under condition 1.1 of this approval; and
e) provide details of any entries in the Complaints Register (as required under condition 5.4 of this approval) relating to noise impacts.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, the Proponent shall prepare a report as required by condition 2.18 of this approval.

Ongoing Operational Noise Monitoring

3.3 The Applicant shall prepare and implement an **Operational Noise Monitoring Program** to assess compliance against the operational noise criterion stipulated in condition 2.15 of this approval, throughout the life of the project. The noise monitoring program shall be prepared in consultation with, and to the satisfaction of, the EPA.

The noise monitoring program shall be prepared in accordance with the requirements of the *NSW Noise Policy for Industry* (EPA, 2017) (or its latest version) and must include, but not be limited to:

a) monitoring during ash placement in the far western area of the site adjacent to the haul road; and
b) monitoring of the effectiveness of any noise mitigation measures implemented under condition 2.18 of this approval, against the noise criterion specified in condition 2.15 of this approval.

Noise from the project is to be measured at the most affected point on or within the residential boundary, or at the most affected point within 30 metres of a dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise criterion stipulated in condition 2.15 of this approval. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance and the modifying factors shall also be applied to the measured noise levels where applicable in accordance with the *NSW Noise Policy for Industry* (EPA, 2017) (or its latest version).

The Applicant shall forward to the EPA and the Secretary a report containing the results of any non-compliance within 14 days of conducting a noise assessment.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, approval, the Applicant shall prepare a report as required by condition 2.18 of this approval.

The monitoring program shall form part of the Operational Noise Management Plan referred to in condition 6.5a) of this approval.

B.2 Environmental protection licence

L5 Noise limits

L5.1 Operational noise from the Kerosene Vale Ash Repository area must not exceed:

40dB(A) LAeq(15 minute) , at the nearest most affected noise sensitive location.

Note: LAeq means the equivalent continuous noise level – the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

L5.2 To determine compliance with condition(s) L4.1 noise must be measured at, or computed for, the most affected location within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural setting) where the dwelling is more than 30 metres from the boundary. A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000)".

L5.3 The noise emission limits identified in this licence apply under the following meteorological conditions:
a) wind speeds up to 3 m/s at 10 metres height above ground; and/or
b) temperature inversion conditions of up to 30C/100m and source to receiver gradient winds of up to 2 m/s at 10 metres height above ground.

Note: The noise emission limits identified in this licence do not apply at a noise sensitive location, where the licensee and the affected noise sensitive location have reached a negotiated agreement in regards to noise, and a copy of that agreement has been provided to the Environment Protection Authority.

L6 Hours of operation

L6.1 Operational activities associated with the Kerosene Vale Ash Repository must only be carried out between the hours of 0700 and 2200 Monday to Sunday.

L6.2 This condition does not apply to the delivery of material outside the hours of operation permitted by condition L6.1, if that delivery is required by police or other authorities for safety reasons; and/or the operation or personnel or equipment are endangered. In such circumstances, prior notification must be provided to the EPA and affected residents as soon as possible or within a reasonable period in the case of emergency.

B.3 Noise management plan

5.2 Environmental monitoring program

An overview of the environmental monitoring activities that have been specified by the respective sub-plans under Section 6 of the OEMP is provided in Table 5-1. Please refer to specific sub-plans under Section 6 for further details.

Table 5-1 Environmental monitoring program

Potential impact	Locations	Parameters	Frequency	Technique	Reporting	Responsibility	OEMP Sub-plan Reference
Noise – Initial 60 day reporting period	4 main locations adopted for a total of 5 monitoring sites: ▪ Skelly Road ▪ Maddox Lane ▪ Neubeck Street ▪ Wolgan Road. (Refer to Figure 5-1)	L_{Aeq}, L_{A10}, L_{A90} and L_{Amax}	4 separate days – 3 week days and a Sunday	Attended monitoring using hand held sound level meter Monitoring to be continuous throughout full day of operations for each 15 minute period, including 30 mins prior to and following normal operating hours (7am to 10pm). Nearest potentially affected receiver to be monitored at 07.00 and at least once between 20.30 – 22.30.	Report to be submitted to EPA within 1 week of monitoring COMPLETE	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.3 Operational Noise and Vibration Management Plan – Appendix A
Noise - Normal conditions	Minimum of 3 most affected locations as per the 60 day post commissioning assessment. To include periods of ash placement at far western area of the site and where noise mitigation measures are in place. (as per COA 2.15) (Refer to Figure 5-1)	Noise levels shall not exceed an LAeq of 40dB(A) at the nearest most affected receiver	During daytime (7am-6pm) and evening time (6pm-10am) Every 6 months or more frequent if adverse trends are noted	Ongoing attended monitoring using hand held sound level meter.	6 monthly noise monitoring report If non-compliance, report is to be forwarded to DPE and EPA within 14-days of conducting monitoring	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.5 Operational Noise and Vibration Management Plan – Appendix A
Noise - Emergency conditions	At the complainant's property or nearest available representative location.	Noise levels shall not exceed an LAeq of 40dB(A) at the nearest most affected receiver	As required	Attended monitoring using hand held sound level meter	6 monthly noise monitoring report	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.3 Operational Noise and Vibration Management Plan – Appendix A

6.3 Noise and vibration management sub-plan

Targets	▪ Achieve compliance with the noise criterion of L_{Aeq} of 40dB(A) at the nearest most affected receiver during normal operations. ▪ Achieve a significant reduction in the number of noise-related complaints during emergency operations (less than 5 per year, stretch target = zero complaints per year).
Indicators	▪ The number of noise-related complaints. ▪ Noise monitoring data obtained from the sensitive receiver locations ▪ Compliance indicators as assessed by the specialist noise consultant and the Environmental Representative, as required. ▪ Observed and monitored reduction in noise generation due to adaptation where necessary of engineering measures on trucks, the implementation of operating techniques such as limited compression braking and speed limit restrictions.
Supporting documentation	
Appendix A: - KVAR Stage 2 Operations- Operational Noise and Vibration Management Plan Australian Standard AS 2436 – Guide to noise control on construction, maintenance and demolition sites	
Key issues/constraints/strategies	
Wallerawang Ash Repositories activities are not anticipated to result in impacts at the nearest potentially affected receivers. Noise impacts in varying conditions can be assessed and used to predict similar scenarios in the future to determine which measures are most effective and when. Wallerawang Ash Repositories activities are not anticipated to result in perceived vibration-related impacts at the nearest potentially affected receivers. Appendix A provides procedures to be implemented should vibration-related non-conformances occur. A Specialist Consultant will be undertaking the prescribed monitoring and analysis of noise results, as per this plan.	

Appendix C
Calibration certificates

EMM
creating opportunities

C.1 Calibration certificates

Acoustic Research Labs Pty Ltd
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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 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.

PAGE 1 OF 1

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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
Calibration Date : 26 Feb 2024
Secondary Check: Rhys Gravelle
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.

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Kerosene Vale Ash Repository

Environmental noise monitoring - Q1 2025

Prepared for Generator Property Management Pty Ltd

February 2025

Kerosene Vale Ash Repository

Environmental noise monitoring - Q1 2025

Generator Property Management Pty Ltd

E240681 RP3

February 2025

Version	Date	Prepared by	Reviewed by	Comments
1	24/02/2025	Will Moore	Amanda Buckeridge	Final

Approved by

Amanda Buckeridge
Associate Acoustic Consultant
24 February 2025

Level 3 175 Scott Street
Newcastle NSW 2300
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Appendices

Tables

Figures

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Generator Property Management Pty Ltd to conduct a quarterly noise survey of construction activities and operations at Kerosene Vale Ash Repository (KVAR, the site) located near Lidsdale, NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

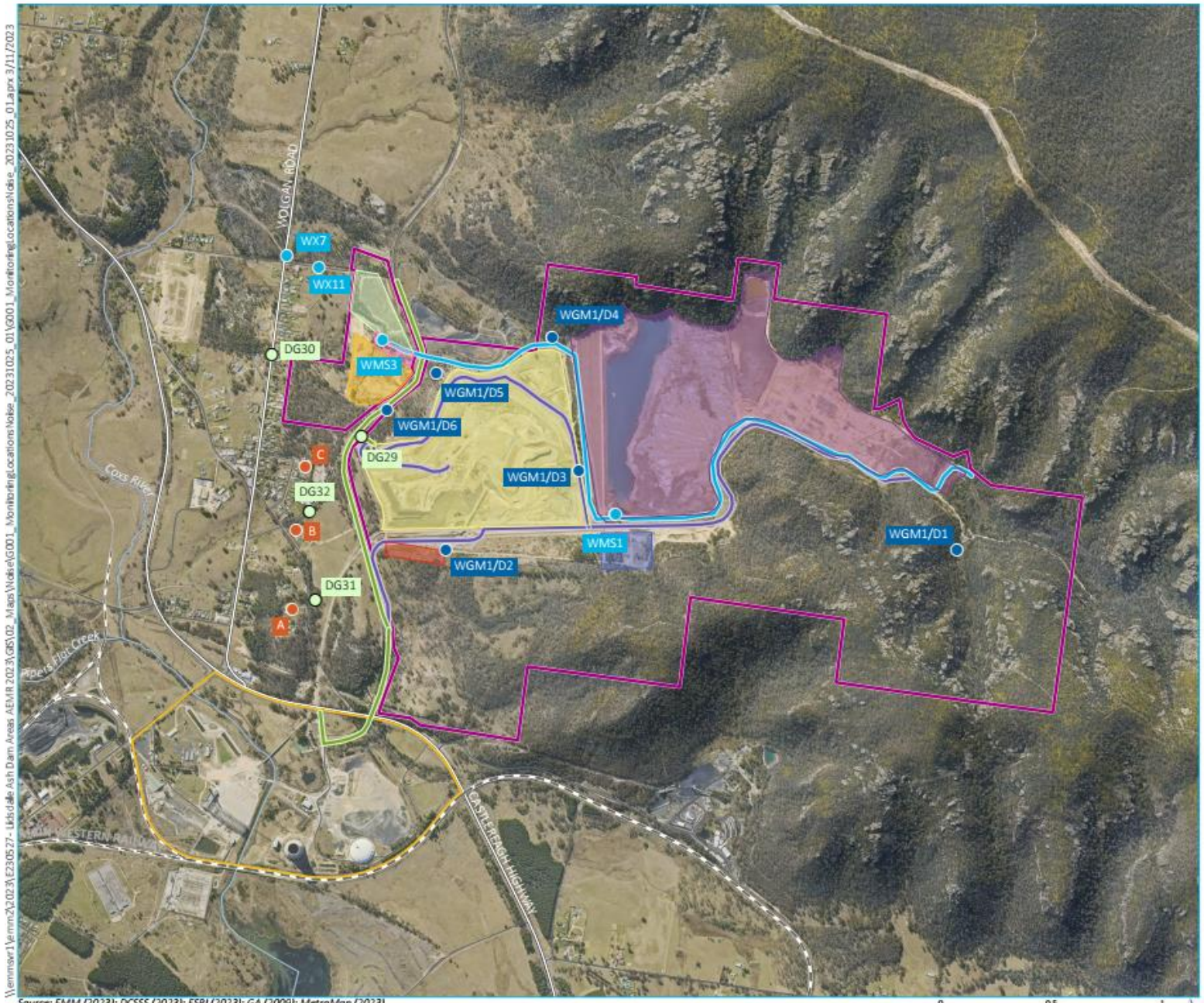
Attended environmental noise monitoring described in this report was done during the day and evening periods of 3/4 February 2025 at three monitoring locations.

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

Descriptor	Description	Coordinates (MGA 56)	
		Easting	Northing
Location A	Skelly Road, Lidsdale NSW	229052	6301209
Location B	Corner Sawyers Road and Skelly Road, Lidsdale NSW	228899	6301470
Location C	End of Nuebeck Street, Lidsdale NSW	228982	6301813



Environmental Monitoring Locations

Kerosene Vale Ash Repositories
Figure 1.1

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 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 percent 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, 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 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	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.

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

The current development consent for KVAR is MP07_0005 (MOD 2, October 2023). Section 2 of the consent details specific conditions relating to operational and construction noise generated by KVAR. Relevant sections of that document are reproduced in Appendix B.1.

2.2 Environment protection licence

KVAR holds Environment Protection Licence (EPL) No. 21185 issued by the Environment Protection Authority (EPA) most recently on19 December 2023. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The KVAR Operational Environmental Management Plan (OEMP) was most recently updated in October 2018. Section 6.3 of the OEMP contains a noise and vibration management sub-plan. Appendix A of the OEMP provides the Operational Noise and Vibration Management Plan. Relevant sections of the OEMP are reproduced Appendix B.3.

2.4 Noise limits

2.4.1 Operational noise limits

Operational noise impact limits based on the EPL are shown in Table 2.1.

Table 2.1 Operational noise impact limits, $L_{Aeq,15minute}$ dB

Location	Day	Evening
Location A	40	40
Location B	40	40
Location C	40	40

2.4.2 Construction noise targets

Condition 2.7 of the consent details construction noise objectives as follows:

> The construction noise objective for the project is to manage noise from construction activities (as measured by a $L_{A10,15minute}$ descriptor) so as not to exceed the background L_{A90} noise level by more than 10 dB(A) at any sensitive receiver.

In accordance with Condition 3.1 of the consent, construction noise monitoring must occur during the following activities:

a) the realignment of Sawyers Swamp Creek;

b) construction of the stabilisation berm;

c) excavation of the former pine plantation area;

d) relocation and construction of surface water management structures; and

e) concurrent construction activities.

However, due to the difficulty of differentiating noise from construction and operational activities, all noise measured from the site has been assessed against operational noise impact limits as per condition 2.15 of the consent.

2.5 Meteorological conditions

As detailed in the development consent and EPL, noise criteria apply under the following meteorological conditions:

- wind speeds up to 3 m/s at 10 metres height above ground; and/or
- temperature inversion conditions of up to 3°C/100m and source to receiver gradient winds of up to 2 m/s at 10 metres height above ground.

2.6 Additional requirements

The NSW EPA 'Industrial Noise Policy' (INP, 2000) was replaced by the 'Noise Policy for Industry' (NPfI) in October 2017. Noise conditions in the EPL and project approval still reference the INP exclusively, so monitoring has been conducted in accordance with the INP.

For assessment of modifying factors, the NPfI immediately superseded the INP, as outlined in the EPA document 'Implementation and transitional arrangements for the Noise Policy for Industry' (2017). Therefore, assessment and reporting of modifying factors have been done in accordance with Fact Sheet C of the NPfI.

Monitoring and reporting have been done in accordance with the EPA 'Approved methods for the measurement and analysis of environmental noise in NSW' issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirement.

3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the day and evening 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's 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 of 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

Meteorological data was obtained from the Bureau of Meteorology (BOM) automatic weather station (AWS) at Marrangaroo which allowed correlation of atmospheric parameters with measured noise levels. Vertical temperature gradient and/or sigma theta data required to determine temperature inversion conditions was not available from this AWS.

As KVAR operates solely during the day and evening periods, it has been assumed that temperature inversion conditions were not present during monitoring.

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site-only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} levels 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 Will Moore. Qualifications, experience and demonstration of competence is in accordance with the Approved methods and 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	01/06/2025	IEC 61672-1:2002
Pulsar 105 acoustic calibrator	78226	26/02/2026	IEC 60942:2003

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1.

Table 4.1 Total measured noise levels, dB – Q1 2025 [1]

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
A	4/02/2025 08:40	62	54	40	41	35	33	30
A	3/02/2025 19:44	65	48	41	40	37	35	34
B	4/02/2025 08:20	60	56	52	49	49	37	32
B	3/02/2025 19:23	60	46	39	37	35	31	28
C	4/02/2025 08:00	64	55	48	45	39	34	31
C	3/02/2025 19:02	59	52	42	40	35	32	27

Notes: 1. Levels in this table are not necessarily the result of activity at 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 Measured atmospheric conditions – Q1 2025

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
A	4/02/2025 08:40	26	<0.5	-	2
A	3/02/2025 19:44	23	1.8	100	2
B	4/02/2025 08:20	24	<0.5	-	1
B	3/02/2025 19:23	24	1.6	100	1
C	4/02/2025 08:00	20	<0.5	-	1
C	3/02/2025 19:02	24	1.8	110	1

Notes: 1. "-" indicates calm conditions at monitoring location.

4.2 Construction activities

KVAR has advised that normal operations were occurring during monitoring, but none of the construction activities as defined in Section 2.4.2 of this report and Condition 3.1 of the consent were occurring at the time of monitoring.

KVAR advised that activities on site during the noise monitoring period included loading waste at Lidsdale Cut, sieving material on top of KVAR, building access roads on SSCAD and a water cart in operation.

4.3 Site only noise levels

4.3.1 Modifying factors

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

4.3.2 Site noise levels

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 – Q1 2025

Location	Start date and time	Wind speed m/s	Limits apply? [1]	KVAR limit, $L_{Aeq,15minute}$ dB	KVAR level, $L_{Aeq,15minute}$ dB [2,3]	Exceedance, dB [4]
A	4/02/2025 08:40	0.0	Yes	40	30	Nil
A	3/02/2025 19:44	3.1	No	40	IA	N/A
B	4/02/2025 08:20	0.0	Yes	40	NM	Nil
B	3/02/2025 19:23	1.9	Yes	40	IA	Nil
C	4/02/2025 08:00	0.0	Yes	40	IA	Nil
C	3/02/2025 19:02	3.1	No	40	IA	N/A

Notes:
1. Noise emission limits do not apply during periods of rainfall or winds greater than 3 metres per second (at a height of 10 metres).
2. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.
3. 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 as per the notes in Section 3.2.
4. N/A in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in project approval.

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 section. Statistical 1/3 octave-band analysis of environmental noise was conducted, 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.

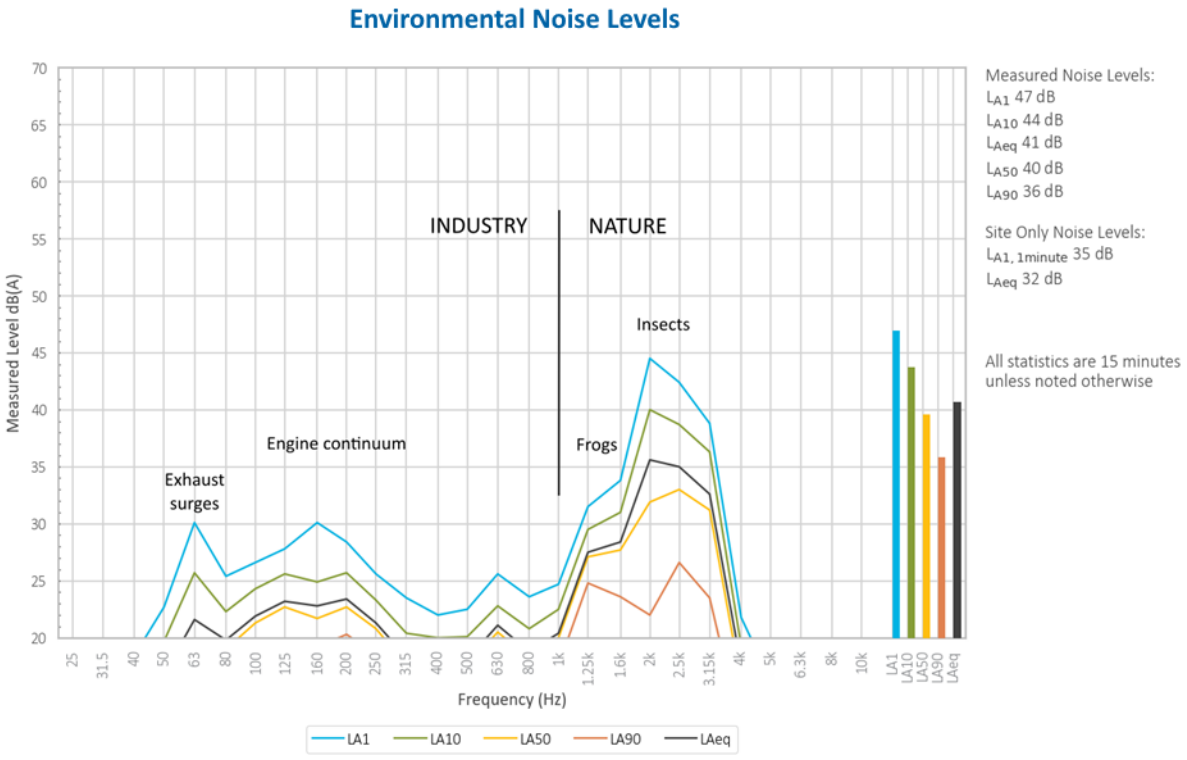


Figure 5.1 Example graph (refer to Section 5.1 for explanatory note)

5.2 Location A – Day

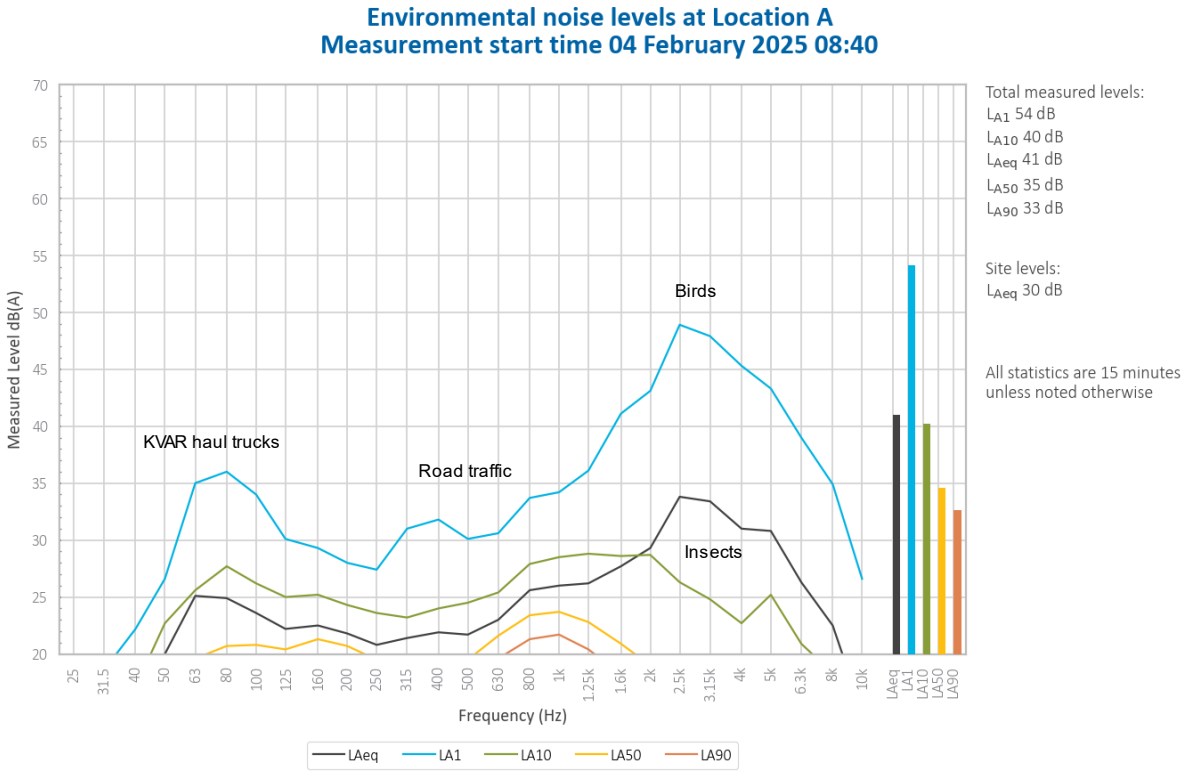


Figure 5.2 Environmental noise levels – Location A

KVAR was audible during the measurement, with noise from trucks generating a site-only L_{Aeq} of 30 dB. Dozer track noise was also noted.

Birds generated the measure L_{A1} and L_{Aeq}. Road traffic generated the measure L_{A50} and L_{A90} and contributed to the L_{A10}. KVAR contributed to the L_{A10}.

Noise from insects was also noted.

5.3 Location A – Evening

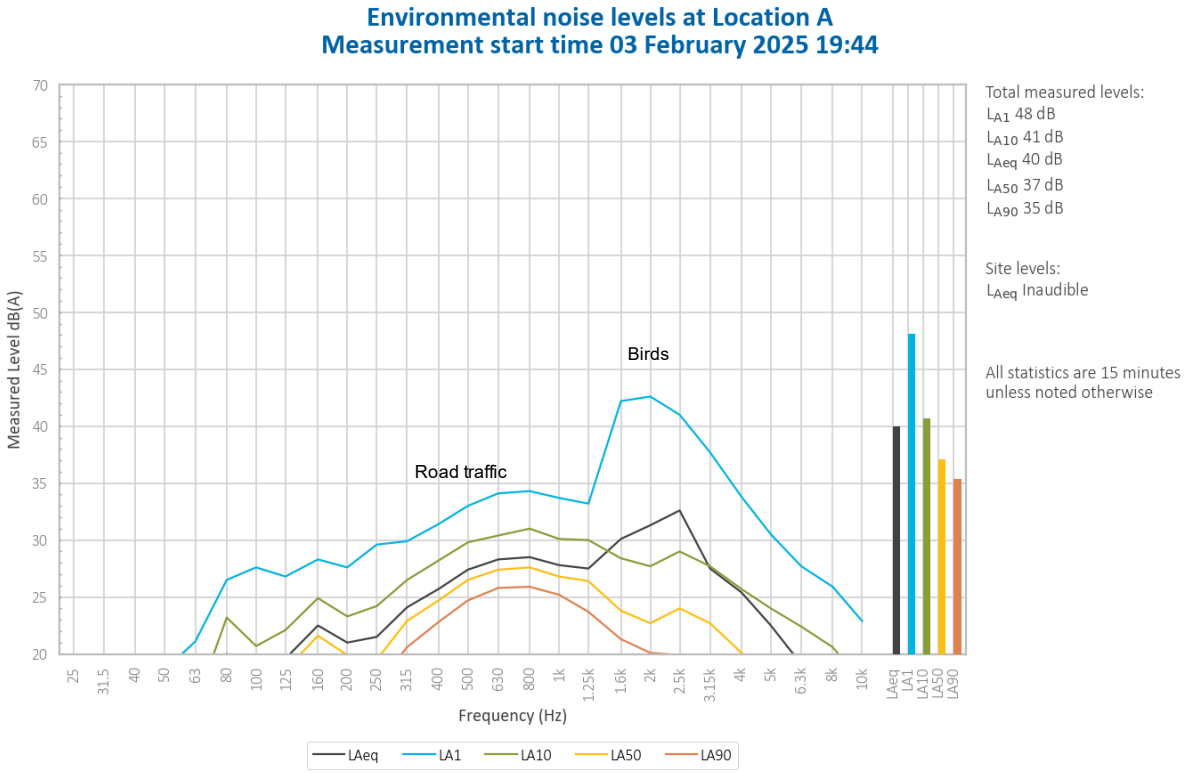


Figure 5.3 Environmental noise levels – Location A

KVAR was inaudible during the measurement.

Road traffic primarily generated total measured levels. Birds generated the measured L_{A1} and contributed to the L_{Aeq}.

A breeze in nearby foliage was also noted.

5.4 Location B – Day

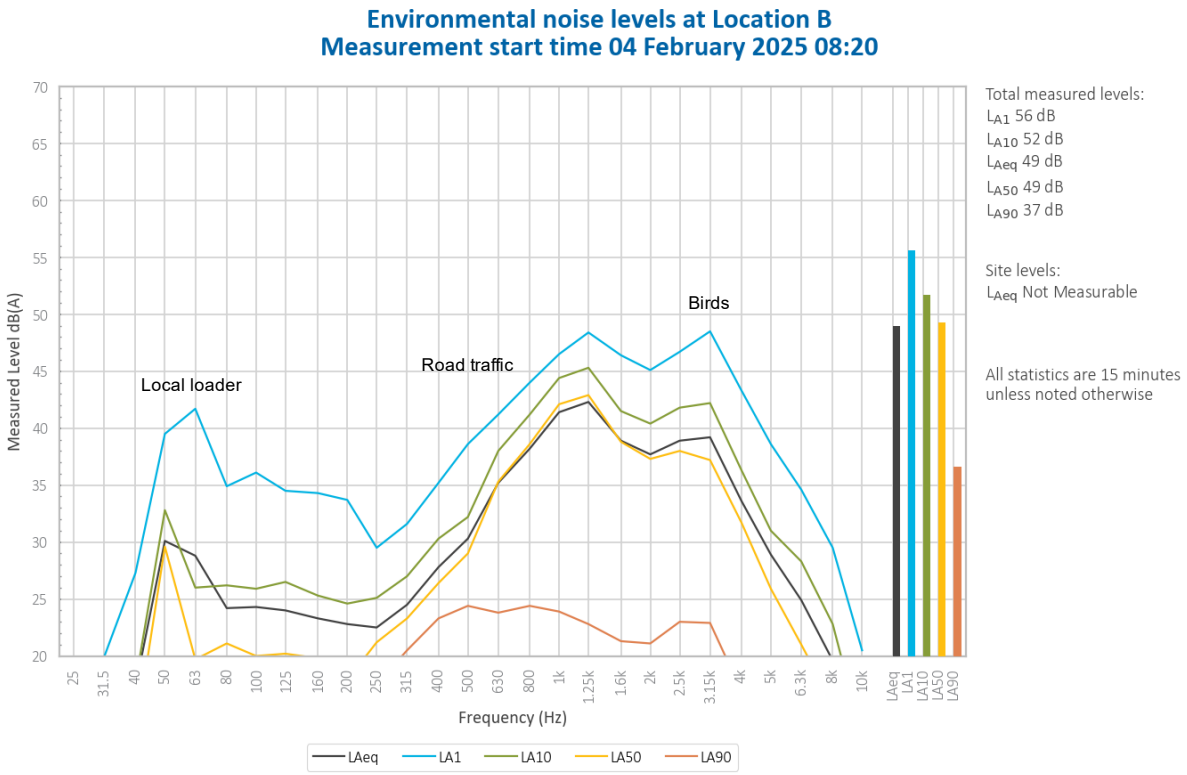


Figure 5.4 Environmental noise levels – Location B

KVAR was audible briefly as truck noise, but was not measurable during the measurement due to local heavy plant and road traffic.

Road traffic and birds generated total measured levels.

Noise from an aeroplane, dogs and a front-end loader was also noted.

5.5 Location B – Evening

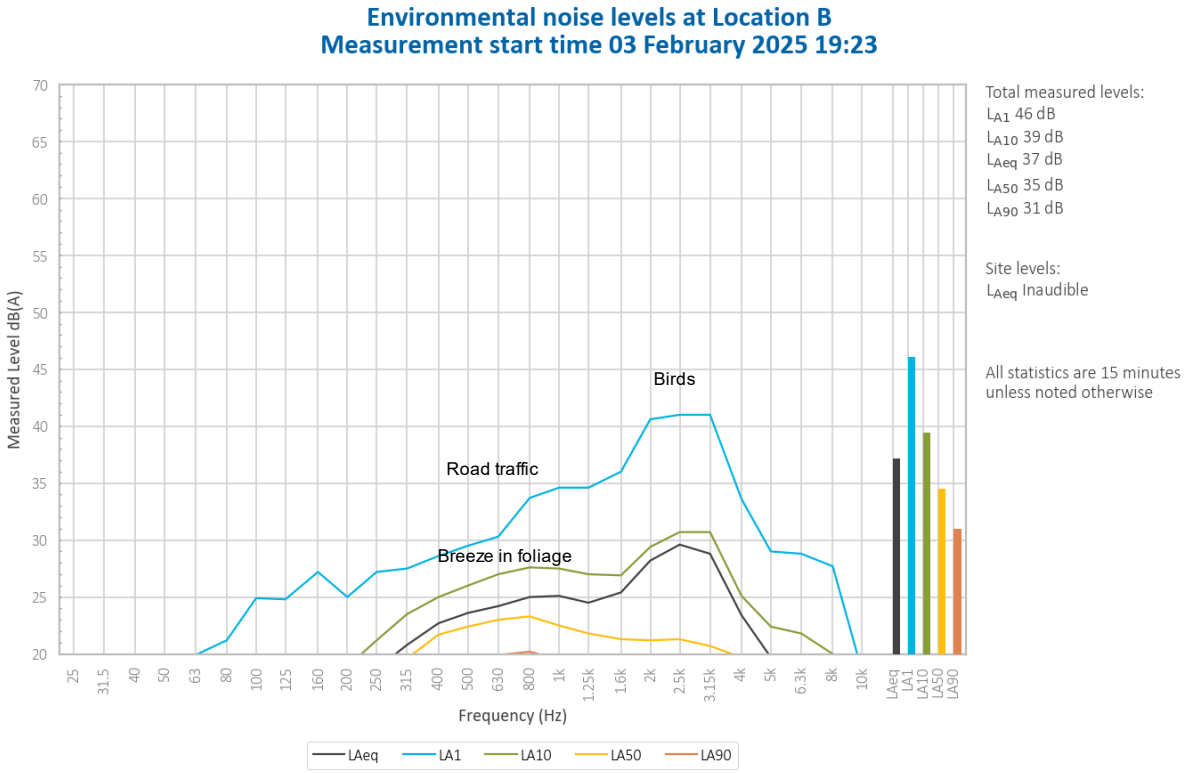


Figure 5.5 Environmental noise levels – Location B

KVAR was inaudible during the measurement.

Birds generated the measured L_{A1} and contributed to the L_{A10} and L_{Aeq}. A breeze in nearby foliage and road traffic both contributed to the measured L_{A10} and L_{Aeq} and generated the measure L_{A50} and L_{A90}.

Noise from insects was also noted.

5.6 Location C – Day

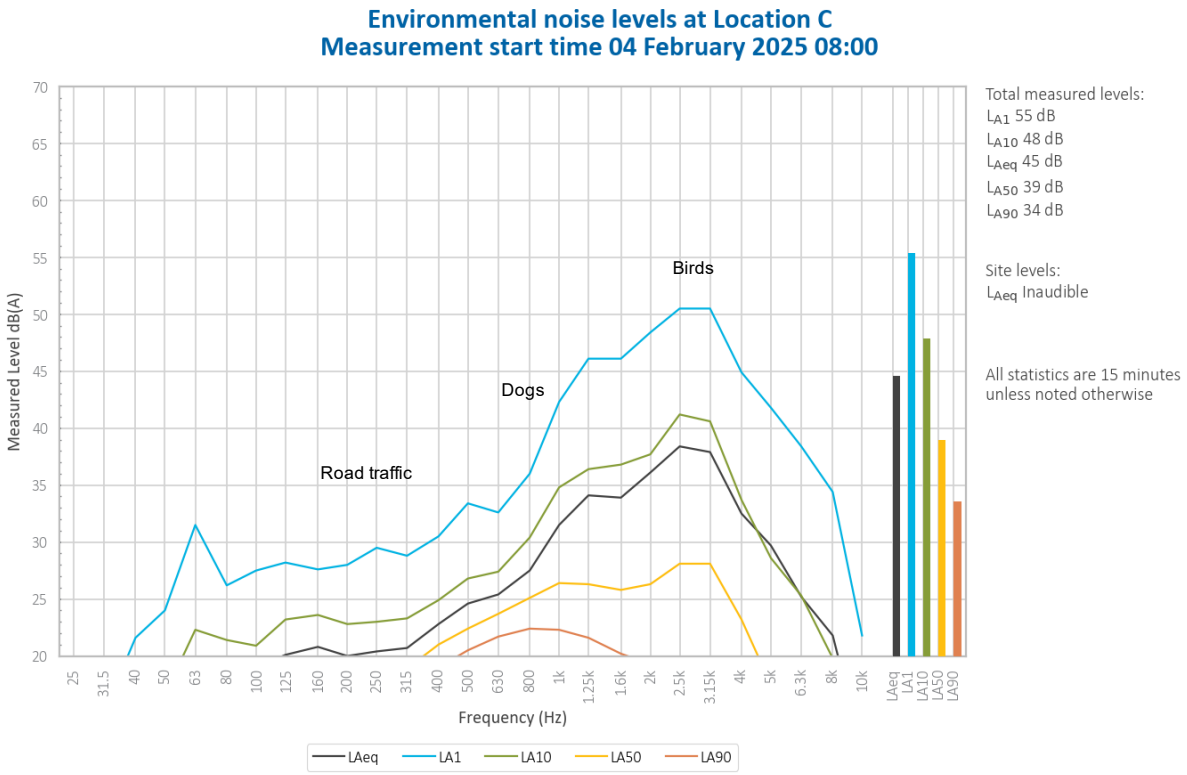


Figure 5.6 Environmental noise levels – Location C

KVAR was inaudible during the measurement.

Birds primarily generated total measured levels. Road traffic generated the measured L_{A90}.

Noise from dogs was also noted.

5.7 Location C – Evening

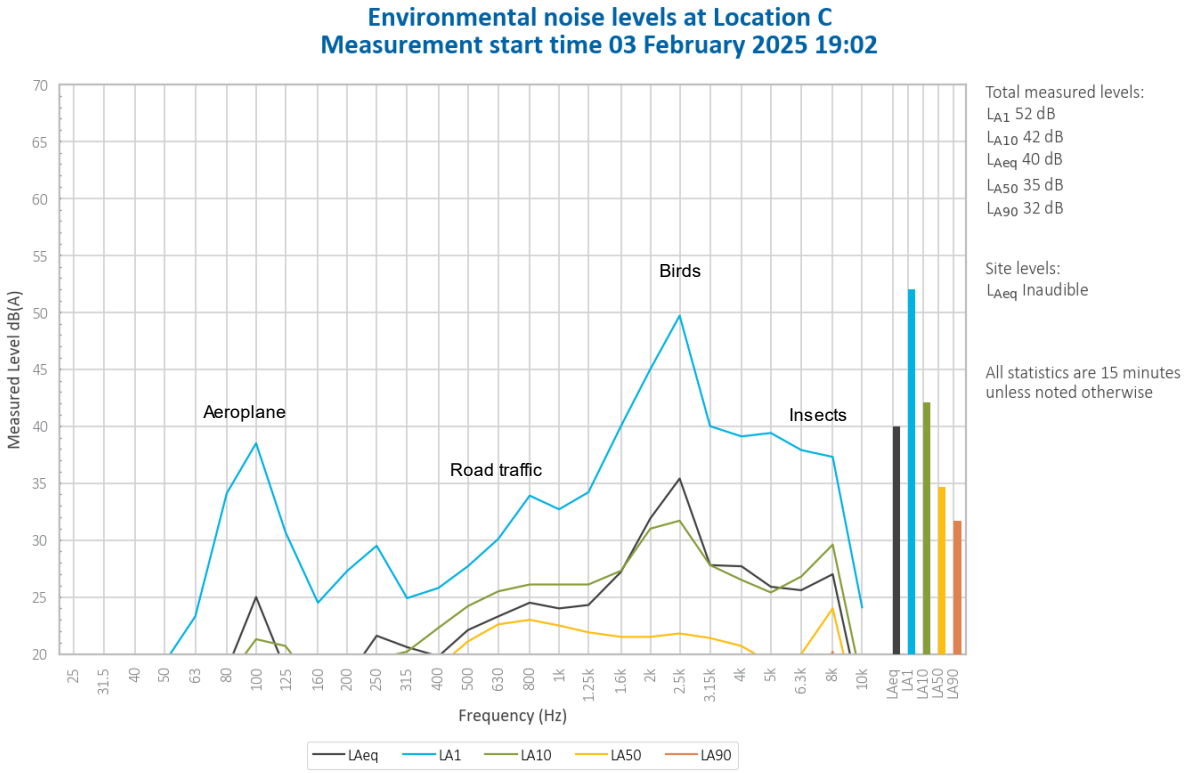


Figure 5.7 Environmental noise levels – Location C

KVAR was inaudible during the measurement.

Birds generated the measured L_{A1}, L_{A10} and L_{Aeq}. Insects generated the L_{A50} and L_{A90}.

Noise from an aeroplane, a breeze in nearby foliage and road traffic was also noted.

6 Summary

EMM was engaged by Generator Property Management Pty Ltd to conduct quarterly noise survey of construction activities and operations at KVAR. 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 undertaken during the day and evening periods of 3/4 February 2025 at three monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the Q1 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 quarter) as loud

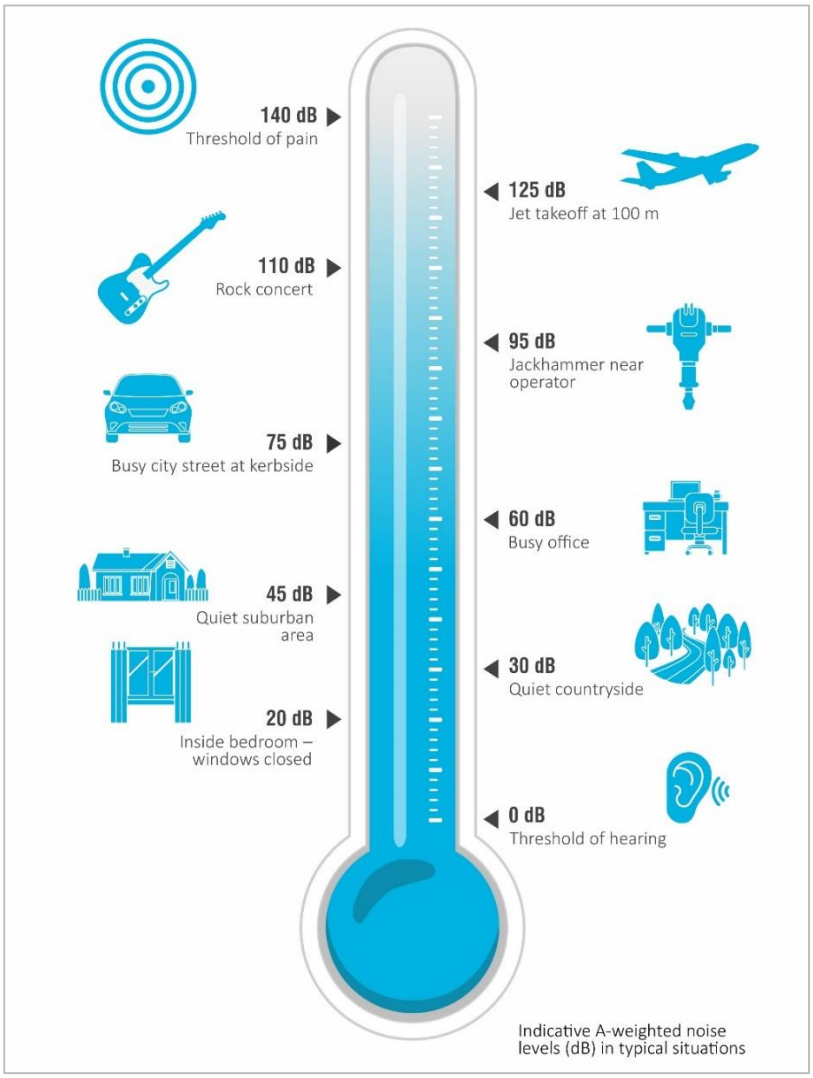

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

Noise Impacts

Construction Hours

2.3 Construction activities associated with the project shall only be undertaken during the following hours:

a) 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;
b) 8:00 am to 1:00 pm on Saturdays; and
c) at no time on Sundays or public holidays.

2.4 Activities resulting in impulsive or tonal noise emission (such as rock breaking or rock hammering) shall be limited to 8:00 am to 12:00 pm, Monday to Saturday and 2:00 pm to 5:00 pm, Monday to Friday. The Proponent shall not undertake such activities for more than three continuous hours and must provide a minimum one-hour respite period.

2.5 Construction outside the hours stipulated in condition 2.3 of this approval is permitted in the following circumstances:

a) where construction works do not cause audible noise at any sensitive receiver; or
b) for the delivery of materials required outside these hours by the Police or other authorities for safety reasons; or
c) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

2.6 The hours of construction activities specified under condition 2.3 of this approval may be varied with the prior written approval of the Secretary. Any request to alter the hours of construction specified under condition 2.3 shall be:

a) considered on a case-by-case basis;
b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours; and
c) accompanied by any information necessary for the Secretary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of sensitive receivers in the vicinity of the site.

Construction Noise

2.7 The construction noise objective for the project is to manage noise from construction activities (as measured by a $L_{A10\ (15\ minute)}$ descriptor) so as not to exceed the background L_{A90} noise level by more than 10 dB(A) at any sensitive receiver.

Any activities that have the potential for noise emissions that exceed the objective must be identified and managed in accordance with the Construction Noise Management Plan (as referred to under condition 6.3b) of this approval). The Proponent shall implement all reasonable and feasible noise mitigation measures with the aim of achieving the construction noise objective.

Operational Noise

2.15 The cumulative operational noise from the ash placement area and ash haulage activity shall not exceed an $L_{Aeq\ (15\ minute)}$ of 40 dB(A) at the nearest most affected sensitive receiver during normal operating hours as defined in condition 2.8 of this approval.

This noise criterion applies under the following meteorological conditions:

a) wind speeds up to 3 m/s at 10 metres above ground; and/or
b) temperature inversion conditions of up to 3°C/100 m and source to receiver gradient winds of up to 2 m/s at 10 m above ground level.

This criterion does not apply where the Proponent and the affected landowner have reached a negotiated agreement in regard to noise, and a copy of the agreement has been forwarded to the Secretary and the EPA.

2.16 The Proponent shall implement measures to ensure noise attenuation of trucks. These measures may include, but are not necessarily limited to, installation of residential class mufflers, engine shrouds, body dampening, speed limiting, fitting of rubber stoppers to tail gates, limiting the use of compression braking, and ensuring trucks operate in a one-way system at the ash repository where feasible.

2.17 The Proponent shall liaise with the owner/operator of Angus Place Coal Mine with the aim of preparing a protocol which provides for a co-operative approach for the management and mitigation of noise impacts associated with coal and ash truck movements along the private haul road.

2.18 Where noise monitoring (as required by conditions 3.2 or 3.3 of this approval) identifies any non-compliance with the operational noise criterion specified under condition 2.15 of this approval the Proponent shall prepare and submit to the Secretary for approval a report including, but not limited to:

a) an assessment of all reasonable and feasible physical and other mitigation measures for reducing noise at the source including, but not limited to -
    i) construction of a noise barrier along the haulage road,
    ii) alternative ash haulage routes, and
    iii) alternative methods of ash conveyance to the repository; and
b) identification of the preferred measure(s) for reducing noise at the source;
c) feedback from directly affected property owners and the EPA on the proposed noise mitigation measures; and
d) location, type, timing and responsibility for implementation of the noise mitigation measure(s).

The report is to be submitted to the Secretary within 60 days of undertaking the noise monitoring which has identified exceedances of the operational noise criterion specified under condition 2.15, unless otherwise agreed to by the Secretary. The Proponent shall implement all reasonable and feasible mitigation measures in accordance with the requirements of the Secretary.

3. ENVIRONMENTAL MONITORING

Construction Noise Monitoring

3.1 The Proponent shall prepare and implement a **Construction Noise Monitoring** Program to confirm the predictions of the noise assessment detailed in the document referred to under condition 1.1 of this approval and assess compliance against the construction noise criterion stipulated in condition 2.7 of this approval. The noise monitoring program shall be prepared in consultation with, and to the satisfaction of, the EPA. The monitoring program shall form part of the Construction Noise Management Plan referred to in condition 6.3b) of this approval and must include monitoring of the construction noise generated during:

a) the realignment Sawyers Swamp Creek;
b) construction of the stabilisation berm;
c) excavation of the former pine plantation area;
d) relocation and construction of surface water management structures; and
e) concurrent construction activities.

The Proponent shall forward to the EPA and the Secretary a report containing the results of each noise assessment and describing any non-compliance within 14 days of conducting a noise assessment.

Operational Noise Review

3.2 Within 60 days of the commencement of operation of the project, unless otherwise agreed to by the Director-General, the Proponent shall submit for the approval of the Secretary an **Operational Noise Review** to confirm the operational noise impacts of the project. The Operational Noise Review must be prepared in consultation with, and to the satisfaction of, the EPA. The Review shall:

a) identify the appropriate operational noise objectives and level for sensitive receivers;
b) describe the methodologies for noise monitoring including the frequency of measurements and location of monitoring sites;
c) document the operational noise levels at sensitive receivers as ascertained by the noise monitoring program;
d) assess the noise performance of the project against the noise criterion specified in condition 2.15 of this approval and the predicted noise levels as detailed in the report referred to under condition 1.1 of this approval; and
e) provide details of any entries in the Complaints Register (as required under condition 5.4 of this approval) relating to noise impacts.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, the Proponent shall prepare a report as required by condition 2.18 of this approval.

Ongoing Operational Noise Monitoring

3.3 The Applicant shall prepare and implement an **Operational Noise Monitoring Program** to assess compliance against the operational noise criterion stipulated in condition 2.15 of this approval, throughout the life of the project. The noise monitoring program shall be prepared in consultation with, and to the satisfaction of, the EPA.

The noise monitoring program shall be prepared in accordance with the requirements of the *NSW Noise Policy for Industry* (EPA, 2017) (or its latest version) and must include, but not be limited to:

a) monitoring during ash placement in the far western area of the site adjacent to the haul road; and
b) monitoring of the effectiveness of any noise mitigation measures implemented under condition 2.18 of this approval, against the noise criterion specified in condition 2.15 of this approval.

Noise from the project is to be measured at the most affected point on or within the residential boundary, or at the most affected point within 30 metres of a dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise criterion stipulated in condition 2.15 of this approval. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance and the modifying factors shall also be applied to the measured noise levels where applicable in accordance with the *NSW Noise Policy for Industry* (EPA, 2017) (or its latest version).

The Applicant shall forward to the EPA and the Secretary a report containing the results of any non-compliance within 14 days of conducting a noise assessment.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, approval, the Applicant shall prepare a report as required by condition 2.18 of this approval.

The monitoring program shall form part of the Operational Noise Management Plan referred to in condition 6.5a) of this approval.

B.2 Environmental protection licence

L5 Noise limits

L5.1 Operational noise from the Kerosene Vale Ash Repository area must not exceed:

40dB(A) LAeq(15 minute) , at the nearest most affected noise sensitive location.

Note: LAeq means the equivalent continuous noise level – the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

L5.2 To determine compliance with condition(s) L4.1 noise must be measured at, or computed for, the most affected location within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural setting) where the dwelling is more than 30 metres from the boundary. A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000)".

L5.3 The noise emission limits identified in this licence apply under the following meteorological conditions:
a) wind speeds up to 3 m/s at 10 metres height above ground; and/or
b) temperature inversion conditions of up to 30C/100m and source to receiver gradient winds of up to 2 m/s at 10 metres height above ground.

Note: The noise emission limits identified in this licence do not apply at a noise sensitive location, where the licensee and the affected noise sensitive location have reached a negotiated agreement in regards to noise, and a copy of that agreement has been provided to the Environment Protection Authority.

L6 Hours of operation

L6.1 Operational activities associated with the Kerosene Vale Ash Repository must only be carried out between the hours of 0700 and 2200 Monday to Sunday.

L6.2 This condition does not apply to the delivery of material outside the hours of operation permitted by condition L6.1, if that delivery is required by police or other authorities for safety reasons; and/or the operation or personnel or equipment are endangered. In such circumstances, prior notification must be provided to the EPA and affected residents as soon as possible or within a reasonable period in the case of emergency.

B.3 Noise management plan

5.2 Environmental monitoring program

An overview of the environmental monitoring activities that have been specified by the respective sub-plans under Section 6 of the OEMP is provided in Table 5-1. Please refer to specific sub-plans under Section 6 for further details.

Table 5-1 Environmental monitoring program

Potential impact	Locations	Parameters	Frequency	Technique	Reporting	Responsibility	OEMP Sub-plan Reference
Noise – Initial 60 day reporting period	4 main locations adopted for a total of 5 monitoring sites: ▪ Skelly Road ▪ Maddox Lane ▪ Neubeck Street ▪ Wolgan Road. (Refer to Figure 5-1)	L_{Aeq}, L_{A10}, L_{A90} and L_{AmaX}	4 separate days – 3 week days and a Sunday	Attended monitoring using hand held sound level meter Monitoring to be continuous throughout full day of operations for each 15 minute period, including 30 mins prior to and following normal operating hours (7am to 10pm). Nearest potentially affected receiver to be monitored at 07.00 and at least once between 20.30 – 22.30.	Report to be submitted to EPA within 1 week of monitoring COMPLETE	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.3 Operational Noise and Vibration Management Plan – Appendix A
Noise - Normal conditions	Minimum of 3 most affected locations as per the 60 day post commissioning assessment. To include periods of ash placement at far western area of the site and where noise mitigation measures are in place. (as per COA 2.15) (Refer to Figure 5-1)	Noise levels shall not exceed an LAeq of 40dB(A) at the nearest most affected receiver	During daytime (7am-6pm) and evening time (6pm-10am) Every 6 months or more frequent if adverse trends are noted	Ongoing attended monitoring using hand held sound level meter.	6 monthly noise monitoring report If non-compliance, report is to be forwarded to DPE and EPA within 14-days of conducting monitoring	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.5 Operational Noise and Vibration Management Plan – Appendix A
Noise - Emergency conditions	At the complainant's property or nearest available representative location.	Noise levels shall not exceed an LAeq of 40dB(A) at the nearest most affected receiver	As required	Attended monitoring using hand held sound level meter	6 monthly noise monitoring report	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.3 Operational Noise and Vibration Management Plan – Appendix A

6.3 Noise and vibration management sub-plan

Targets	▪ Achieve compliance with the noise criterion of L_{Aeq} of 40dB(A) at the nearest most affected receiver during normal operations. ▪ Achieve a significant reduction in the number of noise-related complaints during emergency operations (less than 5 per year, stretch target = zero complaints per year).
Indicators	▪ The number of noise-related complaints. ▪ Noise monitoring data obtained from the sensitive receiver locations ▪ Compliance indicators as assessed by the specialist noise consultant and the Environmental Representative, as required. ▪ Observed and monitored reduction in noise generation due to adaptation where necessary of engineering measures on trucks, the implementation of operating techniques such as limited compression braking and speed limit restrictions.
Supporting documentation	
Appendix A: - KVAR Stage 2 Operations- Operational Noise and Vibration Management Plan Australian Standard AS 2436 – Guide to noise control on construction, maintenance and demolition sites	
Key issues/constraints/strategies	
Wallerawang Ash Repositories activities are not anticipated to result in impacts at the nearest potentially affected receivers. Noise impacts in varying conditions can be assessed and used to predict similar scenarios in the future to determine which measures are most effective and when. Wallerawang Ash Repositories activities are not anticipated to result in perceived vibration-related impacts at the nearest potentially affected receivers. Appendix A provides procedures to be implemented should vibration-related non-conformances occur. A Specialist Consultant will be undertaking the prescribed monitoring and analysis of noise results, as per this plan.	

Appendix C
Calibration certificates

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C.1 Calibration certificates

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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 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.

PAGE 1 OF 1

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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
Calibration Date : 26 Feb 2024
Secondary Check: Rhys Gravelle
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.

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Kerosene Vale Ash Repository

Environmental noise monitoring - Q2 2025

Prepared for Generator Property Management Pty Ltd

April 2025

Kerosene Vale Ash Repository

Environmental noise monitoring - Q2 2025

Generator Property Management Pty Ltd

E240681 RP4

April 2025

Version	Date	Prepared by	Reviewed by	Comments
1	16/04/2025	Ingrid Smith	Jesse Tribby	Final

Approved by

Jesse Tribby
Associate, Acoustics
16 April 2025

Level 10 201 Pacific Highway
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Appendices

Tables

Figures

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Generator Property Management Pty Ltd to conduct a quarterly noise survey of construction activities and operations at Kerosene Vale Ash Repository (KVAR, the site) located near Lidsdale, NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

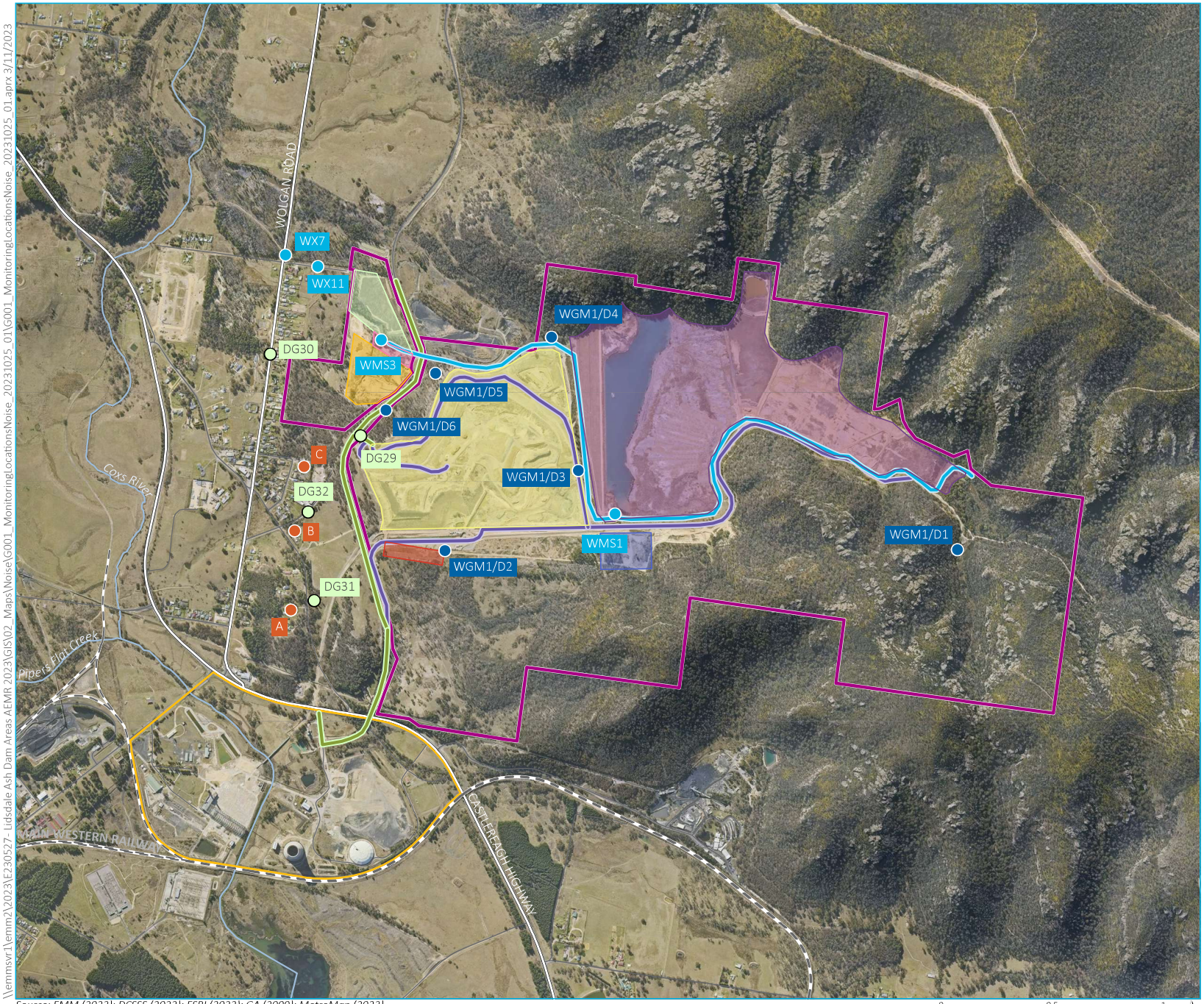
Attended environmental noise monitoring described in this report was done during the day and evening periods of 3/4 April 2025 at three monitoring locations.

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

Descriptor	Description	Coordinates (MGA 56)	
		Easting	Northing
Location A	Skelly Road, Lidsdale NSW	229052	6301209
Location B	Corner Sawyers Road and Skelly Road, Lidsdale NSW	228899	6301470
Location C	End of Nuebeck Street, Lidsdale NSW	228982	6301813



KEY

- Site boundary
- Wallerawang Power Station site
- Private access track
- Private haul road
- Sawyers Swamp Creek
- Groundwater Monitoring
- Noise monitoring
- Surface Water
- Dust gauge

Site layout

- 2018 proposed asbestos disposal area
- Demolition landfill south of SSCAD
- Kerosene Vale ash repository
- Lidsdale cut northern landfill
- Lidsdale cut southern landfill
- Lidsdale cut
- Sawyers Swamp Creek ash dam

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse

Environmental Monitoring Locations

Kerosene Vale Ash Repositories
Figure 1.1

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\\emmsvr1\emm2\2023\E230527 - Lidsdale Ash Dam Areas AEMR 2023\GIS\02_Maps\Noise\G001_MonitoringLocationsNoise_20231025_01\G001_MonitoringLocationsNoise_20231025_01.aprx 3/11/2023

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 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 percent 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, 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 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	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.

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

The current development consent for KVAR is MP07_0005 (MOD 2, October 2023). Section 2 of the consent details specific conditions relating to operational and construction noise generated by KVAR. Relevant sections of that document are reproduced in Appendix B.1.

2.2 Environment protection licence

KVAR holds Environment Protection Licence (EPL) No. 21185 issued by the Environment Protection Authority (EPA) most recently on 19 December 2023. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The KVAR Operational Environmental Management Plan (OEMP) was most recently updated in October 2018. Section 6.3 of the OEMP contains a noise and vibration management sub-plan. Appendix A of the OEMP provides the Operational Noise and Vibration Management Plan. Relevant sections of the OEMP are reproduced Appendix B.3.

2.4 Noise limits

2.4.1 Operational noise limits

Operational noise impact limits based on the EPL are shown in Table 2.1.

Table 2.1 Operational noise impact limits, $L_{Aeq,15minute}$ dB

Location	Day	Evening
Location A	40	40
Location B	40	40
Location C	40	40

2.4.2 Construction noise targets

Condition 2.7 of the consent details construction noise objectives as follows:

> The construction noise objective for the project is to manage noise from construction activities (as measured by a $L_{A10,15minute}$ descriptor) so as not to exceed the background L_{A90} noise level by more than 10 dB(A) at any sensitive receiver.

In accordance with Condition 3.1 of the consent, construction noise monitoring must occur during the following activities:

a) the realignment of Sawyers Swamp Creek;

b) construction of the stabilisation berm;

c) excavation of the former pine plantation area;

d) relocation and construction of surface water management structures; and

e) concurrent construction activities.

However, due to the difficulty of differentiating noise from construction and operational activities, all noise measured from the site has been assessed against operational noise impact limits as per condition 2.15 of the consent.

2.5 Meteorological conditions

As detailed in the development consent and EPL, noise criteria apply under the following meteorological conditions:

- wind speeds up to 3 m/s at 10 metres height above ground; and/or
- temperature inversion conditions of up to 3°C/100m and source to receiver gradient winds of up to 2 m/s at 10 metres height above ground.

2.6 Additional requirements

The NSW EPA 'Industrial Noise Policy' (INP, 2000) was replaced by the 'Noise Policy for Industry' (NPfI) in October 2017. Noise conditions in the EPL and project approval still reference the INP exclusively, so monitoring has been conducted in accordance with the INP.

For assessment of modifying factors, the NPfI immediately superseded the INP, as outlined in the EPA document 'Implementation and transitional arrangements for the Noise Policy for Industry' (2017). Therefore, assessment and reporting of modifying factors have been done in accordance with Fact Sheet C of the NPfI.

Monitoring and reporting have been done in accordance with the EPA 'Approved methods for the measurement and analysis of environmental noise in NSW' issued in January 2022.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirement.

3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the day and evening 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's 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 of 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

Meteorological data was obtained from the Bureau of Meteorology (BOM) automatic weather station (AWS) at Marrangaroo which allowed correlation of atmospheric parameters with measured noise levels. Vertical temperature gradient and/or sigma theta data required to determine temperature inversion conditions was not available from this AWS.

As KVAR operates solely during the day and evening periods, it has been assumed that temperature inversion conditions were not present during monitoring.

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site-only L_{Aeq} noise levels.

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} levels 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 Will Moore. Qualifications, experience and demonstration of competence is in accordance with the Approved methods and 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 Type 2250 sound level meter	3008201	12/07/2025	IEC 61672-1:2013
SVAN SV36 calibrator	154613	05/06/2025	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1.

Table 4.1 Total measured noise levels, dB – Q2 2025 [1]

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
A	03/04/2025 19:01	64	56	47	45	39	37	35
A	04/04/2025 10:14	66	53	45	43	37	35	32
B	03/04/2025 18:38	62	54	46	44	40	37	34
B	04/04/2025 9:52	65	53	45	42	38	33	29
C	03/04/2025 18:15	57	51	43	42	39	37	33
C	04/04/2025 9:30	61	53	43	41	35	32	30

Notes: 1. Levels in this table are not necessarily the result of activity at 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 Measured atmospheric conditions – Q2 2025

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
A	03/04/2025 19:01	18	<0.5	-	0
A	04/04/2025 10:14	22	<0.5	-	0
B	03/04/2025 18:38	18	<0.5	-	1
B	04/04/2025 9:52	27	<0.5	-	0
C	03/04/2025 18:15	20	0.6	194	1
C	04/04/2025 9:30	17	<0.5	-	0

Notes: 1. "-" indicates calm conditions at monitoring location.

4.2 Construction activities

KVAR has advised that normal operations were occurring during monitoring, but none of the construction activities as defined in Section 2.4.2 of this report and Condition 3.1 of the consent were occurring at the time of monitoring.

KVAR advised that activities on site during the noise monitoring period included material delivery, dozers and loaders in operation, truck movements, and excavation and sieving of material.

4.3 Site only noise levels

4.3.1 Modifying factors

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

4.3.2 Site noise levels

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 – Q2 2025

Location	Start date and time	Wind speed m/s	Limits apply? [1]	KVAR limit, $L_{Aeq,15minute}$ dB	KVAR level, $L_{Aeq,15minute}$ dB [2,3]	Exceedance, dB
A	03/04/2025 19:01	0.0	Yes	40	IA	Nil
A	04/04/2025 10:14	1.1	Yes	40	32	Nil
B	03/04/2025 18:38	0.0	Yes	40	IA	Nil
B	04/04/2025 09:52	0.0	Yes	40	27	Nil
C	03/04/2025 18:15	0.6	Yes	40	IA	Nil
C	04/04/2025 09:30	0.0	Yes	40	<25	Nil

Notes: 1. Noise emission limits do not apply during periods of rainfall or winds greater than 3 metres per second (at a height of 10 metres).

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

3. 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 as per the notes in Section 3.2.

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 section. Statistical 1/3 octave-band analysis of environmental noise was conducted, 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.

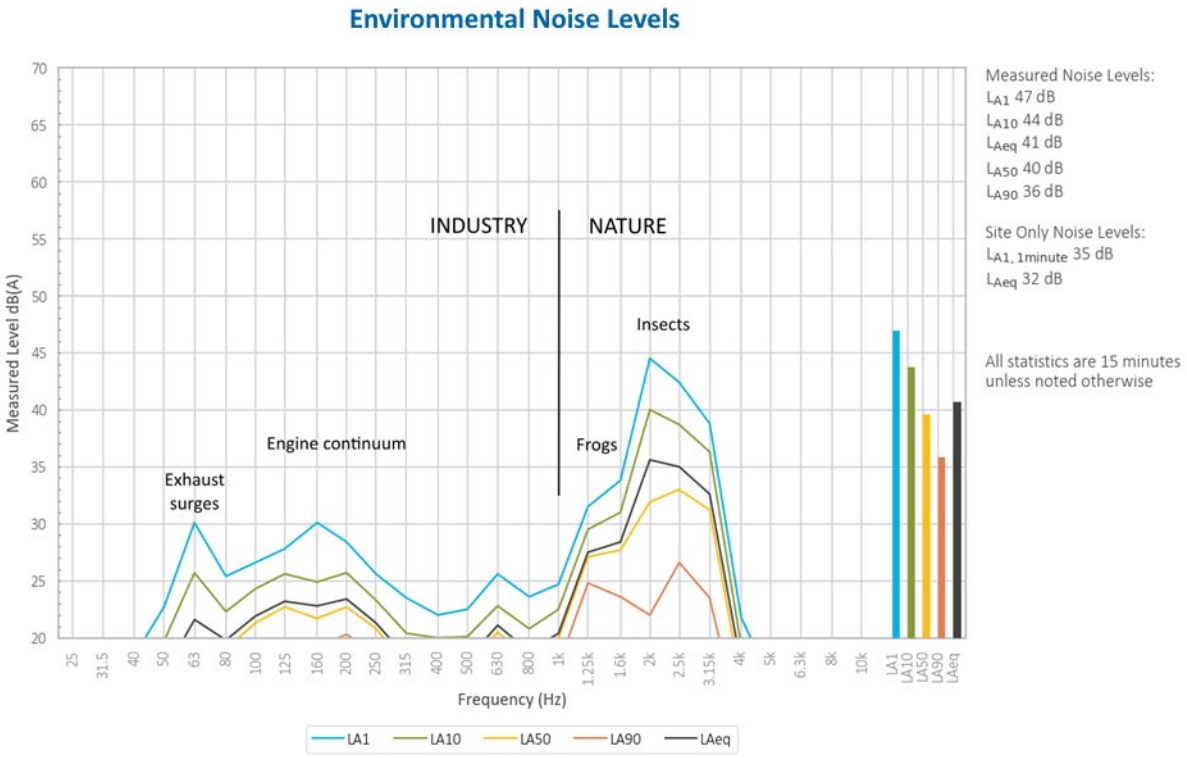

Figure 5.1 Example graph (refer to Section 5.1 for explanatory note)

5.2 Location A – Day

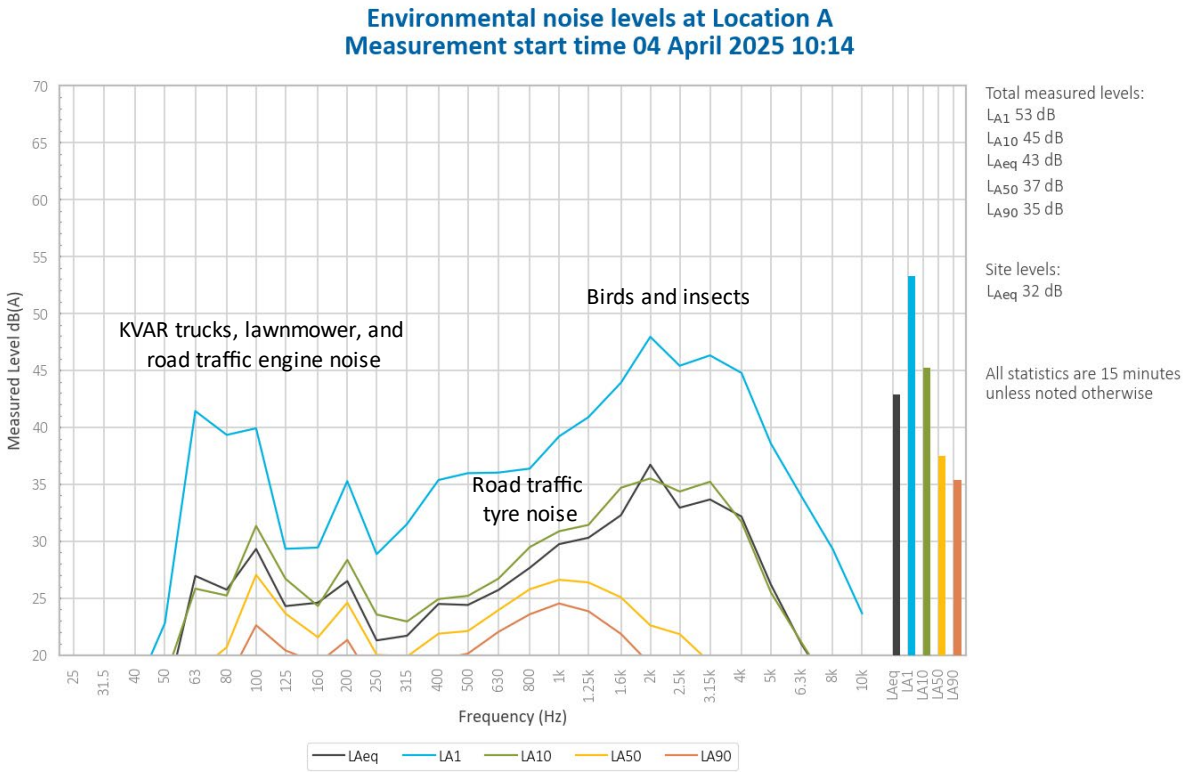

Figure 5.2 Environmental noise levels – Location A

Trucks at KVAR were occasionally audible during the measurement and generated a measured site-only L_{Aeq} of 32 dB.

Birds and insects generated the measured L_{A1} and were primarily responsible for the measured L_{A10} and L_{Aeq}. Road traffic noise and KVAR trucks also contributed to the measured L_{A10} and L_{Aeq}. Road traffic tyre noise and a lawnmower generated the measured L_{A50} and L_{A90}.

5.3 Location A – Evening

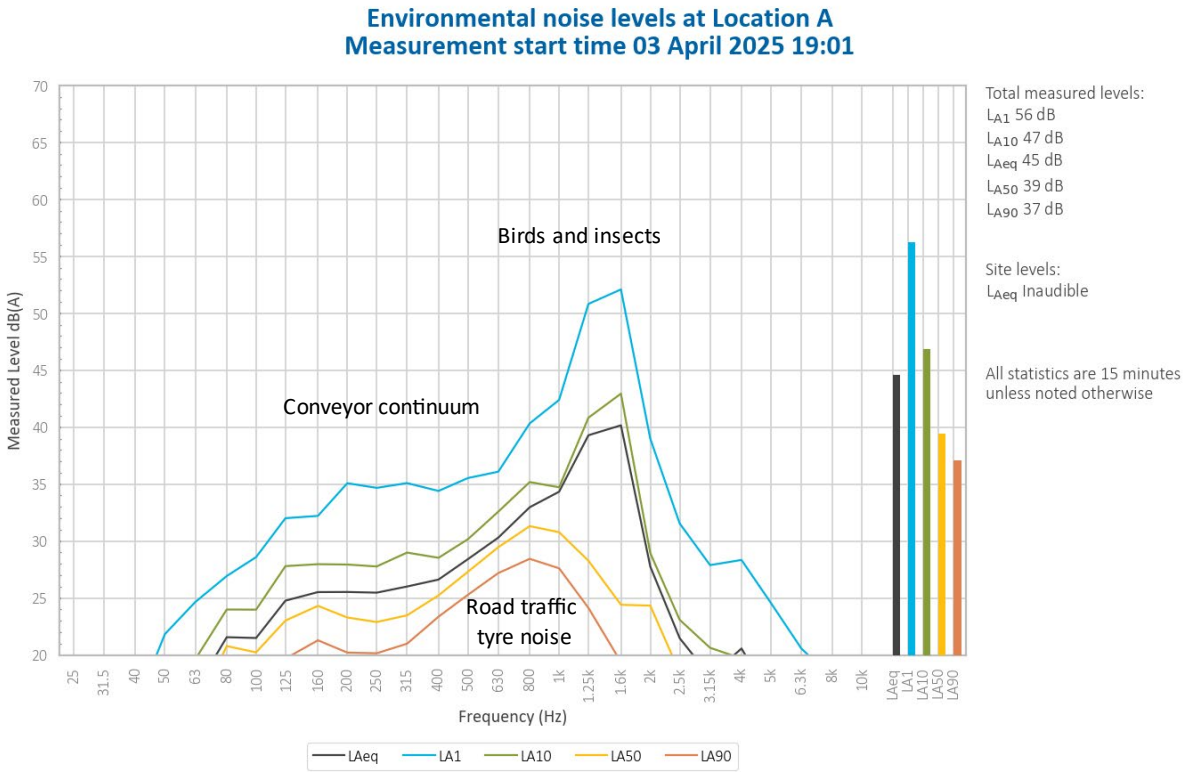

Figure 5.3 Environmental noise levels – Location A

KVAR was inaudible during the measurement.

Birds and insects were primarily responsible for the measured L_{A1}, L_{A10}, and L_{Aeq}. Road traffic tyre noise contributed to the measured L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}. Conveyor continuum was a minor contributor to the measured L_{A50} and L_{A90}.

5.4 Location B – Day

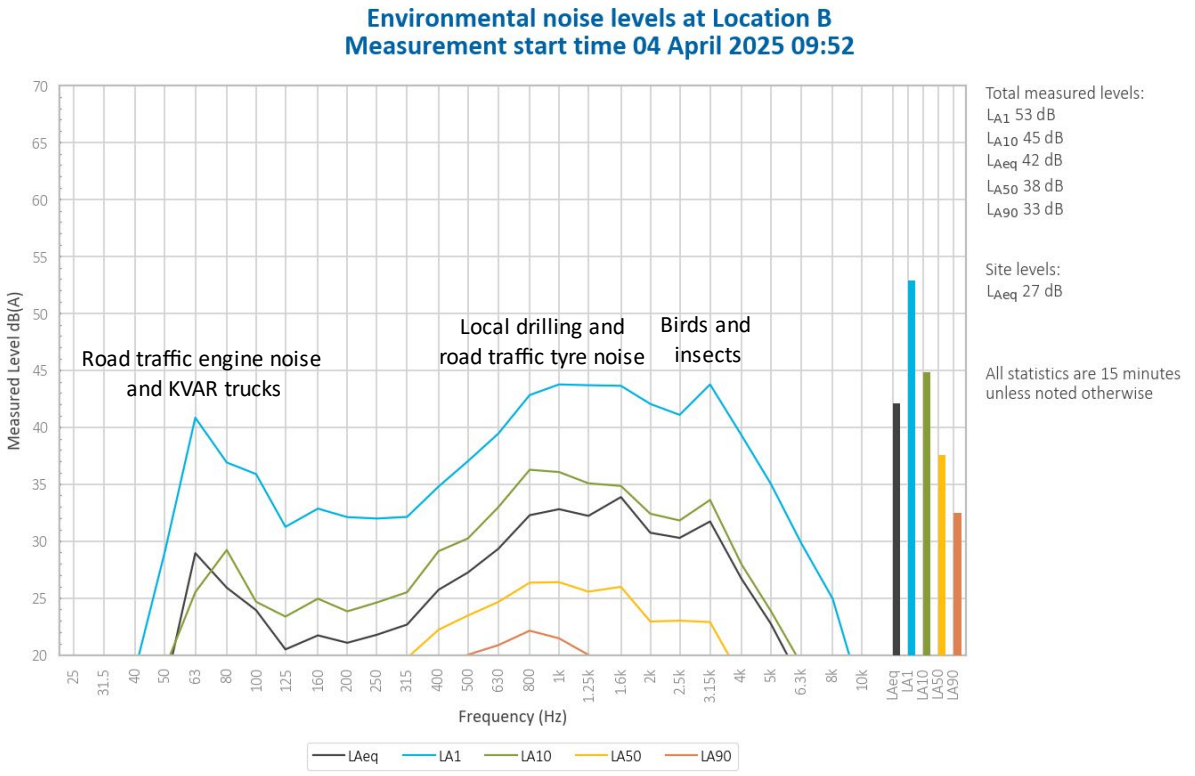

Figure 5.4 Environmental noise levels – Location B

Trucks at KVAR were occasionally audible during the measurement and generated a measured site-only L_{Aeq} of 27 dB.

Local drilling, road traffic, birds, and insects were responsible for the measured L_{A1}, L_{A10}, and L_{A10}. Road traffic tyre noise, birds, and insects generated the measured L_{A50} and L_{A90}.

Noise from conveyors was also noted.

5.5 Location B – Evening

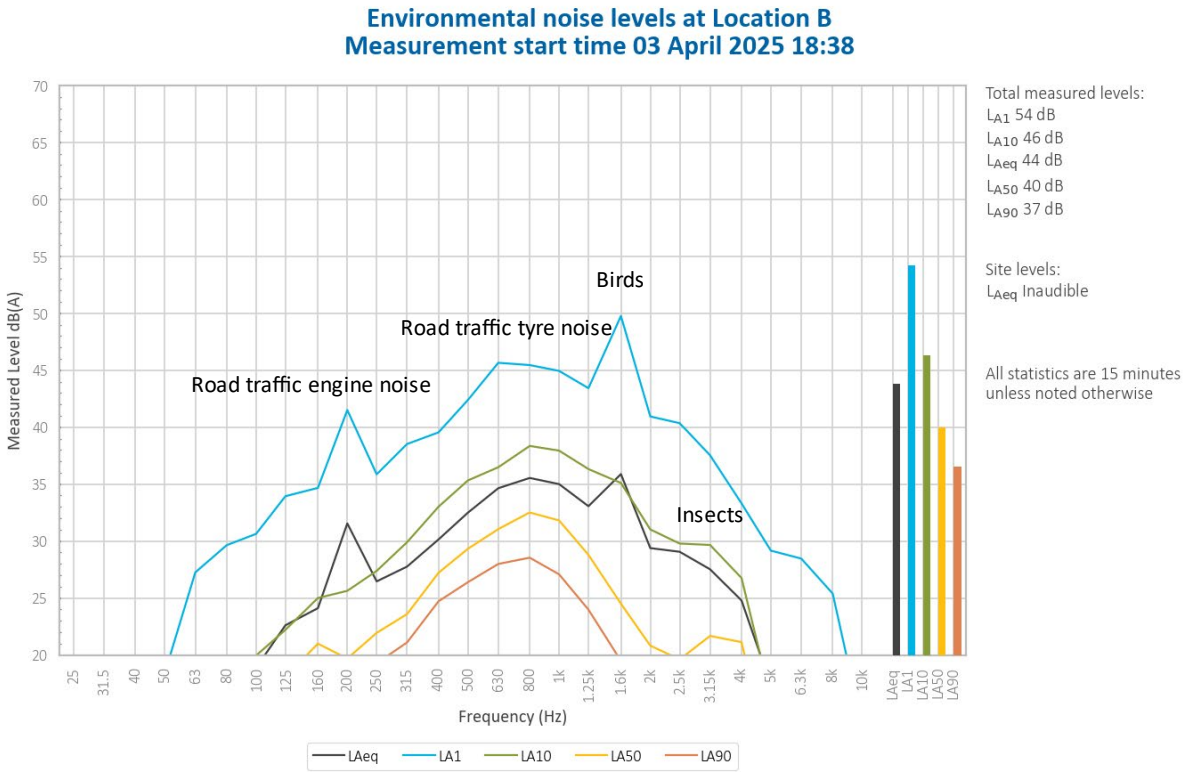

Figure 5.5 Environmental noise levels – Location B

KVAR was inaudible during the measurement.

Birds generated the measured L_{A1}. Road traffic noise and birds were responsible for the measured L_{A10} and L_{Aeq}. Road traffic tyre noise generated the measured L_{A50} and L_{A90}.

Noise from dogs, insects, and a distant generator was also noted.

5.6 Location C – Day

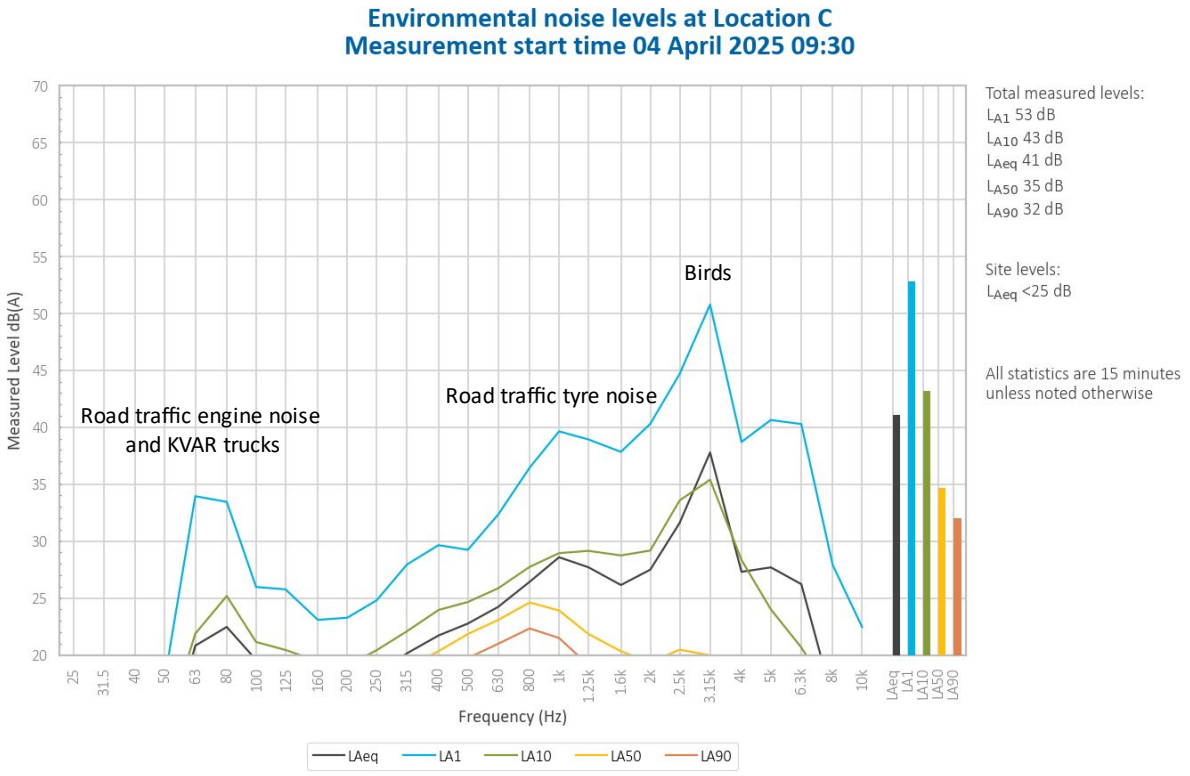

Figure 5.6 Environmental noise levels – Location C

Trucks at KVAR were occasionally audible during the measurement at low levels and generated a measured site-only L_{Aeq} of less than 25 dB.

Birds were primarily responsible for the measured L_{A1}, L_{A10}, and L_{Aeq}. Road traffic tyre noise was a minor contributor to the measured L_{A10} and L_{Aeq} and generated the measured L_{A50} and L_{A90}.

Noise from local drilling and impacts was also noted.

5.7 Location C – Evening

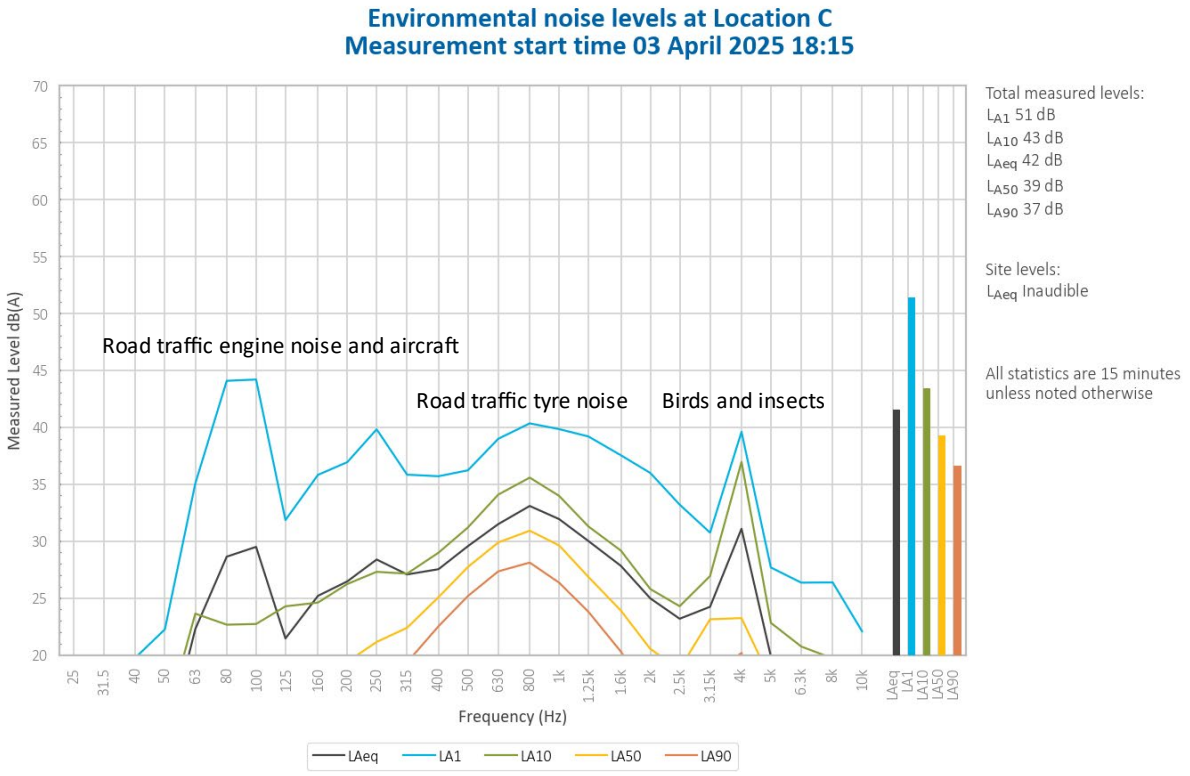

Figure 5.7 Environmental noise levels – Location C

KVAR was inaudible during the measurement.

Road traffic noise, aircraft noise, birds, and insects were responsible for the measured L_{A1}, L_{A10}, and L_{Aeq}. Road traffic tyre noise generated the measured L_{A50} and L_{A90}.

Noise from dogs and breeze in foliage was also noted.

6 Summary

EMM was engaged by Generator Property Management Pty Ltd to conduct quarterly noise survey of construction activities and operations at KVAR. 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 undertaken during the day and evening periods of 3/4 April 2025 at three monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the Q2 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 quarter) as loud

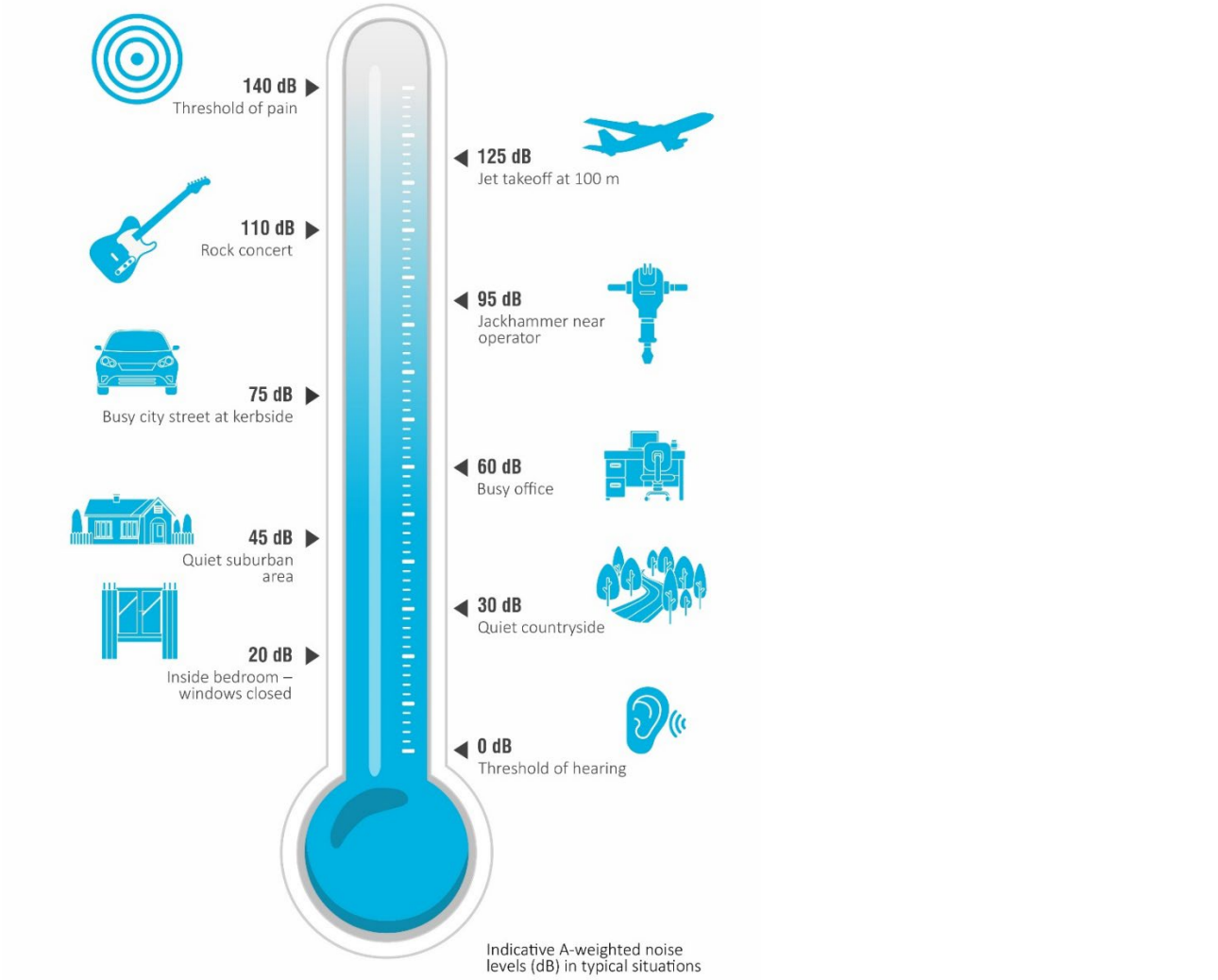

Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

Noise Impacts

Construction Hours

2.3 Construction activities associated with the project shall only be undertaken during the following hours:

a) 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;
b) 8:00 am to 1:00 pm on Saturdays; and
c) at no time on Sundays or public holidays.

2.4 Activities resulting in impulsive or tonal noise emission (such as rock breaking or rock hammering) shall be limited to 8:00 am to 12:00 pm, Monday to Saturday and 2:00 pm to 5:00 pm, Monday to Friday. The Proponent shall not undertake such activities for more than three continuous hours and must provide a minimum one-hour respite period.

2.5 Construction outside the hours stipulated in condition 2.3 of this approval is permitted in the following circumstances:

a) where construction works do not cause audible noise at any sensitive receiver; or
b) for the delivery of materials required outside these hours by the Police or other authorities for safety reasons; or
c) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

2.6 The hours of construction activities specified under condition 2.3 of this approval may be varied with the prior written approval of the Secretary. Any request to alter the hours of construction specified under condition 2.3 shall be:

a) considered on a case-by-case basis;
b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours; and
c) accompanied by any information necessary for the Secretary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of sensitive receivers in the vicinity of the site.

Construction Noise

2.7 The construction noise objective for the project is to manage noise from construction activities (as measured by a $L_{A10\ (15\ minute)}$ descriptor) so as not to exceed the background L_{A90} noise level by more than 10 dB(A) at any sensitive receiver.

Any activities that have the potential for noise emissions that exceed the objective must be identified and managed in accordance with the Construction Noise Management Plan (as referred to under condition 6.3b) of this approval). The Proponent shall implement all reasonable and feasible noise mitigation measures with the aim of achieving the construction noise objective.

Operational Noise

2.15 The cumulative operational noise from the ash placement area and ash haulage activity shall not exceed an $L_{Aeq\ (15\ minute)}$ of 40 dB(A) at the nearest most affected sensitive receiver during normal operating hours as defined in condition 2.8 of this approval.

This noise criterion applies under the following meteorological conditions:

a) wind speeds up to 3 m/s at 10 metres above ground; and/or
b) temperature inversion conditions of up to 3°C/100 m and source to receiver gradient winds of up to 2 m/s at 10 m above ground level.

This criterion does not apply where the Proponent and the affected landowner have reached a negotiated agreement in regard to noise, and a copy of the agreement has been forwarded to the Secretary and the EPA.

2.16 The Proponent shall implement measures to ensure noise attenuation of trucks. These measures may include, but are not necessarily limited to, installation of residential class mufflers, engine shrouds, body dampening, speed limiting, fitting of rubber stoppers to tail gates, limiting the use of compression braking, and ensuring trucks operate in a one-way system at the ash repository where feasible.

2.17 The Proponent shall liaise with the owner/operator of Angus Place Coal Mine with the aim of preparing a protocol which provides for a co-operative approach for the management and mitigation of noise impacts associated with coal and ash truck movements along the private haul road.

2.18 Where noise monitoring (as required by conditions 3.2 or 3.3 of this approval) identifies any non-compliance with the operational noise criterion specified under condition 2.15 of this approval the Proponent shall prepare and submit to the Secretary for approval a report including, but not limited to:

a) an assessment of all reasonable and feasible physical and other mitigation measures for reducing noise at the source including, but not limited to -
    i) construction of a noise barrier along the haulage road,
    ii) alternative ash haulage routes, and
    iii) alternative methods of ash conveyance to the repository; and
b) identification of the preferred measure(s) for reducing noise at the source;
c) feedback from directly affected property owners and the EPA on the proposed noise mitigation measures; and
d) location, type, timing and responsibility for implementation of the noise mitigation measure(s).

The report is to be submitted to the Secretary within 60 days of undertaking the noise monitoring which has identified exceedances of the operational noise criterion specified under condition 2.15, unless otherwise agreed to by the Secretary. The Proponent shall implement all reasonable and feasible mitigation measures in accordance with the requirements of the Secretary.

3. ENVIRONMENTAL MONITORING

Construction Noise Monitoring

3.1 The Proponent shall prepare and implement a **Construction Noise Monitoring** Program to confirm the predictions of the noise assessment detailed in the document referred to under condition 1.1 of this approval and assess compliance against the construction noise criterion stipulated in condition 2.7 of this approval. The noise monitoring program shall be prepared in consultation with, and to the satisfaction of, the EPA. The monitoring program shall form part of the Construction Noise Management Plan referred to in condition 6.3b) of this approval and must include monitoring of the construction noise generated during:

a) the realignment Sawyers Swamp Creek;
b) construction of the stabilisation berm;
c) excavation of the former pine plantation area;
d) relocation and construction of surface water management structures; and
e) concurrent construction activities.

The Proponent shall forward to the EPA and the Secretary a report containing the results of each noise assessment and describing any non-compliance within 14 days of conducting a noise assessment.

Operational Noise Review

3.2 Within 60 days of the commencement of operation of the project, unless otherwise agreed to by the Director-General, the Proponent shall submit for the approval of the Secretary an **Operational Noise Review** to confirm the operational noise impacts of the project. The Operational Noise Review must be prepared in consultation with, and to the satisfaction of, the EPA. The Review shall:

a) identify the appropriate operational noise objectives and level for sensitive receivers;
b) describe the methodologies for noise monitoring including the frequency of measurements and location of monitoring sites;
c) document the operational noise levels at sensitive receivers as ascertained by the noise monitoring program;
d) assess the noise performance of the project against the noise criterion specified in condition 2.15 of this approval and the predicted noise levels as detailed in the report referred to under condition 1.1 of this approval; and
e) provide details of any entries in the Complaints Register (as required under condition 5.4 of this approval) relating to noise impacts.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, the Proponent shall prepare a report as required by condition 2.18 of this approval.

Ongoing Operational Noise Monitoring

3.3 The Applicant shall prepare and implement an **Operational Noise Monitoring Program** to assess compliance against the operational noise criterion stipulated in condition 2.15 of this approval, throughout the life of the project. The noise monitoring program shall be prepared in consultation with, and to the satisfaction of, the EPA.

The noise monitoring program shall be prepared in accordance with the requirements of the *NSW Noise Policy for Industry* (EPA, 2017) (or its latest version) and must include, but not be limited to:

a) monitoring during ash placement in the far western area of the site adjacent to the haul road; and
b) monitoring of the effectiveness of any noise mitigation measures implemented under condition 2.18 of this approval, against the noise criterion specified in condition 2.15 of this approval.

Noise from the project is to be measured at the most affected point on or within the residential boundary, or at the most affected point within 30 metres of a dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise criterion stipulated in condition 2.15 of this approval. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance and the modifying factors shall also be applied to the measured noise levels where applicable in accordance with the *NSW Noise Policy for Industry* (EPA, 2017) (or its latest version).

The Applicant shall forward to the EPA and the Secretary a report containing the results of any non-compliance within 14 days of conducting a noise assessment.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, approval, the Applicant shall prepare a report as required by condition 2.18 of this approval.

The monitoring program shall form part of the Operational Noise Management Plan referred to in condition 6.5a) of this approval.

B.2 Environmental protection licence

L5 Noise limits

L5.1 Operational noise from the Kerosene Vale Ash Repository area must not exceed:

40dB(A) LAeq(15 minute) , at the nearest most affected noise sensitive location.

Note: LAeq means the equivalent continuous noise level – the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

L5.2 To determine compliance with condition(s) L4.1 noise must be measured at, or computed for, the most affected location within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural setting) where the dwelling is more than 30 metres from the boundary. A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000)".

L5.3 The noise emission limits identified in this licence apply under the following meteorological conditions:
a) wind speeds up to 3 m/s at 10 metres height above ground; and/or
b) temperature inversion conditions of up to 30C/100m and source to receiver gradient winds of up to 2 m/s at 10 metres height above ground.

Note: The noise emission limits identified in this licence do not apply at a noise sensitive location, where the licensee and the affected noise sensitive location have reached a negotiated agreement in regards to noise, and a copy of that agreement has been provided to the Environment Protection Authority.

L6 Hours of operation

L6.1 Operational activities associated with the Kerosene Vale Ash Repository must only be carried out between the hours of 0700 and 2200 Monday to Sunday.

L6.2 This condition does not apply to the delivery of material outside the hours of operation permitted by condition L6.1, if that delivery is required by police or other authorities for safety reasons; and/or the operation or personnel or equipment are endangered. In such circumstances, prior notification must be provided to the EPA and affected residents as soon as possible or within a reasonable period in the case of emergency.

B.3 Noise management plan

5.2 Environmental monitoring program

An overview of the environmental monitoring activities that have been specified by the respective sub-plans under Section 6 of the OEMP is provided in Table 5-1. Please refer to specific sub-plans under Section 6 for further details.

Table 5-1 Environmental monitoring program

Potential impact	Locations	Parameters	Frequency	Technique	Reporting	Responsibility	OEMP Sub-plan Reference
Noise – Initial 60 day reporting period	4 main locations adopted for a total of 5 monitoring sites: ▪ Skelly Road ▪ Maddox Lane ▪ Neubeck Street ▪ Wolgan Road. (Refer to Figure 5-1)	L_{Aeq}, L_{A10}, L_{A90} and L_{Amax}	4 separate days – 3 week days and a Sunday	Attended monitoring using hand held sound level meter Monitoring to be continuous throughout full day of operations for each 15 minute period, including 30 mins prior to and following normal operating hours (7am to 10pm). Nearest potentially affected receiver to be monitored at 07.00 and at least once between 20.30 – 22.30.	Report to be submitted to EPA within 1 week of monitoring COMPLETE	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.3 Operational Noise and Vibration Management Plan – Appendix A
Noise - Normal conditions	Minimum of 3 most affected locations as per the 60 day post commissioning assessment. To include periods of ash placement at far western area of the site and where noise mitigation measures are in place. (as per COA 2.15) (Refer to Figure 5-1)	Noise levels shall not exceed an LAeq of 40dB(A) at the nearest most affected receiver	During daytime (7am-6pm) and evening time (6pm-10am) Every 6 months or more frequent if adverse trends are noted	Ongoing attended monitoring using hand held sound level meter.	6 monthly noise monitoring report If non-compliance, report is to be forwarded to DPE and EPA within 14-days of conducting monitoring	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.5 Operational Noise and Vibration Management Plan – Appendix A
Noise - Emergency conditions	At the complainant's property or nearest available representative location.	Noise levels shall not exceed an LAeq of 40dB(A) at the nearest most affected receiver	As required	Attended monitoring using hand held sound level meter	6 monthly noise monitoring report	Specialist Consultant on behalf of EnergyAustralia NSW	Section 6.3 Operational Noise and Vibration Management Plan – Appendix A

6.3 Noise and vibration management sub-plan

Targets	▪ Achieve compliance with the noise criterion of L_{Aeq} of 40dB(A) at the nearest most affected receiver during normal operations. ▪ Achieve a significant reduction in the number of noise-related complaints during emergency operations (less than 5 per year, stretch target = zero complaints per year).
Indicators	▪ The number of noise-related complaints. ▪ Noise monitoring data obtained from the sensitive receiver locations ▪ Compliance indicators as assessed by the specialist noise consultant and the Environmental Representative, as required. ▪ Observed and monitored reduction in noise generation due to adaptation where necessary of engineering measures on trucks, the implementation of operating techniques such as limited compression braking and speed limit restrictions.
Supporting documentation	
Appendix A: - KVAR Stage 2 Operations- Operational Noise and Vibration Management Plan Australian Standard AS 2436 – Guide to noise control on construction, maintenance and demolition sites	
Key issues/constraints/strategies	
Wallerawang Ash Repositories activities are not anticipated to result in impacts at the nearest potentially affected receivers. Noise impacts in varying conditions can be assessed and used to predict similar scenarios in the future to determine which measures are most effective and when. Wallerawang Ash Repositories activities are not anticipated to result in perceived vibration-related impacts at the nearest potentially affected receivers. Appendix A provides procedures to be implemented should vibration-related non-conformances occur. A Specialist Consultant will be undertaking the prescribed monitoring and analysis of noise results, as per this plan.	

Appendix C
Calibration certificates

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C.1 Calibration certificates

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 C23471

Client Details	EMM Consulting Ground Floor Suite 01, 20 Chandos Street
Equipment Tested/ Model Number :	Type 2250
Instrument Serial Number :	3008201
Microphone Serial Number :	2888134
Pre-amplifier Serial Number :	16037
Firmware Version :	N/A

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	23.1 °C	**Ambient Temperature :**	24.3 °C
Relative Humidity :	44 %	**Relative Humidity :**	44.1 %
Barometric Pressure :	101.6 kPa	**Barometric Pressure :**	101.3 kPa

Calibration Technician :	Max Moore	**Secondary Check:**	Rhys Gravelle
Calibration Date :	12 Jul 2023	**Report Issue Date :**	17 Jul 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	*N/A*
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*	*±0.014 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.

PAGE 1 OF 1

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C50057

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV36 **Serial No:** 154613
Class: 1
Owner: EMM Consulting
Level 4, 20 Chandos Street
St Leonards NSW 2065
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	1004	hPa ±1 hPa	**Date of Receipt :**	05/06/2024
Temperature	23	°C ±1° C	**Date of Calibration :**	05/06/2024
Relative Humidity	44	% ±5%	**Date of Issue :**	05/06/2024

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

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

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 C

Annual water quality review

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Kerosene Vale Ash Repositories

Annual Water Quality Review

Prepared for Generator Property Management Pty Ltd

November 2025

Kerosene Vale Ash Repositories

Annual Water Quality Review

Generator Property Management Pty Ltd

E230337 RP23

November 2025

Version	Date	Prepared by	Reviewed by	Comments
V1	20/10/2025	Jack Mellor	Lachlan Hammersley	Draft for GPM review
V1	3/11/2015	Jack Mellor	Lachlan Hammersley	Final

Approved by

Lachlan Hammersley
Associate Water Resources Engineer
3 November 2025

Level 3 175 Scott Street Newcastle
NSW 2300
ABN: 28 141 736 558

Executive Summary

ES1 Report context

Generator Property Management Pty Ltd (GPM) own and operate the Kerosene Vale Ash Repositories and surrounds, located at Skelly Road, Lidsdale NSW (the Site). The Site comprises an area of approximately 528 hectares (ha) that has been used for a range of purposes including ash placement from the Wallerawang Power Station (the Power Station) that operated between 1957 to 2014. Prior the 1957, the Site was used for open cut coal mining and some of the voids were subsequently used as landfills. The Site includes:

- the Kerosene Vale Dry Ash Repository (KVAR) and underlying former Kerosene Vale Ash Dam (KVAD)
- Sawyers Swamp Creek Ash Dam (SSCAD)
- Lidsdale Cut and adjacent landfills
- demolition landfill south of the SSCAD.

Currently the Site is operated on a care and maintenance arrangement consistent with NSW Planning Approval 07_0005 (MOD2) and Environment Protection Licence (EPL) No. 21185 (the EPL). On 22 August 2022, the EPA issued GPM with a Contaminated Land Declaration Notice which declares the Site as significantly contaminated land under Division 2 the Contaminated Land Management Act 1997. In 2023, GPM worked with the EPA to prepare a Voluntary Management Proposal (VMP) that establishes a proposed investigation and remediation approach.

This report is an annual water quality review (AWQR) that has been developed to support the overarching annual environmental management report (AEMR) for the Site. The AEMR considers the period from 1 September 2024 – 31 August 2025 (the AEMR Period). The AWQR addresses the surface and groundwater monitoring and reporting requirements set out in the Lidsdale Ash Repository: Operation Environment Management Plan (OEMP) prepared by EMM Consulting in 2025. It includes:

- a description of the water management system and the AEMR Period
- a review of surface water quality, ground water quality and groundwater levels during the AEMR Period.

ES2 Surface water review summary

The review of surface water quality data concluded that:

- Water quality trends in Lidsdale Cut and the Sawyers Swamp Creek Ash Dam (SSCAD) are consistent with recent AEMR periods (i.e. 2018 to the current period). Lidsdale Cut and SSCAD are part of the Site's contaminated water management system and hold water that is known to be ash affected.
- Dump Creek, which contributes to Sawyers Swamp Creek, outside of wet weather generally has standing water but no visible flow. The water quality over the AEMR period was variable with pH, salinity and metal concentrations, in some samples, exceeding Default Guideline Values (DGVs). Water quality results over the AEMR period, similar to Sawyers Swamp Creek, indicated poor water quality conditions during drier months, where groundwater seepage to the creek is in a higher proportion than better quality surface water.

- Sawyers Swamp Creek was observed to have perennial streamflow therefore ambient water quality conditions were influenced by what portions of groundwater and surface water contributed during the period. Due to the predominately wet conditions in the AEMR period, water quality downstream of the Site in Sawyers Swamp Creek was generally consistent with the understood surface water characteristics.

- The water quality in the Coxs River is not affected by the inflows from Sawyers Swamp Creek.

In August 2022 GPM issued a Water Management Assessment (EMM 2022c) to the NSW Environment Protection Authority (EPA). This assessment included an Action Plan that described water management system improvements that were either underway or proposed. The plan included a description of each improvement, expected outcome once implemented and an estimated completion timeframe. GPM continue to progressively improve the water management system through implementing the Action Plan commitments. During the AEMR Period, a review of progress against the Action Plan was included within the two Water Quality Monitoring Reports that were submitted to the EPA in March 2025.

ES3 Groundwater review summary

The review of groundwater quality data concluded that:

- groundwater quality trends during the AEMR Period were generally consistent with recent AEMR periods (i.e. 2018 to the current period)

- groundwater quality at monitoring bore WGM1/D3 (located between SSCAD and the KVAR/KVAD), may be degraded, however this is consistent with previous results, relative to water quality trends at upgradient bores

- groundwater quality at monitoring bore WGM1/D6 (located downgradient of KVAR/KVAD) is consistent with ash affected water

- elevated concentrations of arsenic were reported at WK_MW06 in November 2024 which is consistent with previous results at this location but is an anomaly compared to other groundwater monitoring locations. In May 2025 the concentration of arsenic decreased to within range of other groundwater monitoring bores.

- groundwater quality at monitoring bore WGM1/D5 (located downgradient of KVAR/KVAD) has changed. The increases in concentrations of metals and EC may be indicative of KVAD seepages.

- The groundwater level trends were consistent with historical trends and generally reflect the CRD.

Potential groundwater contamination sources, pathways and receptors are being investigated as part of the Voluntary Management Proposal process that GPM has negotiated with the EPA.

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Appendices

Tables

Figures

1 Introduction

1.1 Site background

Generator Property Management Pty Ltd (GPM) own and operate the Kerosene Ash Dam Areas, located at Skelly Road, Lidsdale NSW (the Site). The Site comprises an area of approximately 528 hectares (ha) that has been used for a range of purposes including ash placement from the Wallerawang Power Station (the Power Station) that operated between 1957 to 2014. Prior to 1957, the Site was used for open cut coal mining and some of the voids were subsequently used as landfills.

The Site includes:

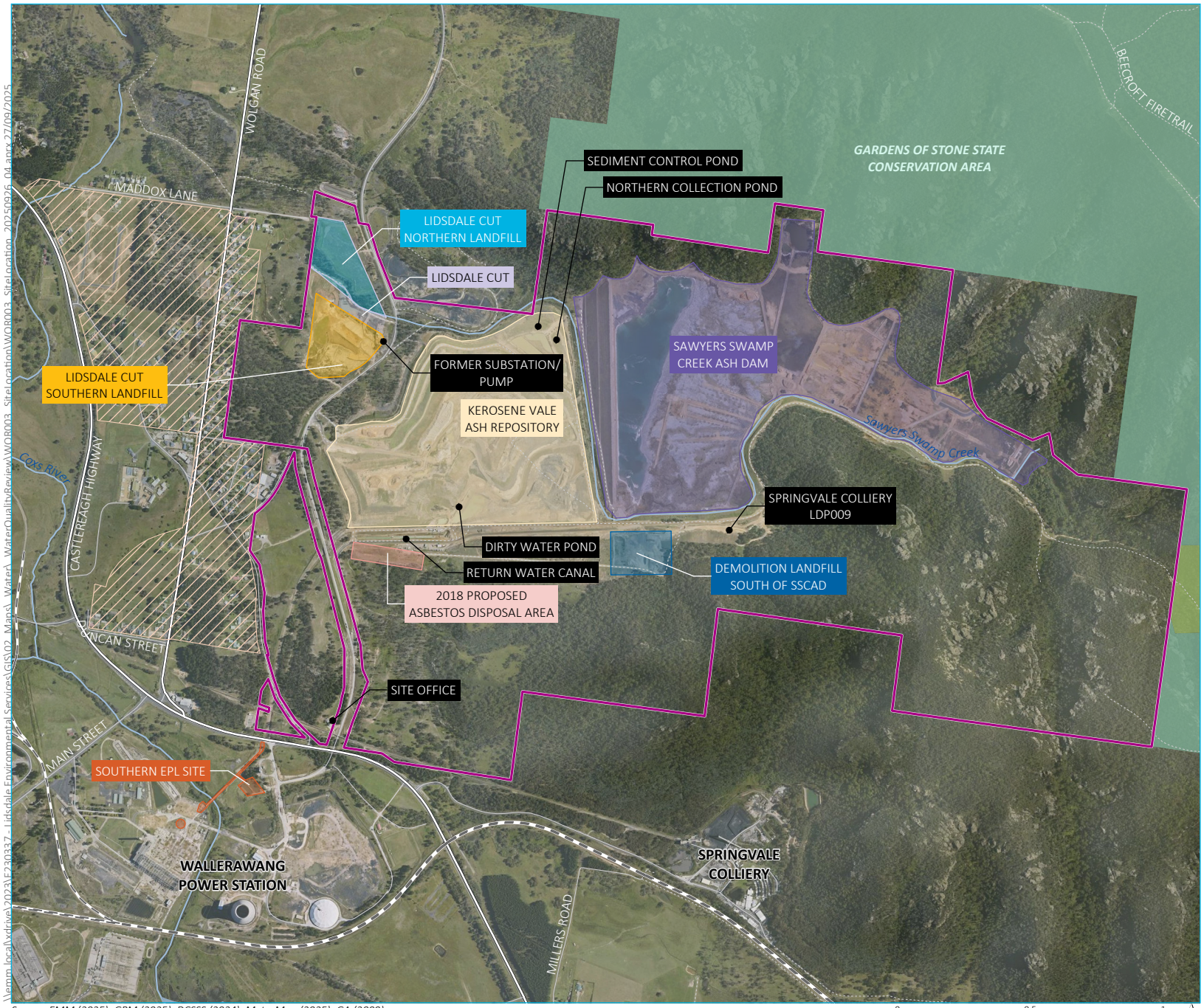
- the Kerosene Vale Dry Ash Repository (KVAR) and underlying former Kerosene Vale Ash Dam (KVAD)
- Sawyers Swamp Creek Ash Dam (SSCAD)
- The associated heavy vehicle access route
- KVAR and SSCAD private access routes.

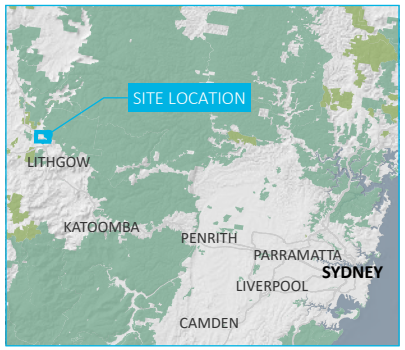
The primary ash repository areas are the KVAR, KVAD water management area and SSCAD. In 2014, the closure and demolition of the Wallerawang Power Station was approved. Currently the Site is operated on a care and maintenance arrangement consistent with NSW Planning Approval 07_0005 (MOD2) and Environment Protection Licence (EPL) No. 21185 (the EPL).

The Power Station was separated into two separate ownership parcels in 2020. GPM commenced ownership and responsibility for the land north of the Castlereagh Highway (referred to as the Kerosene Ash Dam Areas or 'the Site') in September 2020, taking over from Energy Australia NSW Pty Ltd. GPM's initial focus has been to manage the ongoing regulatory and contractual obligations for the Site. The longer-term objective is to plan for and then undertake the safe closure of the ash dams and repositories and appropriately remediate the Site for permanent closure.

Contamination at the Site was notified to the NSW Environment Protection Authority (EPA) by GPM under section 60 of the Contaminated Land Management Act 1997 (CLM Act) on 10 March 2021. Following review of available information, the EPA advised on 27 June 2022, that the contamination is significant enough to warrant regulation under the CLM Act. Following this determination, the Site has been declared as significantly contaminated land under section 11 of the CLM Act. In 2023, GPM worked with the EPA to prepare a Voluntary Management Proposal (VMP) that establishes a proposed investigation and remediation approach (the VMP process).

Figure 1.1 shows the Site layout, noting the abovementioned features.





KEY

- Site boundary
- Nearest sensitive (residential) receivers

Site layout

- 2018 proposed asbestos disposal area
- Demolition landfill south of SSCAD
- Kerosene Vale ash repository
- Lidsdale cut northern landfill
- Lidsdale cut southern landfill
- Lidsdale cut
- Sawyers Swamp Creek ash dam
- Southern EPL site

Existing environment

- Rail line
- Major road
- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

INSET KEY

- Major road
- NPWS reserve
- State forest

Source: EMM (2025); GPM (2025); DCSSS (2024); MetroMap (2025); GA (2009)

0 0.5 1 km

GDA2020 MGA Zone 56

N

\\emm.local\xdrive\2023\EF230337 - Lidsdale Environmental Services\GIS\02_Maps_Water_WaterQualityReview\WQR003_SiteLocation\WQR003_SiteLocation_20250926_04.aprx 27/09/2025

Site location

Kerosene Vale Ash Repositories
Annual Water Quality Review
Figure 1.1

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1.2 Report scope and structure

This report is an annual water quality review (AWQR) that has been developed to support the overarching annual environmental management report (AEMR) for the Site. The AEMR considers the period from 1 September 2024 – 31 August 2025 (the AEMR Period). The AWQR addresses the surface and groundwater monitoring and reporting requirements set out in the Lidsdale Ash Repository: Operation Environment Management Plan (OEMP) prepared by EMM Consulting in 2025.

Table 1.1 provides a summary of these requirements and notes where each requirement is addressed in this report.

This report is structured as follows:

- Chapter 2 describes the water management system
- Chapter 3 describes the AEMR Period
- Chapter 4 reviews surface water quality, and
- Chapter 5 reviews groundwater quality.

Table 1.1 OEMP – water monitoring and reporting requirements

	Description	OEMP reference	Report reference
Surface water			
Monitoring	Monthly monitoring will be undertaken at the following locations: <u>Coxs River:</u> • **WX12** – upstream of Sawyers Swamp Creek confluence • **S1** – downstream of Sawyers Swamp Creek confluence <u>Sawyers Swamp Creek:</u> • **SS5** – upstream of SSCAD • **S6** – downstream of SSCAD, upstream of SSCAD embankment and KVAR / KVAD water management area • **S5** – downstream of SSCAD, SSCAD embankment and the eastern part of KVAR / KVAD water management area • **WX5** – downstream of SSCAD, SSCAD embankment and KVAR / KVAD water management area, adjacent to Lidsdale Cut • **WX7** – downstream of the Site <u>Dump Creek:</u> • **WX11** – immediately upstream of the confluence with Sawyers Swamp Creek <u>Water Management System:</u> • **BLKH** – located in the Black Hole which is a waterbody that has formed adjacent to placed ash in SSCAD section B. • **SSCAD Pond** – a large water body located to the east of the SSCAD embankment. • **Lidsdale Cut** – a former open cut mine. Contaminated water from the KVAR / KVAD Water Management Area is reticulated to Lidsdale Cut. It is noted that additional monitoring within the water management system will be undertaken if specified in the surface water quality sub-plan. This monitoring is referred to as Operational Monitoring and will be used to inform the operation of the water management system and therefore does not need to be reported in the AEMR.	Section 4.1 – Surface water quality sub-plan	Chapter 4

	Description	OEMP reference	Report reference
Analysis	Surface water quality results will be compared to: • Guideline Values (GVs) for a slightly-to-moderately disturbed upland river system. • Water quality trends at each sampling location (where available) since July 2019. Earlier data is not considered to be relevant due to the water quality in Sawyers Swamp Creek being strongly influenced by discharges from Springvale Colliery that occurred between 2013 and July 2019. The results will be interpreted by a suitably qualified professional who will describe any deviations from GVs and changes to water quality trends.	Section 4.1 – Surface water quality sub-plan	Chapter 4
Reporting	An Annual Surface Water Quality Review (ASWQR) will be prepared as part of the AEMR. The ASWQR will include: • a description of weather and streamflow conditions over the AEMR period (the period) • a description of the water management system that was operated over the period • all water quality data and analysis.	Section 4.1 – Surface water quality sub-plan	Chapter 4
Groundwater			
Monitoring	6-monthly groundwater quality and level monitoring at thirteen locations: • WGM1/D1 ^ • WGM1/D2 *^ • WGM1/D3 *^ • WGM1/D4 *^ • WGM1/D5 ^ • WGM1/D6 *^ • WH_MW02 * • WH_MW03 * • WI_MW03 * • WJ_MW03 * • WK_MW01 * • WK_MW04 * • WK_MW06 * ** Sites nominated in EPL21185* *^ Current OEMP monitoring and reporting site* *Note that shallow seepage bore sites GW10, GW11, A9(AP09) and A17 (AP17) are not included in the OEMP but should continue to be sampled on a 6-monthly basis* *6-monthly groundwater level monitoring at 13 locations:* • WWD1A • WWD1B • WWD2A • WWD2B • WWD5A • WWD5B • WWD6A • WWD6B • WWD10 • WWD12 • WWD13 • WWD14A • WWD14B	Appendix B – Groundwater sub-plan	Chapter 5
Analysis	Groundwater quality results will be compared to: • water quality trends at each location (where available) using recent data (since 2019). Earlier data is not considered to be relevant due to the water quality being influenced by discharges from Springvale Colliery that occurred between 2013 and July 2019 • the baseline data (Appendix A) as per the baseline condition as assessed in the Environmental Assessment • the ANZECC 2000 Irrigation and Ecosystem Protection guidelines used as a reference point.	Section 5.1 – Groundwater sub-plan	Chapter 5

	Description	OEMP reference	Report reference
Reporting	The groundwater quality monitoring data and associated analysis is to be reported in the AEMR.	Section 5.1 – Groundwater sub-plan	Chapter 5

1.3 EPL requirements and studies

GPM and the EPA have had ongoing discussions regarding water management improvements at the Site. In February 2022, GPM prepared a table-form water management Action Plan (the Action Plan) that described water management improvements that were either underway or proposed. In a letter dated 20 May 2022, the EPA advised GPM that the Action Plan is an appropriate means to track progress and facilitate completion of the water management-related pollution reduction program that was under discussion at the time.

The EPA varied EPL 21185 on 19 December 2023 to include (among other things):

- **Condition L2.4** – the concentration limit for sulfate was removed and limits were added for ammonia, cadmium, manganese and turbidity. The concentration limit for suspended solids was reduced from 30 to 20 mg/L.
- **Condition L2.5** – the definition of wet weather discharge was changed from streamflow in the Coxs River being >= 20ML/day to >= 10 ML/day.
- **Condition M2** – surface water monitoring requirements have has been revised so that:
  - weekly monitoring during discharge at EPL point 1 (known as LDP3) is now only required at the following monitoring locations: LDP3, WX9 and WX10A
  - monthly monitoring is undertaken at all other EPL surface water monitoring locations regardless of discharge or weather.

  It is noted that there were no changes to the surface water monitoring analytes or any groundwater monitoring requirements.
- **Condition U2** – the pollution reduction study focusing on Water Management was revised to:
  - acknowledge that short and medium-term measures have been implemented
  - replace the previous long-term measures with a new requirement to prepare a Water Treatment Management Suitability and Feasibility Assessment and submit to the EPA by 15 October 2024.

The following sections describe reports that have been submitted to the EPA to address the above conditions.

1.3.1 Water management and discharge impact assessments

A Discharge Water Quality Assessment for LDP3 (DWQA) (EMM 2021) was prepared in 2021 to address special EPL conditions, focusing on interim measures for the Site over a two-year period. In August 2022, a Water Management Assessment (EMM 2022a) was submitted to the EPA, including an Action Plan for ongoing and proposed improvements, with a commitment to update the discharge impact assessment after the LDP3 Treatment System upgrade. In October 2022, a Discharge Impact Assessment (EMM 2022b) requested an EPL condition variation to set concentration limits for additional pollutants. Although the LDP3 Treatment System was upgraded in January 2023, further commissioning activities have been recommended to improve the water

management on the Site (including irrigation of SSCAD pond, irrigation of contaminated water on to Section C of SSCAD and mechanical evaporation units on SSCAD pond). Section 3.2 describes the actions that were implemented, progressed, or completed during the AEMR period.

1.3.2 6-monthly water quality monitoring reports

Condition R4 was added to the EPL when it was varied on 18 July 2022. GPM have prepared a Water Quality Monitoring Report for every six-month period since this date. The latest report issued was number six, which addresses the 6-month period between 18 January 2025 and 17 July 2025. The reports include:

- a description of site conditions and GPM actions over the reporting period, including a progress update on the Action Plan that was provided to the EPA in the Water Management Assessment (EMM 2022), and
- a review of surface and groundwater monitoring data that was collected in accordance with EPL Condition M.

As the purpose of this AWQR is to address OEMP requirements, data from the EPL monitoring program is not reported unless relevant to the OEMP requirements.

1.3.3 Surface and groundwater characterisation report

In September 2023 GPM submitted an Initial Groundwater Characterisation Report (EMM 2023a) and a Surface Water Characterisation Report (EMM 2023b) to the EPA. These reports collectively addressed EPL Conditions U1 and E1.2.

1.3.4 Voluntary Management Proposal

Contamination at the Site was notified to the EPA by GPM under section 60 of the CLM Act on 10 March 2021. Following review of available information, the EPA advised on 27 June 2022, that the contamination is significant enough to warrant regulation under the CLM Act. On 22 August 2022, the EPA agreed to a voluntary declaration and declared the site under a Contaminated Land Declaration Notice which declares the Site as significantly contaminated land under division 2 of the *Contaminated Land Management Act 1997*. GPM has submitted a VMP to the EPA that establishes a proposed investigation and remediation approach. The status of the VMP is:

- The Detailed Site Investigation (DSI) has the objective of identifying the nature and extent of contamination. The DSI report will include relevant data from the Initial Groundwater Characterisation Report (EMM 2023a) and the Surface Water Characterisation Report (EMM 2023b). The draft DSI was submitted to the Site Auditor in May 2025.
- A Human Health and Ecological Risk Assessment (HHERA) has been prepared to identify site-specific soil and groundwater acceptance criteria for the Site and for the remediation works. A draft HHERA was submitted to the Site Auditor in June 2025.
- A Remedial Options Assessment (ROA) and Remedial Action Plan(s) (RAP) will be prepared to inform remediation requirements. The Site Auditor's endorsement of/or confirmation that they have no objection to the ROA and RAP will be obtained and the EPA's approval of the RAP will be obtained.

1.4 OEMP update

The OEMP (including Operational Surface Water Management Plan) has been revised in the AEMR reporting period by EMM. These revisions have updated the approach for annual water quality monitoring results analysis. Once approved by DPHI this will be implemented.

To comply with Condition of Approval (CoA) 6.5c), the results in previous annual water quality monitoring reports have used baseline data from July 2004 to January 2006 at the four surface water monitoring locations as per CoA 3.5. This report has not undertaken a comparison of current water quality against this baseline dataset. This baseline data relates to data collected immediately prior to wet ash placement in SSCAD ceasing. Dry ash was also being placed in Stage 1 of KVAR over the period. Hence, this data is no longer considered representative of pre-disturbance conditions and has little relevance to current site conditions.

2 Water management system overview

Surface water within the Site is described, in this Chapter, uses the following nomenclature:

- The Site's water management system includes:
  - **Sawyers Swamp Creek Ash Dam (SSCAD)** is an ash dam that was formed in the Sawyers Swamp Creek valley. It is divided into four sections (A, B, C and D) and has a total area of 82 ha. Each section is separated by earthen embankments. Section A comprises an open water body that is referred to as the SSCAD Pond and has areas of exposed ash. Sections B, C and D are referred to as the Upper Dam. A perched groundwater system exists within the placed ash (the perched SSCAD groundwater system).

    The SSCAD Pond is a large water body and is a central feature of the Site's overall water management system. It has historically received contaminated water from the KVAR/KVAD water management area and the SSCAD embankment drainage system. This has assisted in minimising incidental surface and groundwater discharges from the Site. SSCAD Pond also receives runoff from direct rainfall, a clean water catchment and overflows from the SSCAD Upper Dam (Section B, C and D). In late 2023, GPM commenced irrigating contaminated water from the KVAR/KVAD water management area and the SSCAD embankment drainage system to SSCAD Section C as part of an irrigation trial.

    Water accumulation in SSCAD Pond is managed via irrigation to exposed ash areas (when possible) and at times via controlled discharges to the Coxs River at a licensed discharge point located within the historical Power Station site (referred to as LDP3). Controlled discharges are treated in the LDP3 Treatment System which adjusts pH and reduces metal concentrations. Controlled discharges at LDP3 are regulated by EPL no. 21185, which has restrictions on when discharge can occur.

    During wet conditions, clean water runoff and groundwater inflows from the vegetated escarpments located to the north of SSCAD accumulate on the surface of Section B, C and D. Water quality testing has identified this water as being clean (as it has not infiltrated through the ash). Accordingly, during wet conditions, this water is pumped from Section B into Sawyers Swamp Creek. This practice has been successful in preventing overflows of clean water from the Upper Dam into SSCAD Pond. It is noted that GPM are currently constructing gravity operated systems that will minimise the volume of clean water that accumulates on Sections B, and C (refer Figure 2.1). Gravity drainage works in Section D were completed in early 2024 (Section 3.2).

  - **KVAR/KVAD water management area** is located to the west (downgradient) of SSCAD. KVAD is the Power Station's original ash dam which used to be an open cut mine void and KVAR is the dry ash compacted stockpile situated on top of the capped KVAD water management area. The combined area now has an associated water management system. A perched groundwater system exists within the KVAR (the perched KVAR groundwater system). Surface water runoff and seepage from this area drains to several water storage areas. Captured water that is known to be contaminated is pumped to the SSCAD Pond.

  - **Sawyers Swamp Creek Diversion** is a clean water system that manages streamflow from Sawyers Swamp Creek and runoff from catchment areas to the south of SSCAD. The system diverts clean water around SSCAD and the KVAR/KVAD water management area. The diversion eventually joins what is thought to be the original Sawyers Swamp Creek channel to the north-west of the Site.

- The following ancillary areas are located within the Site or are relevant to the Site's water management system:

- **Investigation Area** is a 24-ha area located west of the Site, downgradient from the KVAR / KVAD water management area. Parts of this area have been disturbed by mining that is understood to have occurred prior to the 1950s. There are known deposits of coal ash, chitter and a potential landfill in this area. Vegetation has re-established within most of the Investigation Area. GPM propose to investigate the potential for surface and groundwater contamination to occur from this area as part of the contaminated land investigations that are a separate process to this OEMP.

- **Upgradient clean water catchments** refer to clean water catchment areas that are upgradient of either the SSCAD or the Sawyers Swamp Creek Diversion. Runoff from these catchments has potential to interact with the Site's water management system via either direct inflows or system overflows during certain high flow events. Incidental discharge from the Site's water management system (discussed above) may also enter the Sawyers Swamp Creek Diversion at several locations.

- **Downgradient clean water** areas refer to parts of the Site that are not known to have been previously disturbed by mining operations or ash placement and drain away from the Site's water management system.

- **Dump Creek** is a first order watercourse that is located to the west of the Site. Parts of the Investigation Area are within the Dump Creek Catchment. There is also potential for some groundwater from the Site to flow to the north-west towards Dump Creek.

Figure 2.1 shows the locations of the above-mentioned water management areas and water management system features.

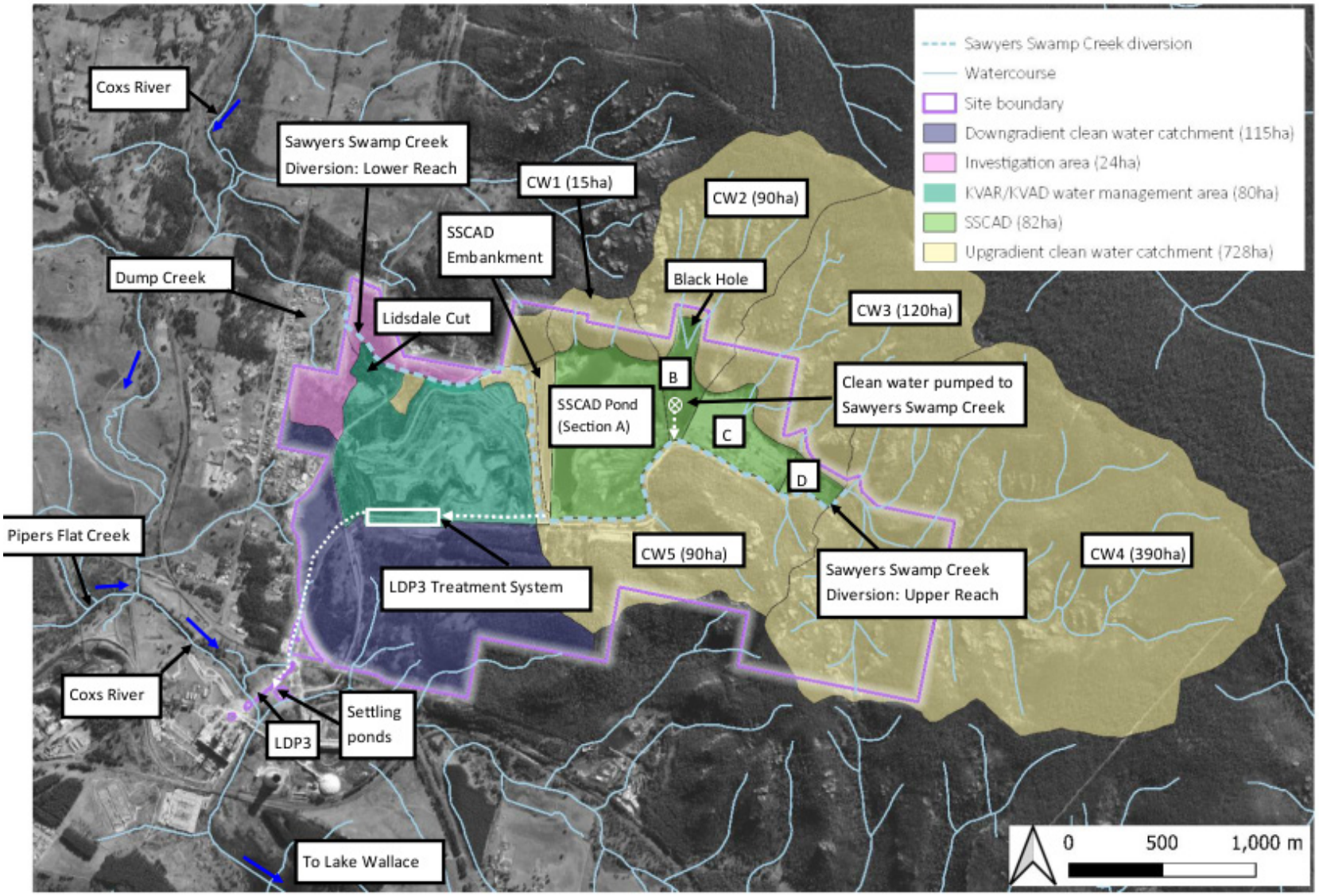


Figure 2.1 Water management areas

3 AEMR Period

This chapter describes the weather and key water management actions undertaken by GPM over the AEMR Period (1 September 2024 to 31 August 2025).

3.1 Weather conditions

A total of 715 mm of rainfall was recorded over the AEMR Period at the Bureau of Meteorology (BoM) Station 63132 at Lidsdale (Maddox Lane), which is located 2 km north-west of the Site. Figure 3.1 compares the recorded rainfall (at Lidsdale (Maddox Lane)) to the median and the 90th percentile monthly rainfall calculated from the 60-year gauge record.

Weather during the initial two months of the AEMR Period was characterised by generally dry conditions, with below median monthly rainfall. November 2024 to January 2025 was characterised by generally wet conditions with above median rainfall occurring. As shown in Figure 3.1, the monthly median was exceeded since October 2024 in seven of the remaining 10 months (November 2024, December 2024, January 2025, April 2025, May 2025, July 2025 and August 2025). The November 2024 rainfall total was 9 mm below the 90th percentile. These conditions are described in this report as being persistently wet.

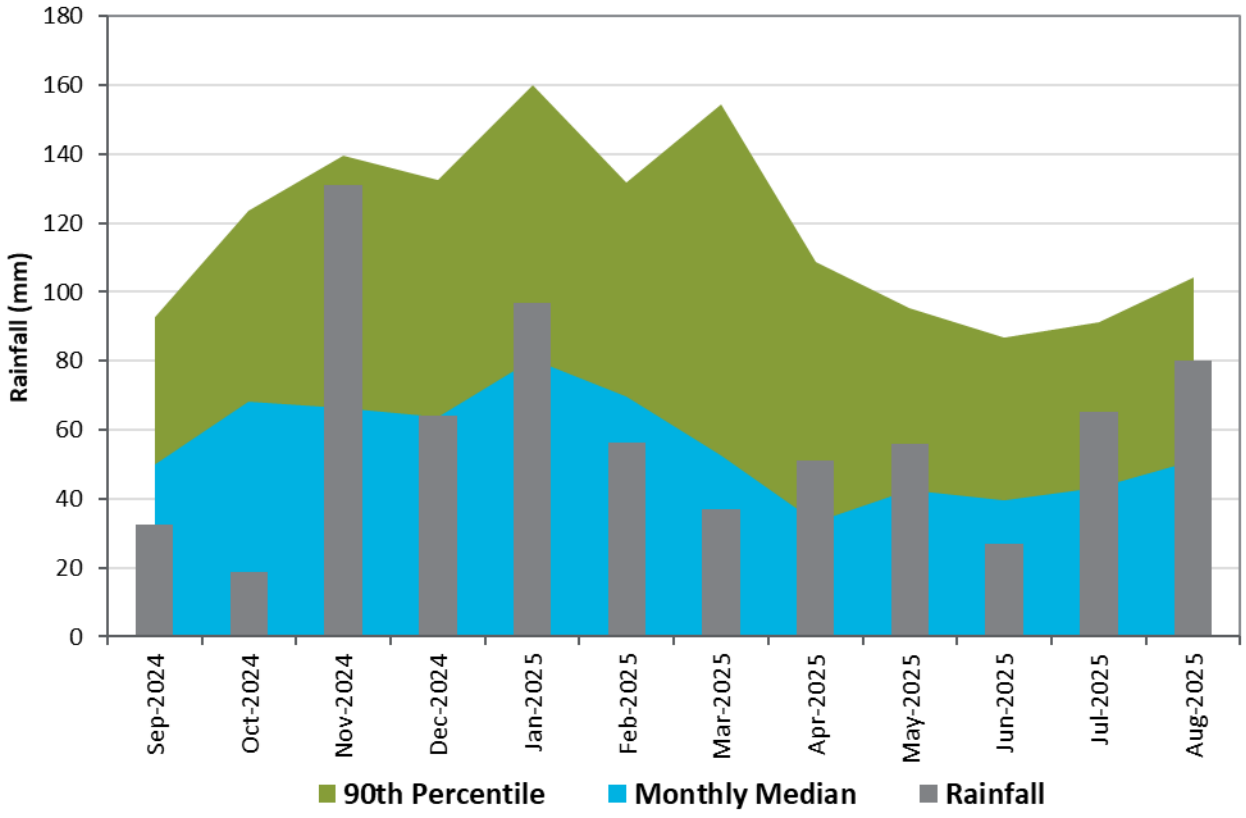


Figure 3.1 Monthly rainfall over the AEMR Period

3.2 Water management actions

GPM have been and continue to progressively improve the water management system to:

- comply with dam safety management obligations
- improve the capture and containment of contaminated water

- improve the treatment of water discharged at LDP3
- reduce the volume of contaminated water that requires management
- improve clean water separation and stormwater management.

These improvements require numerous works at various locations within the Site. Many works have been completed to date which have resulted in significant improvements, with further improvements expected over time. During the AEMR Period, a review of progress against the Action Plan was included in Water Quality Monitoring Reports that were submitted to the EPA in March 2025. These plans provided an update on the progress of the improvement works, including anticipated implementation timeframes.

The 6 monthly reports (EMM 2025b) have progressively tracked actions for the AWQR period seen in Table 3.1.

Table 3.1 Water management system operations

Water management area	Description of operations during the Current Period
KVAR/KVAD Water Management Area	• All known seepage and subsurface drainage discharges from KVAD were collected in the seepage collection system which reticulates all captured water to Lidsdale Cut. Lidsdale Cut was dewatered to SSCAD, with most water irrigated in a segregated portion of SSCAD Section C as part of the irrigation trial. Sediment build up was removed from Lidsdale Cut Pond to increase water storage capacity. Downdraft evaporator trials continued in the leachate pond at Lidsdale Cut however, mechanical failure of the pump motor occurred due to impact from the aggressive nature of the leachate water quality within Lidsdale Cut. Multiple atomizer sprays are planned to be installed at SSCAD (latter half of 2025) with changes to submersible pump fixtures modified from the initial trial system. • The majority of stormwater runoff from KVAD and KVAR was managed into the stormwater system of the Wetland Pond. However, there is no active management of water from the red swamp area (i.e. runoff and seepage from the area still drains into Lidsdale Cut).
SSCAD embankment drainage system	• Seepage from the SSCAD embankment foundation and abutment drains was collected and pumped into the KVAR/KVAD contaminated water system, which is dewatered to SSCAD Cell C evaporation trial.
SSCAD Upper Dam	• The gravity diversion works (referred to as CP1) transferred clean water runoff that enters the northern portion of SSCAD Section D into the Sawyers Swamp Creek Diversion. Clean water runoff was also pumped from Black Hole and SSCAD Section C (CP2) into Sawyers Swamp Creek. • Construction of a second system for SSCAD Section C (CP2) was paused during 2024. Works have been commenced during the current AEMR period with construction currently underway. • Management of water within the cut off trench along the toe of diversion dam to capture clean water seepage from diversion dam. • The proposed diversion from the Black Hole to the Sawyers Swamp Creek Diversion was redesigned from a single diversion work to two diversion works that are located slightly upstream of the Black Hole. Works have commenced during the current reporting period with construction currently underway. • As noted above, the trial of irrigating contaminated water from Lidsdale Cut onto the surface of SSCAD Section C continued during the period. It is noted that the irrigation area is segregated from the part of SSCAD Section C where clean water accumulates and is pumped into the Sawyers Swamp Creek Diversion.

Water management area	Description of operations during the Current Period
SSCAD Pond	• Water accumulation in SSCAD Pond was managed by evaporation from the pond, irrigation of exposed ash in SSCAD Section A and discharges at LDP3 when the water level was above the safe operating level. 185 ML of treated water from SSCAD Pond was discharged at LDP3 in the AEMR Period. The discharges occurred in December 2024 (12 ML) and between late April and August 2025 (173 ML). • An automated system is used to improve irrigation of treated water from SSCAD Pond in the western portion of the Site. Irrigation activities were undertaken intermittently during the current reporting period when the water level in SSCAD was below the safe operating level. • The SSCAD pond level has been on a steady decline since December 2024, dropping from 938.5 m AHD to 937.1 m AHD in July 2025 • Methods of enhanced evaporation are being trialled on site currently.
LDP3	• During the AEMR Period, discharge of treated water at LDP3 occurred in 96 out of 365 days. The total discharge at LDP3 between September 2024 and August 2025 was 185 ML. – the minimum streamflow to discharge ratio of 10:1 was generally maintained, and most discharges occurred at a higher ratio (i.e. the discharge rate was less than 10% of the streamflow rate). – discharges only occurred when the Coxs River streamflow was above 10 ML/day, which is the minimum streamflow rate for which discharge can occur • During 2023, limestone leaky weirs were installed in the Return Water Canal to improve sludge removal efficiencies. During the AEMR Period, accumulated sludge was removed from the Return Canal regularly. GPM are investigating an alternative sludge pump removal system which would progressively remove sludge from the Return Water Canal as this has the potential to impact on treatment efficiency of the LDP3 Treatment System. De-sludging occurred in the Canal during July 2025.

4 Surface water quality review

This chapter reviews surface water quality data from the OEMP monitoring locations over the AEMR Period. It includes a description of the monitoring requirements and assessment criteria established in the OEMP and presents and discusses the surface water quality data.

4.1 OEMP monitoring requirements

4.1.1 Monitoring requirements

The environmental monitoring plan established in the OEMP identifies 11 surface water monitoring locations. Table 4.1 describes each of these monitoring locations and associated monitoring requirements. Monitoring locations are provided in Figure 4.1.

Table 4.1 Surface water monitoring requirements

Monitoring location	Description	Monitoring frequency	Monitoring analytes
WMS3 – Lidsdale Cut	Lidsdale Cut is one of the storages in the KVAR water management system (see Chapter **2**). It receives runoff and collected seepage from the western portion of the KVAR water management area. Lidsdale Cut is dewatered to SSCAD Pond on an as-needed basis.	Monthly Monitoring	See Table 4.2
WX11 – Dump Creek	Dump Creek is a 1st order watercourse located to the west (down gradient) of the KVAR water management area (see Figure 4.1). It flows to the north and joins Sawyers Swamp Creek upstream of WX7 (see Figure 4.1).		
WMS1 – Sawyers Swamp Creek Ash Dam (SCCAD Pond)	This monitoring location is in the SSCAD Pond (see Figure 4.1) to characterise water quality and comply with CoA 3.5a.		
WX7 – Sawyers Swamp Creek	WX7 is located on Sawyers Swamp Creek approximately 500 m downstream of the Site.		
WX12 – Upstream of Sawyers Swamp Creek confluence	To characterise the quality of the water in the Coxs River upstream and downstream of the Sawyers Swamp Creek confluence and to enable an assessment of water quality impacts to the Coxs River.		
S1 – Downstream of Sawyers Swamp Creek confluence			
SS5 – Upstream of SSCAD	SS5 is located upstream of SSCAD and is therefore not potentially impacted by the Site's water management system. Water quality data from SS5 can be used to: • identify changes in Swayers Swamp Creek water quality within the Site (i.e. by comparison with downstream samples); and • categorise water quality within the Site's water management system. It is noted that historically S7 has been used as an upstream monitoring location. SS5 replaces S7 as it was recently discovered that S7 is on a tributary to Sawyers Swamp Creek.		

Monitoring location	Description	Monitoring frequency	Monitoring analytes
S6 – Downstream of SSCAD, upstream of SSCAD embankment and KVAR / KVAD water management area	To identify changes in water quality in the upper reach of the Sawyers Swamp Creek Diversion, which flows to the south of SSCAD.		
S5 - Downstream of SSCAD, SSCAD embankment and the eastern part of KVAR / KVAD water management area	To identify changes in water quality in the Sawyers Swamp Creek Diversion reach, that flows between the SSCAD embankment and the eastern portion of the KVAR/KVAD water management area. This reach may receive seepage from SCCAD and the eastern portion of KVAD.		
WX5 - Downstream of SSCAD, SSCAD embankment and KVAR / KVAD water management area, adjacent to Lidsdale Cut	To identify changes in water quality in the lower reach of the Sawyers Swamp Creek Diversion, which flows past the northern portion of the KVAR/KVAD water management area. This reach of the creek may receive seepage from western and northern portions of KVAD.		
BLKH - Located in the Black Hole which is a waterbody that has formed adjacent to placed ash in SSCAD section B.	To characterise water quality in the Black Hole which receives catchment runoff from the north of the site.		

Table 4.2 provides the surface water monitoring analytes that are established in the OEMP.

Table 4.2 Surface water monitoring analytes – OEMP

Category	Analytes[1]
Physico-chemical	pH, electrical conductivity (EC), alkalinity, total dissolved solids, dissolved oxygen, turbidity, total phosphorus, total nitrogen, turbidity, redox, total suspended solids, total hardness, ammonia
Anions	Chloride, fluoride, sulfate
Cations	Sodium, potassium, calcium, magnesium
Metals[2]	Aluminium, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, vanadium, zinc

Notes: 1. Sourced from OEMP Table A in Appendix B plus additional analytes noted in the surface and groundwater water quality sub-plans (OEMP Sections 6.4 and 6.5).
2. Refers to total concentrations unless stated as filtered

KEY

- Site boundary
- Stream gauge

EPL routine monitoring network

- Groundwater
- Surface water
- Discharge

Existing environment

- Rail line
- Major road
- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

Source: EMM (2025); GPM (2025); DCSSS (2024); MetroMap (2025)

0 0.5 1 km

GDA2020 MGA Zone 56

N

\\emm.local\xdrive\2023\EF230337-Lidsdale Environmental Services\GIS\02_Maps_Water_WaterQualityReview\WQR001_SWMonitoring\WQR001_SWMonitoring_20250926_05.aprx 27/09/2025

Surface water monitoring locations

Kerosene Vale Ash Repositories
Annual Water Quality Review
Figure 4.1

EMM
creating opportunities

4.1.2 Assessment criteria

The surface water quality sub-plan (surface water sub plan Section 4.1) specifies that surface water monitoring results are to be compared to:

- Guideline Values (DGVs) for a slightly-to-moderately disturbed upland river system. The GV are the default values for a slightly-to-moderately disturbed upland river system that are provided in ANZG 2018. Default guideline values (DGVs) are provided in Appendix A, Table A.2 of the Surface water management sub plan OEMP.

- The 80th percentile values at Sawyers Swamp Creek upstream of SSCAD (monitoring site SS5) have been calculated using data from 22 samples collected between 15 December 2021 to 21 July 2022 (all parameters); plus data from samples collected between 2013 to December 2021 that included pH (51 samples), EC (47 samples), turbidity (48 samples), boron (3 samples), copper (4 samples), manganese (45 samples), vanadium (28 samples) and zinc (28 samples), (note that these samples are in addition to the 22 samples mentioned above).

- Water quality trends at each sampling location (where available) since July 2019. Earlier data is not considered to be relevant due to the water quality in Sawyers Swamp Creek being strongly influenced by discharges from Springvale Colliery that occurred between 2013 and July 2019.

No baseline data for the Coxs River has been provided in the recent OEMP for use in comparisons. To maintain consistency with previous assessments, the comparison data relied on in this document are the DGVs for a slightly-to-moderately disturbed upland river system and ambient conditions monitored in the upstream of Coxs River. This includes:

- The 80th percentile values at Coxs River (monitoring site WX12) have been calculated using data from 59 samples collected between 16 August 2022 to 16 August 2025 (all parameters).

- The Coxs River is known to have water that has a moderate hardness (i.e. Ca CO_3 between 60 – 119 mg/L). Hence, hardness adjustments have been made to the DGVs for lead, cadmium, nickel and zinc using the ANZG 2018 / ANZECC 2000 methodology. In previous reports, a water hardness (mg/L of $CaCo_3$) of 99 was used to calculate the adjusted values. This was the median water hardness calculated from the Coxs River water quality monitoring location WX9 that is upstream of the LDP3 using data from the January 2022 to January 2023. During the current period, the median water hardness (mg/L of $CaCo_3$) at WX9 increased to 135 due to the drier conditions. To maintain consistency with previous reports, hardness adjustments for the Current Period (i.e. this report) were calculated using a water hardness of 99. This is a conservative approach given that using a higher hardness would increase the DGVs.

Table 4.3 describes the surface water assessment criteria for each monitoring location. It is noted that the baseline data is provided as a range.

Table 4.3 Surface water assessment criteria

			Guideline values (GVs)	Sawyers Swamp Creek upstream of SSCAD (SS5)	Coxs River upstream (WX12)[1]
Parameters	**Units**	**DGV**	**Source**	**80th percentile value**	
Physico-chemical parameters					
pH	-	6.5 - 8.0	Default Guideline Value (DGV) for upland river in south-east Australia (Table 3.3.2; ANZECC 2000)	5.5 – 6.8	6.5 – 7.1

		Guideline values (GVs)		Sawyers Swamp Creek upstream of SSCAD (SS5)	Coxs River upstream (WX12)[1]
Parameters	**Units**	**DGV**	**Source**	**80th percentile value**	
EC	µS/cm	350	DGV for NSW upland rivers (Table 3.3.3; ANZECC 2000)	114	1,255
Turbidity	NTU	2 - 25	DGV for upland river in south-east Australia (Table 3.3.2; ANZECC 2000)	26	29
Metals (refers to results from 45 µm filtered samples only)					
Aluminium	mg/L	0.055	Low reliability DGV (pH > 6.5) (ANZG 2018)	0.160	0.030
Antimony	mg/L	0.009	Unknown reliability DGV (ANZG 2018)	<0.001	<0.001
Arsenic	mg/L	0.013	Moderate reliability DGV for As(V) (ANZG 2018)	<0.001	<0.001
Boron	mg/L	0.94	Very high reliability DGV (ANZG 2018)	<0.05	0.330
Cadmium[2]	mg/L	0.0002 (SSC) 0.001 (Coxs R)	Very high reliability DGV (ANZG 2018)	<0.0001	<0.0001
Chromium	mg/L	0.001	Very high reliability DGV for Cr(VI) (ANZG 2018)	<0.001	<0.001
Cobalt	mg/L	0.0014	Unknown reliability DGV (ANZG 2018)	0.005	0.010
Copper	mg/L	0.0014	Very high reliability DGV (ANZG 2018)	<0.001	<0.001
Lead[2]	mg/L	0.0034 (SSC) 0.0155 (Coxs R)	Moderate reliability DGV (ANZG 2018)	<0.001	<0.001
Manganese	mg/L	1.9	Moderate reliability DGV (ANZG 2018)	0.265	0.910
Mercury	mg/L	0.00006	Moderate reliability DGV for 99% species protection level recommended for slightly to moderately disturbed systems due to the potential for bioaccumulation (ANZG 2018)	<0.00004	<0.00005
Molybdenum	mg/L	0.034	Unknown reliability DGV (ANZG 2018)	<0.001	<0.001
Nickel[2]	mg/L	0.011 (SSC) 0.030 (Coxs R)	Low reliability DGV (ANZG 2018)	0.002	0.095
Selenium	mg/L	0.005	Moderate reliability DGV for 99% species protection level recommended for slightly to moderately disturbed systems due to the potential for bioaccumulation (ANZG 2018)	<0.01	<0.001
Silver	mg/L	0.00005	Low reliability DGV (ANZG 2018)	<0.001	<0.001
Vanadium	mg/L	0.006	Unknown reliability DGV (ANZG 2018)	<0.01	<0.001
Zinc[2]	mg/L	0.008 (SSC) 0.022 (Coxs R)	Very high reliability DGV (ANZG 2018)	0.034	0.038

Notes:
1. 80th percentile values subject to update as additional data becomes available
2. Hardness corrected guideline value based on Coxs River having a median water hardness of approximately 99 mg/L as $CaCO_3$.

4.2 Results

Surface water monitoring results for the AEMR Period are presented and discussed in this section. The results for each monitoring location are presented in table form and compared to the assessment criteria established in Section 4.1.2.

Results for key analytes from all surface water monitoring locations are also presented as time-series charts provided in Appendix A. These charts show all results from 1 September 2022 to the end of the AEMR Period and can be used to establish water quality trends (i.e. increasing or decreasing concentrations).

4.2.1 Lidsdale Cut – WMS3

Lidsdale Cut is one of the storages in the KVAR/KVAD water management system (see Figure 4.1). It receives collected seepage from the KVAD and runoff from the western portion of the KVAR/KVAD water management area. Captured water has historically been dewatered via pumping to SSCAD Pond however, following October 2023, this water has now been redirected to an irrigation scheme within Section C of SSCAD. It is noted that in previous AEMR reports, Lidsdale Cut was sampled as WX5 but was changed to WMS3 in 2022 following a review of surface water monitoring locations.

12 samples were collected from Lidsdale Cut over the AEMR Period. Table 4.4 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The results indicate that the water quality in Lidsdale Cut has an acidic pH, high salinity and generally high metal concentrations. These characteristics are consistent with ash affected water at the Site and are expected given that Lidsdale Cut receives collected seepage from the KVAD contaminated water management system.

The water quality concentrations of aluminium, boron cadmium, copper, manganese, nickel and zinc exceed the DGV and baseline range. The elevated concentrations of these metals are consistent with water quality in previous AEMR periods (see time-series charts in Appendix A).

The data confirms that the current management approach of dewatering Lidsdale Cut to the SSCAD for ongoing management is appropriate.

Table 4.4 Lidsdale Cut WMS3 – results summary

	Units	DGV	Baseline range[2]	No. samples	Minimum	Maximum	Median
Physico-chemical parameters							
pH	-	6.5–8.0	5.5 - 6.8	12	**3.4**	**4.8**	**3.7**
EC	µS/cm	350	114	12	**672**	**3282**	**1495**
DO	mg/L	-	NM	12	5	10	6
Turbidity	mg/L	-	25	12	3	30	7
Total dissolved solids	NTU	-	NM	12	490	1700	1250
Total nitrogen	mg/L	-	NM	12	0.40	1.40	1.05
Total phosphorus	mg/L	-	NM	12	0.03	0.05	0.05
Anions							
Chloride	mg/L	-	NM	12	10	33	27
Fluoride	mg/L	-	NM	12	1.7	4.9	4.1
Sulfate	mg/L	-	NM	12	300	1300	880

	Units	DGV	Baseline range[2]	No. samples	Minimum	Maximum	Median
Cations							
Sodium	mg/L	-	NM	12	38	140	105
Potassium	mg/L	-	NM	12	28	81	58
Calcium	mg/L	-	NM	12	49	130	100
Magnesium	mg/L	-	NM	12	21	53	43
Metals[1]							
Aluminium	mg/L	0.055	0.160	12	**3.5**	**30.0**	**18.5**
Antimony	mg/L	0.009	<0.001	12	<0.001	<0.001	<0.001
Arsenic	mg/L	0.013	<0.001	12	<0.001	0.009	0.004
Barium	mg/L	-	NM	12	0.018	0.062	0.033
Boron	mg/L	0.94	<0.05	12	**1.5**	**5.2**	**3.4**
Cadmium	mg/L	0.0002	<0.0001	12	0.001	0.006	0.003
Chromium	mg/L	0.001	<0.001	12	<0.001	**0.002**	0.001
Copper	mg/L	0.0014	<0.001	12	**0.002**	**0.012**	**0.005**
Iron	mg/L	-	NM	12	0.8	16.0	4.8
Lead	mg/L	0.0034	NM	12	0.002	**0.021**	**0.015**
Manganese	mg/L	1.9	0.265	12	**2.9**	**7.7**	**5.9**
Mercury	mg/L	0.00006	<0.00004	12	<0.00005	<0.0001	<0.0001
Molybdenum	mg/L	0.034	<0.001	12	<0.001	0.003	0.001
Nickel	mg/L	0.011	0.002	12	**0.16**	**0.56**	**0.42**
Selenium	mg/L	0.005	<0.01	12	<0.001	**0.030**	0.003
Silver	mg/L	0.00005	<0.001	12	**<0.001**	**<0.001**	**<0.001**
Zinc	mg/L	0.008	0.034	12	**0.34**	**1.50**	**1.10**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples.
2. The 80th percentile values at Sawyers Swamp Creek upstream of SSCAD (monitoring site SS5) calculated using data from 22 samples collected between 15 December 2021 to 21 July 2022 (all parameters); plus data from samples collected between 2013 to December 2021 that are available for pH (51 samples), EC (47 samples), turbidity (48 samples), boron (3 samples), copper (4 samples), manganese (45 samples), vanadium (28 samples) and zinc (28 samples) - note these samples are in addition to the 22 samples mentioned above.

4.2.2 SSCAD Pond – WMS1

SSCAD Pond refers to the waterbody that is in the western portion of the SSCAD, adjacent to the dam's embankment. It is a large water body and is a central feature of the Site's overall water management system. Water accumulation in the SSCAD Pond, from localised surface and groundwater sources, is managed via irrigation to exposed ash areas and at times via controlled discharges into the Coxs River at LDP3, following treatment.

12 samples were collected from SSCAD Pond, which was renamed as site WMS1 on 16 August 2022. Table 4.5 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range. The results from the 12 samples have consistent water quality, which is characterised as having a pH ranging between 4.3 and 6.3 and elevated salinity and metal concentrations. The pH is typically lower than the baseline range. Aluminium, boron, cadmium, copper, manganese, nickel and zinc concentrations, all consistently exceed the respective DGVs. However, the reported metal concentrations have not changed significantly from previous AEMR periods.

Treated water from SSCAD Pond was discharged to the Coxs River via LDP3 over the period. Monitoring of discharges at LDP3 was undertaken in accordance with the requirements of the EPL. This data is not reported in this AWQR as the scope of this review is to address the OEMP. However, the data is provided in the various water quality reports issued to the EPA (see Section 1.3), the EPL annual return and on GPM's website.

Table 4.5 SSCAD Pond WMS1– results summary

	Units	DGV	Baseline range[2]	No. samples	Minimum	Maximum	Median
Physico-chemical parameters							
pH	-	6.5–8.0	5.5 - 6.8	12	**4.3**	**6.3**	**4.9**
EC	µS/cm	350	114	12	**955**	**1466**	**1183**
DO	mg/L	-	NM	12	2.7	10.5	5.9
Turbidity	mg/L	-	25	12	3	35	8
Total dissolved solids	NTU	-	NM	12	860	1200	995
Total nitrogen	mg/L	-	NM	12	0.10	0.40	0.10
Total phosphorus	mg/L	-	NM	12	0.02	0.06	0.05
Anions							
Chloride	mg/L	-	NM	12	18	71	22
Fluoride	mg/L	-	NM	12	1.8	3.2	3.2
Sulfate	mg/L	-	NM	12	500	733	590
Cations							
Sodium	mg/L	-	NM	12	96	200	110
Potassium	mg/L	-	NM	12	37	58	46
Calcium	mg/L	-	NM	12	65	101	78
Magnesium	mg/L	-	NM	12	21	35	26
Metals[1]							
Aluminium	mg/L	0.055	0.160	12	**1.9**	**10.0**	**8.8**
Antimony	mg/L	0.009	<0.001	12	<0.001	0.003	<0.001
Arsenic	mg/L	0.013	<0.001	12	0.002	0.004	0.003
Barium	mg/L	-	NM	12	0.023	0.049	0.044

	Units	DGV	Baseline range[2]	No. samples	Minimum	Maximum	Median
Boron	mg/L	0.94	<0.05	12	**2.0**	**4.2**	**3.6**
Cadmium	mg/L	0.0002	<0.0001	12	**0.003**	**0.005**	**0.003**
Chromium	mg/L	0.001	<0.001	12	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	<0.001	12	**0.003**	**0.064**	**0.013**
Iron	mg/L	-	NM	12	0.05	2.90	0.21
Lead	mg/L	0.0034	NM	12	<0.001	**0.007**	0.001
Manganese	mg/L	1.9	0.265	12	**3.0**	**3.9**	**3.5**
Mercury	mg/L	0.00006	<0.00004	12	0.00005	**0.0001**	**0.0001**
Molybdenum	mg/L	0.034	<0.001	12	<0.001	0.014	0.003
Nickel	mg/L	0.011	0.002	12	**0.150**	**0.190**	**0.180**
Selenium	mg/L	0.005	<0.01	12	<0.001	**0.030**	0.003
Silver	mg/L	0.00005	<0.001	12	<0.001	<0.001	<0.001
Zinc	mg/L	0.008	0.034	12	**0.360**	**0.540**	**0.430**

Notes: Reported metal concentrations for the current AEMR Period are from filtered samples.

1. **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.
2. The 80th percentile values at Sawyers Swamp Creek upstream of SSCAD (monitoring site SS5) calculated using data from 22 samples collected between 15 December 2021 to 21 July 2022 (all parameters); plus data from samples collected between 2013 to December 2021 that are available for pH (51 samples), EC (47 samples), turbidity (48 samples), boron (3 samples), copper (4 samples), manganese (45 samples), vanadium (28 samples) and zinc (28 samples) - note these samples are in addition to the 22 samples mentioned above.

4.2.3 Dump Creek – WX11

Dump Creek is located to the west (down gradient) of the KVAR/KVAD water management area and flows to the north and joins Sawyers Swamp Creek upstream of WX7 (see Figure 1.1).

10 samples were collected from Dump Creek over the AEMR Period. Table 4.6 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The results indicate that the water quality in Dump Creek is variable. The pH, salinity and metal concentrations in some samples exceed the DGV and ambient concentrations in Sawyers Swamp Creek at WX7 (see Section 4.2.4) indicating that some ash affected water is seeping via groundwater baseflow into Dump Creek. As some results have water quality that is consistent with clean water, it is interpreted that surface water runoff in the Dump Creek catchment is generally clean and that seep(s) of ash affected water may impact water quality during dry conditions when the streamflow is minimal.

The aluminium, copper, manganese, nickel and zinc concentrations were generally highest between May and July 2025 and June experienced below median rainfall. The copper, nickel and zinc concentrations were lowest in January 2025 which recorded above average rainfall (for the month) of 97 mm.

The time-series results presented in Appendix A shows that the water quality in Dump Creek is generally consistent with the prior AEMR Periods.

Table 4.6 Dump Creek WX11 – results summary

	Units	DGV	Baseline range[2]	No. samples	Minimum	Maximum	Median
Physico-chemical parameters							
pH	-	6.5–8.0	5.5 - 6.8	10	**3.2**	6.9	**6.0**
EC	µS/cm	350	114	10	**419**	**1038**	**527**
DO	mg/L	-	NM	10	1.3	6.6	2.8
Turbidity	mg/L	-	25	10	5	144	24
Total dissolved solids	NTU	-	NM	10	250	940	438
Total nitrogen	mg/L	-	NM	10	0.7	21.0	5.9
Total phosphorus	mg/L	-	NM	10	0.1	6.9	0.5
Anions							
Chloride	mg/L	-	NM	10	15	48	32
Fluoride	mg/L	-	NM	10	0.1	1.4	0.4
Sulfate	mg/L	-	NM	10	99	690	224
Cations							
Sodium	mg/L	-	NM	10	25	73	36
Potassium	mg/L	-	NM	10	5.8	26.0	14.5
Calcium	mg/L	-	NM	10	12	78	23
Magnesium	mg/L	-	NM	10	8	34	15
Metals[1]							
Aluminium	mg/L	0.055	0.160	10	0.04	**9.30**	**0.07**
Antimony	mg/L	0.009	<0.001	10	<0.001	<0.001	<0.001
Arsenic	mg/L	0.013	<0.001	10	<0.001	0.003	0.001
Barium	mg/L	-	NM	10	0.020	0.042	0.029
Boron	mg/L	0.94	<0.05	10	0.26	0.72	0.50
Cadmium	mg/L	0.0002	<0.0001	10	<0.0001	**0.0100**	<0.0001
Chromium	mg/L	0.001	<0.001	10	<0.001	**0.002**	<0.001
Copper	mg/L	0.0014	<0.001	10	<0.001	**0.065**	**0.002**
Iron	mg/L	-	NM	10	2.6	98.0	16.5
Lead	mg/L	0.0034	NM	10	<0.001	**0.004**	<0.001
Manganese	mg/L	1.9	0.265	10	0.30	**7.20**	1.65
Mercury	mg/L	0.00006	<0.00004	10	<0.00005	<0.0001	<0.0001
Molybdenum	mg/L	0.034	<0.001	10	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	0.002	10	0.01	**2.10**	**0.07**

	Units	DGV	Baseline range[2]	No. samples	Minimum	Maximum	Median
Selenium	mg/L	0.005	<0.01	10	<0.001	**<0.010**	<0.001
Silver	mg/L	0.00005	<0.001	10	<0.001	<0.001	<0.001
Zinc	mg/L	0.008	0.034	10	0.003	**8.800**	**0.119**

Notes: Reported metal concentrations for the current AEMR Period are from filtered samples.

1. **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.
2. The 80th percentile values at Sawyers Swamp Creek upstream of SSCAD (monitoring site SS5) calculated using data from 22 samples collected between 15 December 2021 to 21 July 2022 (all parameters); plus data from samples collected between 2013 to December 2021 that are available for pH (51 samples), EC (47 samples), turbidity (48 samples), boron (3 samples), copper (4 samples), manganese (45 samples), vanadium (28 samples) and zinc (28 samples) - note these samples are in addition to the 22 samples mentioned above.

4.2.4 Black Hole – BLKH

Black Hole is a waterbody that has formed adjacent to placed ash in SSCAD Section B. Construction of gravity diversions (CP3 and CP4) from the Black Hole to the Sawyers Swamp Creek Diversion commenced in Autumn 2023 and remains ongoing. The construction activities included dewatering the Black Hole and limited filling to create access to construct CP3 and CP4. Dewatering volumes were pumped into SSCAD Pond. Dewatering has now reduced to minimal levels to maintain a steady water level.

12 samples were collected from the Black Hole over the AEMR Period. Table 4.7 shows the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The results indicate that the water quality in the Black Hole is variable. The salinity has remained relatively stable and generally below the DGV. The metal concentrations in some samples exceeded both the DGV and typical concentrations at the Black Hole indicating that some ash affected water is seeping into the Black Hole. The Black Hole receives surface water runoff from clean water catchments north of SSCAD. During dewatering activities that significantly reduce the water level (such as those being undertaken during construction activities) within the waterbody, it has become evident that inflows increase from the SSCAD perched groundwater table which can lead to changes in water quality.

The time-series results presented in Appendix A show nickel and zinc concentrations to exceed the DGV and baseline conditions during this period. Boron concentrations remain below the DGV but have consistently been elevated in comparison to the 2023-2024 period.

Table 4.7 Black Hole BLKH – results summary

	Units	DGV	Baseline range[2]	No. samples	Minimum	Maximum	Median
Physico-chemical parameters							
pH	-	6.5–8.0	5.5 - 6.8	12	**5.9**	7.4	**6.3**
EC	µS/cm	350	114	12	134	**476**	237
DO	mg/L	-	NM	12	4.1	9.7	6.4
Turbidity	mg/L	-	25	12	6	304	22
Total dissolved solids	NTU	-	NM	12	72	310	125
Total nitrogen	mg/L	-	NM	12	0.1	1.3	0.2
Total phosphorus	mg/L	-	NM	12	0.02	0.18	0.05

	Units	DGV	Baseline range[2]	No. samples	Minimum	Maximum	Median
Anions							
Chloride	mg/L	-	NM	12	6	14	9
Fluoride	mg/L	-	NM	12	0.2	0.6	0.3
Sulfate	mg/L	-	NM	12	27	160	46
Cations							
Sodium	mg/L	-	NM	12	12	29	16
Potassium	mg/L	-	NM	12	4.0	14.0	6.9
Calcium	mg/L	-	NM	12	4.0	23.0	7.3
Magnesium	mg/L	-	NM	12	3.0	16.0	5.6
Metals[1]							
Aluminium	mg/L	0.055	0.160	12	<0.01	0.05	<0.01
Antimony	mg/L	0.009	<0.001	12	<0.001	0.004	<0.001
Arsenic	mg/L	0.013	<0.001	12	<0.001	0.013	<0.001
Barium	mg/L	-	NM	12	0.026	0.210	0.065
Boron	mg/L	0.94	<0.05	12	0.20	0.80	0.30
Cadmium	mg/L	0.0002	<0.0001	12	<0.0001	**0.0003**	<0.0001
Chromium	mg/L	0.001	<0.001	12	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	<0.001	12	<0.001	<0.001	<0.001
Iron	mg/L	-	NM	12	0.03	6.4	0.15
Lead	mg/L	0.0034	NM	12	<0.001	<0.001	<0.001
Manganese	mg/L	1.9	0.265	12	0.53	**9.10**	**2.55**
Mercury	mg/L	0.00006	<0.00004	12	<0.00005	**<0.00010**	<0.00005
Molybdenum	mg/L	0.034	<0.001	12	<0.001	0.017	<0.001
Nickel	mg/L	0.011	0.002	12	0.007	**0.079**	**0.013**
Selenium	mg/L	0.005	<0.01	12	<0.001	**<0.010**	<0.001
Silver	mg/L	0.00005	<0.001	12	**<0.001**	**<0.001**	**<0.001**
Zinc	mg/L	0.008	0.034	12	0.005	**0.063**	**0.010**

Notes: Reported metal concentrations for the current AEMR Period are from filtered samples.

1. **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.
2. The 80th percentile values at Sawyers Swamp Creek upstream of SSCAD (monitoring site SS5) calculated using data from 22 samples collected between 15 December 2021 to 21 July 2022 (all parameters); plus data from samples collected between 2013 to December 2021 that are available for pH (51 samples), EC (47 samples), turbidity (48 samples), boron (3 samples), copper (4 samples), manganese (45 samples), vanadium (28 samples) and zinc (28 samples) - note these samples are in addition to the 22 samples mentioned above.

4.2.5 Sawyers Swamp Creek

WX7 is located on Sawyers Swamp Creek approximately 500 m downstream of the Site. Sawyers Swamp Creek is a watercourse that flows through the Site in a westerly direction and joins the Coxs River approximately 1 km to the west of the Site. The creek was diverted from its original alignment early in the Site's history due to coal mining and has been further adjusted when the SSCAD was constructed. The diverted creek (the Sawyers Swamp Creek Diversion) is a clean water system that manages the natural streamflow from the creek's catchment. The system diverts clean water around SSCAD and the KVAR/KVAD water management area. The diversion joins what is thought to be the original Sawyers Swamp Creek to the north-west of the Site. The alignment of the Sawyers Swamp Creek Diversion is shown in Figure 2.1.

The Sawyers Swamp Creek Diversion receives inflows from the following sources:

- clean water runoff from naturally vegetated catchments to the east and south of the Site
- water pumped from the surface of Section B of the SSCAD (wet conditions only)
- stormwater discharges from the KVAR/KVAD water management area (wet conditions only)
- inflows from Dump Creek, which are minor compared to the streamflow in Sawyers Swamp Creek, and
- groundwater inflows, including potential inflows from the perched groundwater systems that are within the ash dams.

The creek has been observed to have a perennial streamflow, indicating that baseflows are maintained by groundwater inflows from the greater catchment. Various groundwater systems (refer to Section 5.1) exist throughout the Site which have different levels of impact from ash emplacements. This means that the ambient water quality can vary based on the groundwater inflow contribution as a percentage of total streamflow and water quality during wet and dry conditions can be markedly different.

Monitoring locations along Sawyers Swamp Creek Diversion, including the number of samples collected at each site are outlined below. Table 4.8 provides the minimum, median, and maximum values for each analyte, comparing them to DGVs and the baseline water quality range:

- **SS5**: Located upstream of SSCAD in a headwater dam to the Sawyers Swamp Creek Diversion and is an upstream reference site that is used to characterise ambient water quality in the Sawyers Swamp Creek Catchment. 12 samples were collected from SS5 over the AEMR Period.
- **S6**: Located on Sawyers Swamp Creek directly downstream from SSCAD pond. 12 samples were collected from S6 over the AEMR Period.
- **S5:** Located on Sawyers Swamp Creek adjacent to KAVAR and downstream to SSCAD pond. 12 samples were collected from S5 over the AEMR Period.
- **WX5:** Located on Sawyers Swamp Creek adjacent to Lidsdale Cut. 12 samples were collected from WX5 over the AEMR Period.
- **WX7:** Located on Sawyers Swamp Creek approximately 500 m downstream of the Site. 17 samples were collected from WX7 over the AEMR Period.

The results indicate the water quality in Sawyers Swamp Creek has a pH that ranges between 4.3 and 8.3, generally low salinity and metal concentrations. These characteristics are consistent with water unaffected by site operations. However, there was a trend of increasing concentrations of salinity, sulfate, total dissolved solids, aluminium, boron, iron, manganese, nickel and zinc between SS5 (upstream of SSCAD) and WX7 (downstream of the Site). The results at WX7 were generally within the DGVs except for aluminium, nickel and zinc.

The time-series results presented in Appendix A shows that the water quality in Sawyers Swamp Creek is consistent with the prior AEMR Periods and varies between wet and dry conditions, with higher salinity and metal concentrations occurring during dry conditions. These results are consistent with historical trends during dry periods and indicate that there is some incidental discharge of ash affected water entering the lower portion of the Sawyers Swamp Creek Diversion.

Table 4.8 Sawyer Swamp Creek – results summary

	Units	DGV	Baseline range[2]	SS5			S6			S5			WX5			WX7		
				Min	Max	Median	Min	Max	Median	Min	Max	Median	Min	Max	Median	Min	Max	Median
Physico-chemical parameters																		
pH	-	6.5–8.0	5.5 - 6.8	**5.6**	**8.3**	7.1	**5.7**	7.6	6.6	**4.3**	7.4	6.6	**5.3**	7.4	6.9	**5.6**	8.0	6.7
EC	µS/cm	350	114	60	173	110	13	178	110	159	**1686**	239	146	**1132**	213	149	**393**	244
DO	mg/L	-	NM	2.9	8.4	4.4	5.6	10.4	6.8	2.7	10.2	6.1	6.2	11.6	7.1	4.5	12.4	6.4
Turbidity	mg/L	-	25	5	23	13	9	32	14	7	71	22	3	81	8	3	34	8
Total dissolved solids	NTU	-	NM	5	66	36	5	70	51	5	140	95	90	180	124	92	280	140
Total nitrogen	mg/L	-	NM	0.10	0.90	0.20	0.10	0.40	0.20	0.10	0.40	0.20	0.10	0.40	0.20	0.10	0.50	0.20
Total phosphorus	mg/L	-	NM	0.01	0.05	0.05	0.01	0.05	0.05	0.03	0.09	0.05	0.01	0.11	0.05	<0.01	0.05	0.05
Anions																		
Chloride	mg/L	-	NM	5	10	7	6	11	8	9	15	12	10	16	13	12	19	14
Fluoride	mg/L	-	NM	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.3	0.2	0.1	0.3	0.2	0.2	0.4	0.2
Sulfate	mg/L	-	NM	5	15	8	6.0	23.0	11.0	14	57	29	29	90	47	39	120	55
Cations																		
Sodium	mg/L	-	NM	7.4	15.0	8.8	8.2	16.0	9.8	13.0	23.0	15.5	16.0	31.0	19.5	17.0	35.0	21.0
Potassium	mg/L	-	NM	1.0	4.0	1.0	2.0	4.0	2.0	2.0	4.0	3.0	3.0	6.5	4.0	3.0	8.2	5.0

	Units	DGV	Baseline range[2]	SS5			S6			S5			WX5			WX7		
				Min	Max	Median	Min	Max	Median	Min	Max	Median	Min	Max	Median	Min	Max	Median
Calcium	mg/L	-	NM	0.5	3.0	0.9	2.0	3.0	2.5	4.0	8.0	5.8	5.7	13.0	7.6	5.9	16.0	9.0
Magnesium	mg/L	-	NM	0.7	2.0	1.0	1.0	2.0	1.0	3.0	6.2	4.0	4.0	9.2	5.7	5.0	9.6	6.3
Metals[1]																		
Aluminium	mg/L	0.055	0.160	<0.01	**0.10**	0.02	0.01	**0.10**	**0.06**	0.01	**0.11**	0.04	0.01	**0.11**	0.03	<0.01	**0.12**	0.03
Antimony	mg/L	0.009	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	0.013	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	-	NM	0.019	0.036	0.023	0.009	0.030	0.015	0.021	0.041	0.032	0.019	0.053	0.031	0.022	0.040	0.028
Boron	mg/L	0.94	<0.05	0.02	0.08	0.04	0.03	0.20	0.05	0.07	0.20	0.10	0.10	0.32	0.16	0.08	0.57	0.20
Cadmium	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.003**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	mg/L	-	NM	0.05	2.00	0.27	0.07	2.10	0.24	0.210	1.700	0.985	0.050	0.450	0.195	0.03	1.00	0.32
Lead	mg/L	0.0034	NM	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	1.9	0.265	0.10	**2.00**	0.40	0.054	0.310	0.115	0.16	1.10	0.54	0.13	1.60	0.54	0.130	0.880	0.330
Mercury	mg/L	0.00006	<0.00004	**<0.00005**	**<0.0001**	**<0.0001**	<0.00005	**<0.0001**	**<0.0001**	<0.00005	**<0.0001**	**<0.0001**	<0.0005	**<0.0001**	**<0.0001**	<0.00005	**<0.0001**	**<0.0001**
Molybdenum	mg/L	0.034	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	0.002	<0.001	0.003	<0.001	<0.001	0.004	<0.001	0.002	0.010	0.003	0.003	0.011	0.007	0.003	**0.012**	0.006

	Units	DGV	Baseline range[2]	SS5			S6			S5			WX5			WX7		
				Min	Max	Median	Min	Max	Median	Min	Max	Median	Min	Max	Median	Min	Max	Median
Selenium	mg/L	0.005	<0.01	<0.001	**<0.010**	<0.001	<0.001	**<0.010**	<0.001	<0.001	**<0.010**	<0.001	<0.001	**<0.010**	<0.001	<0.001	**<0.010**	<0.001
Silver	mg/L	0.00005	<0.001	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Zinc	mg/L	0.008	0.034	0.003	**0.012**	0.007	0.003	**0.016**	0.005	0.004	**0.010**	0.008	0.004	**0.015**	**0.010**	0.006	**<u>0.036</u>**	**0.010**

Notes: Reported metal concentrations for the current AEMR Period are from filtered samples.

1. **Bold** indicates DGV exceeded, <u>underlined</u> indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.
2. The 80th percentile values at Sawyers Swamp Creek upstream of SSCAD (monitoring site SS5) calculated using data from 22 samples collected between 15 December 2021 to 21 July 2022 (all parameters); plus data from samples collected between 2013 to December 2021 that are available for pH (51 samples), EC (47 samples), turbidity (48 samples), boron (3 samples), copper (4 samples), manganese (45 samples), vanadium (28 samples) and zinc (28 samples) - note these samples are in addition to the 22 samples mentioned above.

4.2.6 Coxs River

The Coxs River is a major tributary to the Hawkesbury-Nepean system. The river flows generally in a southerly direction through parts of the Central Tablelands and Blue Mountains regions of NSW. It has a total catchment area of 1,450 km^2 and ultimately flows into the northern arm of Lake Burragorang (also known as Warragamba Dam). Lake Burragorang is a major water supply dam for the Sydney metropolitan region and is managed by WaterNSW. The Site and LDP3 are in the upper portion of the river's catchment. The catchment area upstream of LDP3 is 178 km^2 and is characterised by a series of valleys that are generally bound by rugged forested escarpments and have cleared valley floors. Key tributaries include Wangcol, Sawyers Swamp, Pipers Flat and Kangaroo Creeks. The river is unregulated and has a variable streamflow regime. Baseflow is known to occur year-round, even during severe droughts such as the 2018–2020 drought (albeit at minimal rates). Seasonally, streamflow is highest in late winter and spring and lowest in late summer and autumn. The streamflow regime fits the definition of a permanent or perennial stream.

The Coxs River flows in a southerly direction past the western and south-western portions of the Site. Inflows into the river from the Site can occur via incidental discharges to Sawyers Swamp Creek and LDP3 discharges.

S1 and WX12 are monitoring locations within the Coxs River. WX12 is located upstream of the Sawyers Swamp Creek confluence and is the upstream reference location. The water quality at WX12 is potentially impacted by anthropogenic influences in the upstream catchment, including coal mining, coal ash dams and agriculture. S1 is located downstream of the Sawyers Swamp Creek confluence, Sawyers Swamp Creek is the only material inflow between WX12 and S1. The water quality in the Coxs River between S1 and LDP3 monitoring points can potentially be impacted by inflows from Pipers Flat creek and stormwater runoff and seepage from the township of Lidsdale. A WaterNSW operated stream gauge (212054) is located immediately downstream of WX9.

17 samples were collected from WX12 and S1 over the AEMR Period. Table 4.9 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range. DGVs had their hardness adjustment applied according to Section 4.1.2.

The results indicate that the water quality in Coxs River is similar at S1 and WX12. Inflows from Sawyers Swamp Creek are generally beneficial for Coxs River water quality. The basis for this is that the concentrations (or values) of all analytes shown in Table 4.8 at Sawyers Swamp Creek (WX7) are either below DGVs and/or are similar to or lower than at the upstream reference location (WX12).

The water quality concentrations generally do not exceed the DGV and baseline range, and are consistent with water quality in previous AEMR periods (see time-series charts in Appendix A).

Table 4.9 Coxs River – results summary

				WX12			S1		
	Units	**DGV**	**Baseline range[2]**	**Min**	**Max**	**Median**	**Min**	**Max**	**Median**
Physico-chemical parameters									
pH	-	6.5–8.0	5.6 – 7.0	**6.2**	7.6	7.1	**6.2**	8.0	6.7
EC	µS/cm	350	1,224	**525**	**1592**	**1255**	**505**	**1478**	**1154**
DO	mg/L	-	NM	4.4	10.7	6.4	4.5	10.8	6.2
Turbidity	mg/L	-	24	2.0	17.1	7.0	2.0	14.0	6.0
Total dissolved solids	NTU	-	NM	420	1400	1000	370	1300	920
Total nitrogen	mg/L	-	NM	0.1	0.6	0.2	0.1	0.4	0.2

	Units	DGV	Baseline range[2]	WX12			S1		
				Min	Max	Median	Min	Max	Median
Total phosphorus	mg/L	-	NM	0.01	0.05	0.05	0.01	2.16	0.05
Anions									
Chloride	mg/L	-	NM	37	97	69	34	89	66
Fluoride	mg/L	-	NM	0.1	0.2	0.2	0.1	0.2	0.2
Sulfate	mg/L	-	NM	230	690	520	210	620	480
Cations									
Sodium	mg/L	-	NM	73	230	160	65	200	150
Potassium	mg/L	-	NM	10.0	24.0	19.0	9.8	21.0	18.0
Calcium	mg/L	-	NM	31.0	87.0	68.0	27.0	81.0	69.0
Magnesium	mg/L	-	NM	21.0	65.0	50.0	18.0	58.0	48.0
Metals[1]									
Aluminium	mg/L	0.055	0.030	<0.01	**0.06**	<0.01	<0.01	**0.09**	<0.01
Antimony	mg/L	0.009	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	0.013	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	-	0.025	0.016	0.026	0.019	0.017	0.031	0.021
Boron	mg/L	0.94	0.300	0.16	0.50	0.33	0.16	0.49	0.30
Cadmium[2]	mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	mg/L	-	0.20	0.050	0.370	0.120	0.05	0.41	0.14
Lead[2]	mg/L	0.0155	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	1.90	0.91	0.38	1.30	0.87	0.23	1.20	0.49
Mercury	mg/L	0.00006	<0.00005	<0.00005	**<0.0001**	**<0.0001**	<0.00005	**<0.0001**	**<0.0001**
Molybdenum	mg/L	0.034	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel[2]	mg/L	0.030	0.091	**0.039**	**0.140**	**0.095**	**0.032**	**0.110**	**0.080**
Selenium	mg/L	0.005	<0.001	<0.001	**<0.010**	<0.001	<0.001	**<0.010**	<0.001
Silver	mg/L	0.00005	<0.001	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Zinc[2]	mg/L	0.022	0.038	0.005	**0.051**	0.019	0.005	**0.031**	0.012

Notes: Reported metal concentrations for the current AEMR Period are from filtered samples.

1. **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.
2. DGV indicate analytes with hardness adjustment applied.
3. The 80th percentile values at Coxs River (monitoring site WX12) have been calculated using data from 22 samples collected between 16 August 2022 to 16 August 2024 (all parameters).

4.3 Summary

The surface water quality results for the AEMR Period indicate that:

- Water quality trends in Lidsdale Cut and the SSCAD are consistent with recent AEMR periods (i.e. 2018 to the current period). Lidsdale Cut and SSCAD are part of the Site's contaminated water management system and hold water that is known to be ash affected.
- The water quality in Dump Creek was consistent with ash affected water during dry conditions. It is interpreted that surface water runoff in the Dump Creek catchment is clean and that seep(s) of ash affected water may impact water quality during dry conditions when the streamflow is minimal.
- The water quality in Sawyers Swamp Creek downstream of the Site (WX7) is generally consistent with clean water. There is a variation to water quality monitored in the creek changing from upstream to downstream.
- The water quality in Coxs River is not affected by the inflows from Sawyers Swamp Creek.

GPM continue to progressively improve the water management system through implementing the Action Plan commitments and feasibility assessment recommendations.

5 Groundwater quality review

This chapter reviews groundwater quality data from the OEMP monitoring locations over the AEMR Period. It includes descriptions of the hydrogeological context of the Site, monitoring requirements and assessment criteria established in the OEMP and presents and discusses the groundwater quality data.

5.1 Hydrogeological context

The three main groundwater systems at the Site are:

- **Perched groundwater systems** – are interpreted to be present in the SSCAD, and within the KVAR . The perched groundwater systems present within the KVAR has been conceptualised as two separate systems. One perched system is expected within the KVAD, below the capping layer which is drained through a seepage capture system, and one perched system is considered to be above the KVAD capping layer (located within KVAR). The perched groundwater system within SSCAD is connected and controlled by the water level in SSCAD Pond.

  The degree of connectivity between each of the emplacement areas is not known. Groundwater seeps occur around the downgradient edges and through the floors of each of the emplacement areas. Groundwater recharge is via rainfall infiltration, possible upgradient groundwater inflows and leakage from any unlined ponds within the fill areas. Seepage collection systems intercept seepage from SSCAD embankment, KVAD and the KVAR. Captured seepage is reticulated via channels and pipelines to Lidsdale Cut or SSCAD Pond for management.

- **Local groundwater system** is hosted by the alluvial/colluvial strata along the original line of Sawyers Swamp Creek. However, there have been extensive modifications to the Site, making it difficult to assess the extent of the remaining alluvium/colluvium. Unconsolidated deposits vary spatially and are thicker in the lower catchment areas of Sawyers Swamp Creek and Dump Creek towards the Coxs River. The groundwater flow direction is to the west, following the local topographic gradient.

  This groundwater system is naturally recharged by rainfall and surface water losses from connected creeks in upper catchment areas. Furthermore, in the upgradient catchment areas where the Banks Wall Sandstone outcrops, spring discharge feeds local watercourses, including Sawyers Swamp Creek and local alluvium. Groundwater discharge is via evapotranspiration and baseflow to streams in lower catchment areas.

- **Regional porous and fractured rock groundwater systems** are hosted by the Illawarra Coal Measures (ICM) sedimentary sequences where multiple groundwater zones occur within the different bedrock geologies. Immediately below the SSCAD and KVAR/KVAD ash emplacement areas, the primary aquifer is within the Lithgow coal seam (or at higher elevations potentially above the Lidsdale coal seam) and the weathered bedrock units.

  Prior to mining and ash emplacement, the groundwater flow direction most likely followed the dip of the coal measure and deeper sandstone strata to the east. However, there is no historical baseline data to confirm this conceptualisation. The current composite groundwater contours suggest that the uppermost regional groundwater flow in the bedrock aquifers follows the topography to the west. Naturally this system is recharged by rainfall across the catchment where the ICM bedrock is exposed at or near the surface. Typically, recharge to the regional water table is a very small percentage of rainfall.

5.2 OEMP monitoring requirements

5.2.1 Monitoring locations

The environmental monitoring plan established in the OEMP identifies 13 groundwater monitoring locations for 6-monthly water quality sampling and 13 bores are to be monitored for water level only. Table 5.1 describes each of these monitoring locations, their hydrogeological context and associated monitoring requirements. The monitoring locations are shown in Figure 5.1.

Table 5.1 Groundwater monitoring requirements

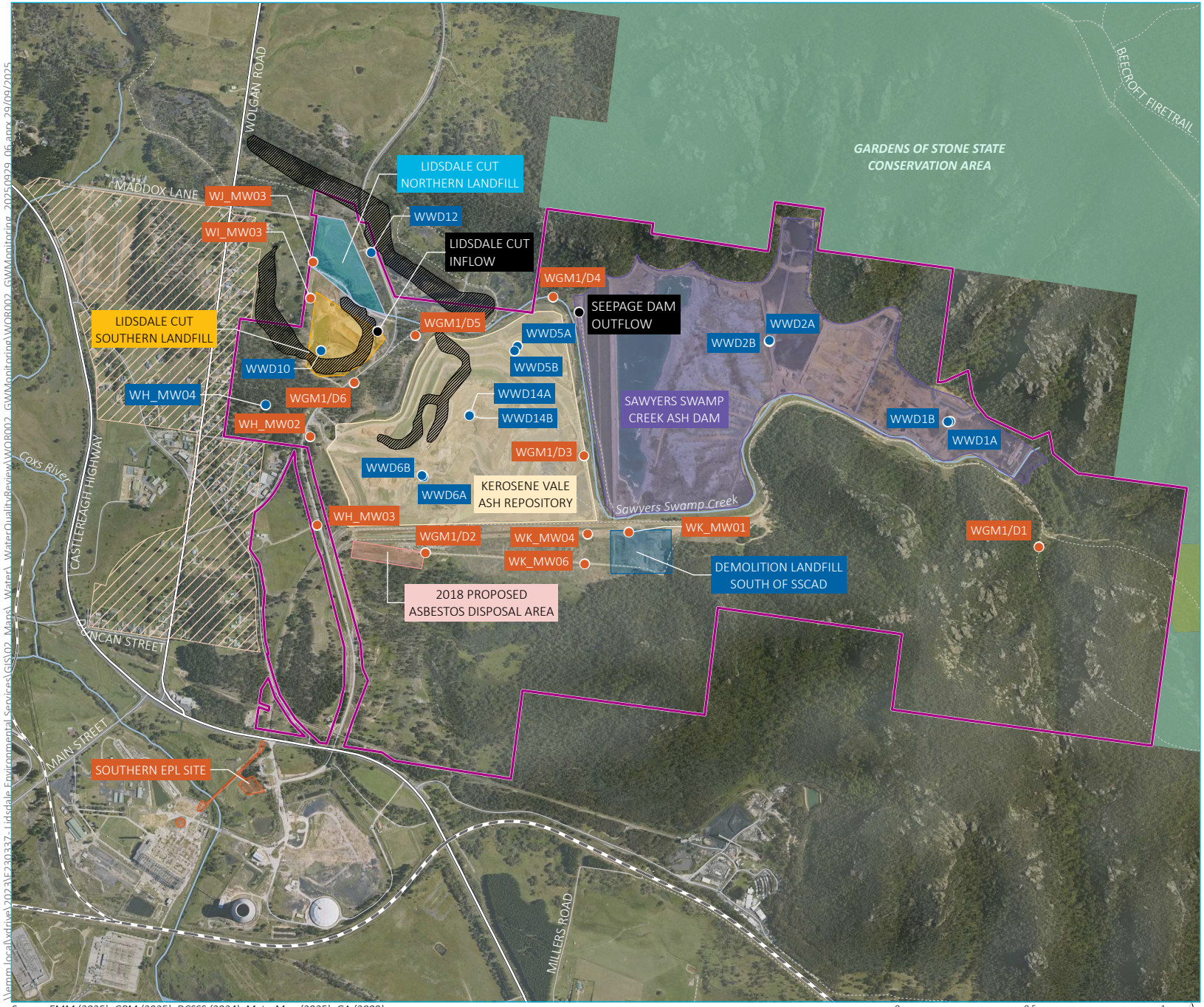
Monitoring location	Easting	Northing	Ground elevation ([2]mAHD)	Screen interval ([3]mbgl)	Description	Screened lithology and groundwater system	Monitoring frequency	Monitoring analytes
WGM1/D1	231988	6301410	954.50	2.6-9.0	Groundwater monitoring bore located to the south-east of SSCAD.	Clayey sand—local groundwater	6-monthly monitoring	Water quality (see Table 5.2) and water level via manual dips
WGM1/D2	229680	6301388	928.50	5.6-18.0	Groundwater monitoring bore located to the south of KVAR/KVAD.	Siltstone/sandstone—regional groundwater		
WGM1/D3	230276	6301753	930.19	4.1-17.5	Groundwater monitoring bore located between SSCAD and KVAR/KVAD.	Siltstone/sandstone/coal—regional groundwater		
WGM1/D4	230160	6302350	907.06	4.1-6.0	Groundwater monitoring bore located to the north of KVAR/KVAD and immediately to the west of the northern side of the SSCAD embankment.	Weathered sandstone —local groundwater		
WGM1/D5	229642	6302206	904.26	4.1-14.3	Groundwater monitoring bore located to the north-west of KVAR/KVAD.	Sandstone/coal—regional groundwater		
WGM1/D6	229412	6302028	907.04	2.5-14.9	Groundwater monitoring bore located to the west of KVAR/KVAD.	Sandstone/mudstone/coal—regional groundwater		
WH_MW02	229246	6301826	923.81	24.0-27.0	Groundwater monitoring bore located to the west of KVAR/KVAD.	Sandstone – regional groundwater		
WH_MW03	229272	6301492	920.62	16.0-19.0	Groundwater monitoring bore located to the south-west of KVAR/KVAD.	Coal/siltstone-regional aquifer		
WI_MW03R[1]	229247	6302346	901.03	6.5-9.5	Groundwater monitoring bore located to the north-west of KVAR/KVAD.	Clayey sand – local groundwater		
WJ_MW03	229257	6302482	896.39	4.5-7.5	Groundwater monitoring bore located to the north-west of KVAR/KVAD and adjacent to Sawyers Swamp Creek.	Sandstone / siltstone – local groundwater		
WK_MW01	230445	6301466	944.38	5.0-9.0	Groundwater monitoring bore located to the south of SSCAD pond	Shale/siltstone-local groundwater		

Monitoring location	Easting	Northing	Ground elevation ([2]mAHD)	Screen interval ([3]mbgl)	Description	Screened lithology and groundwater system	Monitoring frequency	Monitoring analytes
WK_MW04	230290	6301459	936.59	3.0-6.0	Groundwater monitoring bore located to the south-east of KVAR/KVAD.	Shale-local groundwater		
WK_MW06	230279	6301346	948.31	26.0-30.0	Groundwater monitoring bore located to the south-east of KVAR/KVAD.	Siltstone/sandstone – regional groundwater		
WWD1A	231654	6301882	943.10	11.5-14.5	Groundwater nested monitoring bore located on the SSCAD	Ash – perched groundwater		Water level only (logger and manual dips)
WWD1B	231645	6301881	943.53	20.5-23.5	Groundwater nested monitoring bore located on the SSCAD	Siltstone – regional groundwater		
WWD2A	230974	6302184	943.04	20.5-23.5	Groundwater nested monitoring bore located on the SSCAD	Ash - perched groundwater		
WWD2B	230974	6302187	943.08	29.0-32.0	Groundwater nested monitoring bore located on the SSCAD	Shale- regional groundwater		
WWD5A	230026	6302165	917.60	4.5-7.5	Groundwater nested monitoring bore located on the KVAR adjacent the northern collection pond	Ash - perched groundwater		
WWD5B	230015	6302148	921.06	17.5-20.8	Groundwater nested monitoring bore located on the KVAR adjacent the northern collection pond	Siltstone - regional groundwater		
WWD6A	229672	6301674	942.21	26.7-29.7	Groundwater nested monitoring bore located on the KVAD	Ash - perched groundwater		
WWD6B	229667	6301680	942.03	30.3-34.3	Groundwater nested monitoring bore located on the KVAD	Coal - regional groundwater		
WWD10	229287	6302149	905.25	8.9-11.9	Groundwater monitoring bore located on Lidsdale cut southern landfill	Fill- Coal chitter		
WWD12	229476	6302519	901.42	6.6-9.6	Groundwater monitoring bore located near Lidsdale cut northern landfill	Coal - regional groundwater		
WWD14A	229847	6301909	940.90	17.6-20.6	Groundwater nested monitoring bore located on the KVAR/KVAD	Ash - perched groundwater		

Monitoring location	Easting	Northing	Ground elevation ([2]mAHD)	Screen interval ([3]mbgl)	Description	Screened lithology and groundwater system	Monitoring frequency	Monitoring analytes
WWD14B	229845	6301905	940.86	22.6-25.6	Groundwater nested monitoring bore located on the KVAR/KVAD	Siltstone - regional groundwater		
WH_MW04	229080	6301944	908.13	49.0-55.0	Groundwater monitoring bore located on the western property boundary	Siltstone – regional groundwater		

Notes:

1. WI_MW03 was damaged in November 2023 so a replacement EPL monitoring location was established in April 2024 (WI_MW03R) (EMM 2024b).
2. Meters above Australian Height Datum
3. Meters below ground level



KEY

- Site boundary
- Nearest sensitive (residential) receiver

Groundwater bore location

- Water level only- data logger
- Water quality and water level
- Groundwater flow meter
- Historical open cut pit

Site layout

- 2018 proposed asbestos disposal area
- Demolition landfill south of SSCAD
- Kerosene Vale ash repository
- Lidsdale cut northern landfill
- Lidsdale cut southern landfill
- Lidsdale cut
- Sawyers Swamp Creek ash dam
- Southern EPL site

Existing environment

- Rail line
- Major road
- Minor road
- Vehicular track
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

Source: EMM (2025); GPM (2025); DCSSS (2024); MetroMap (2025); GA (2009)

\\emm.local\xtdrive\2023\E230337-Lidsdale Environmental Services\GIS\02_Maps_Water_WaterQualityReview\WQR002_GWMonitoring_20250929_06.aprx 29/09/2025

Groundwater monitoring locations

Kerosene Vale Ash Repositories
Annual Water Quality Review
Figure 5.1

EMM
creating opportunities

5.2.2 Monitoring approach

Table 5.2 provides the groundwater analytes that are established in the Groundwater sub-plan OEMP (Table B.2 in Appendix B).

Table 5.2 Groundwater monitoring analytes – OEMP

Category	Analytes[1]	Sampling and analysis methods
Bore conditions	Static water level (measured by dip meter)	Note SWL and bore conditions at the time of sampling
Physio-chemical parameters	pH, dissolved oxygen (DO), Temperature, electrical conductivity (EC), total dissolved solids (TDS) in mg/L, Redox Potential (ORP)	Analysis is to be undertaken in-situ using a calibrated water quality meter.
Anions	Total dissolved solids (lab)	Analysis is to be undertaken by a NATA-certified laboratory.
Anions	Bicarbonate, carbonate, chloride, fluoride, sulfate	Analysis is to be undertaken by a NATA- certified laboratory.
Cations	Sodium, potassium, calcium, magnesium	Analysis is to be undertaken by a NATA- certified laboratory.
Dissolved metals and metalloids	Aluminium (Al), arsenic (As) [2], boron (B), cadmium (Cd), chromium (Cr) [α], copper (Cu), lead (Pb), manganese (Mn), mercury (Hg), nickel (Ni), selenium (Se), silver (Ag), and zinc (Zn)	Samples are to be filtered using a 0.45 µm filter. Analysis is to be undertaken by a NATA-certified laboratory.

Notes:

1. Sourced from OEMP Table B.2 in Appendix B plus additional analytes noted in the surface and groundwater water quality sub-plans.
2. Speciation of arsenic and chromium will be undertaken in the following sampling round if significant arsenic or chromium contamination is identified in the dissolved metals and metalloids groundwater samples for a particular bore. *A significant level is defined by the ANZECC 2000 guideline value for 95% Freshwater species protection for the speciation of the lower guideline value. For arsenic this is defined by As(V) at 13 µg/L and for chromium this is defined by Cr(VI) at 1 µg/L.* Assessment criteria.

The groundwater quality sub-plan (Section 5.1 – Groundwater sub-plan OEMP) specifies that groundwater monitoring results are to be compared to:

- the baseline data (Appendix C – Groundwater sub-plan OEMP)) for the Trigger Action Response Plan (Appendix B Table B.5 - Groundwater sub-plan OEMP);
- the ANZG 2018 DGV's used as a reference point.

There are insufficient sample points at monitoring locations WH_MW02, WH_MW03, WI_MW03, WJ_MW03, WK_MW01, WK_MW04, and WK_MW06 to establish a baseline data range for comparison during the AEMR Period. As a result, data from these locations will be compared to the ANZG 2018 DGVs instead.

Table 5.3 describes the groundwater assessment criteria for each monitoring location. It is noted that the baseline data is provided as a range.

Table 5.3 Groundwater assessment criteria

	Units	DGV	Baseline range (Groundwater sub-plan OEMP, Table 7 in Appendix C)					
			WGM1/D1	WGM1/D2	WGM1/D3	WGM1/D4	WGM1/D5	WGM1/D6
Physico-chemical parameters								
pH	-	6.5–8.0	5.5 – 6.0	3.7 – 5.1	5.8 – 6.7	5.0 – 6.6	3.7 – 4.7	3.1 – 5.5
EC	µS/cm	350	90 – 170	278 – 502	332 – 773	492 – 1,331	229 – 634	283 – 1,013
Total dissolved solids	mg/L	-	60 – 302	120 – 315	238 – 538	270 – 1210	170 – 1913	200 – 902
DO	mg/L	-	NM	NM	NM	NM	NM	NM
Turbidity	NTU	25	NM	NM	NM	NM	NM	NM
Total nitrogen	mg/L	0.25	NM	NM	NM	NM	NM	NM
Total phosphorus	mg/L	0.02	NM	NM	NM	NM	NM	NM
Anions								
Chloride	mg/L	-	12 – 37	12 – 104	32 – 140	16 – 86	3 – 26	14 – 118
Fluoride	mg/L	-	0.001– 0.1	0.001 – 0.1	0.05 – 0.2	0.001 – 0.1	0.2 – 0.4	0.001 – 0.2
Sulphate	mg/L	-	3 – 8	57 – 180	54 – 130	77 – 770	86 – 274	89 – 360
Cations								
Sodium	mg/L	-	8 – 19	17 – 58	35 – 96	27 – 91	6 – 55	25 – 58
Potassium	mg/L	-	2 – 10	0.03 – 5	5 – 12	5 – 10	4 – 23	4 – 9
Calcium	mg/L	-	2 – 9	1 – 5	11 – 27	38 – 100	12 – 21	4 – 24
Magnesium	mg/L	-	1 – 5	7 – 22	11 – 30	21 – 73	5 – 24	12 – 29
Metals[1]								
Aluminium	mg/L	0.055	NM	NM	NM	NM	NM	NM

			Baseline range (Groundwater sub-plan OEMP, Table 7 in Appendix C)					
	Units	**DGV**	**WGM1/D1**	**WGM1/D2**	**WGM1/D3**	**WGM1/D4**	**WGM1/D5**	**WGM1/D6**
Arsenic	mg/L	0.013	0.001 – 0.001	0.001 – 0.025	0.001 – 0.025	0.001 – 0.025	0.001 – 0.025	0.004 – 0.025
Silver	mg/L	0.00005	0.00025 – 0.00100	0.00025 – 0.00500	0.00025 – 0.00500	0.00025 – 0.00500	0.00100 – 0.00500	0.00100 – 0.00500
Barium	mg/L	-	0.04 – 0.06	0.04 – 0.13	0.05 – 0.13	0.03 – 0.13	0.02 – 0.07	0.02 – 0.07
Boron	mg/L	0.94	0.02 – 0.05	0.01 – 0.15	0.01 – 0.06	0.23 – 1.30	0.08 – 1.10	0.12 – 0.82
Cadmium	mg/L	0.0002	0.0001 – 0.0010	0.0001 – 0.0010	0.0001 – 0.0010	0.0001 – 0.0010	0.0010 – 0.0430	0.0010 – 0.0010
Chromium	mg/L	0.001	0.010 – 0.010	0.001 – 0.010	0.001 – 0.010	0.001 – 0.010	0.005 – 0.010	0.002 – 0.010
Copper	mg/L	0.0014	0.002 – 0.055	0.001 – 0.005	0.001 – 0.006	0.001 – 0.005	0.005 – 0.072	0.002 – 0.010
Iron (filtered)	mg/L	-	0.02 – 4.50	0.03 – 5.70	0.01 – 6.50	22.00 – 71.00	0.06 – 5.32	13.00 – 104.00
Mercury	mg/L	0.00006	0.000025 – 0.0002	0.000025 – 0.0002	0.000025 – 0.0002	0.000025 – 0.0002	0.00005 – 0.0002	0.00005– 0.0002
Manganese	mg/L	1.9	0.046 – 0.2	0.3 – 0.7	0.2 – 1.1	6.0 – 20.0	0.8 – 2.1	0.6 – 4.3
Molybdenum	mg/L	0.034	NM	NM	NM	NM	NM	NM
Nickel	mg/L	0.011	NM	NM	NM	NM	NM	NM
Lead	mg/L	0.0034	0.0005 – 0.0160	0.0020 – 0.0080	0.0005 – 0.0080	0.0005 – 0.0100	0.0050 – 0.0760	0.0020 – 0.0110
Selenium	mg/L	0.005	0.001 – 0.001	0.001 – 0.003	0.001 – 0.003	0.001 – 0.003	0.001 – 0.003	0.001 – 0.003
Zinc	mg/L	0.008	0.030 – 0.240	0.048 – 0.130	0.030 – 0.061	0.020 – 0.090	0.240 – 2.630	0.050 – 0.566

Notes: NM denotes not monitored or not provided in the baseline data set.
1. Assumed baseline data was measured as total concentrations

5.3 Results

Groundwater monitoring results for the AEMR Period are presented and discussed in this section. The groundwater quality results for each monitoring location are presented in table form and compared to the assessment criteria established in Section 5.2. The groundwater level results are presented as hydrographs in Appendix B noting that no formal assessment criteria for water levels has been established as of the writing of this AEMR.

Results for key analytes from all groundwater monitoring locations are also presented as time-series charts that are provided in Appendix B. These charts show all results from 1 January 2018 to the end of the AEMR Period (recent AEMR periods) and can be used to establish water quality and level trends (i.e. increasing or decreasing concentrations and levels). The water quality results are presented and discussed for each groundwater monitoring location and the general water level trends are discussed on a site wide basis in the following sections.

5.3.1 Groundwater monitoring location WGM1/D1

Groundwater monitoring bore WGM1/D1 is located to the south-east of SSCAD (see Figure 5.1). The bore is screened in the local groundwater system (Table 5.1). The groundwater flow direction at this bore is interpreted to be to the north-west, towards SSCAD (EMM 2023a).

Two samples were collected from D1 over the period with most analytes being sampled on at least two occasions. Table 5.4 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The results indicate that the groundwater quality has a pH ranging between 5.1 to 5.6 and low salinity, which indicates surface water influences. Metal parameters zinc, copper and aluminium concentrations exceed DGVs but are generally within the baseline range.

The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in recent AEMR periods (i.e. 2018 to the current period).

Table 5.4 Groundwater monitoring location WGM1/D1 – results summary

	Units	DGV	Baseline range[1]	No. samples	Minimum	Maximum	Median
Physico-chemical parameters							
pH	-	6.5–8.0	5.5 – 6.0	2	**5.1**	**5.6**	**5.4**
EC	µS/cm	350	90 – 170	2	108	121	114
Total dissolved solids	mg/L	-	60 – 302	2	73	86	80
Anions							
Chloride	mg/L	-	12 – 37	2	15	16	16
Fluoride	mg/L	-	0.001 – 0.1	2	<0.1	<0.1	<0.1
Sulfate	mg/L	-	3 – 8	2	11	13	12
Cations							
Sodium	mg/L	-	8 – 19	2	14	16	15
Potassium	mg/L	-	2 – 10	2	3	4	3.5
Calcium	mg/L	-	2 – 9	2	2	2	2

	Units	DGV	Baseline range[1]	No. samples	Minimum	Maximum	Median
Magnesium	mg/L	-	1 – 5	2	2	3	3
Metals[1]							
Aluminium	mg/L	0.055	NM	2	**0.08**	**0.22**	**0.15**
Arsenic	mg/L	0.013	0.001 – 0.001	2	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	0.00025 – 0.00100	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	0.04 – 0.06	2	0.04	0.04	0.04
Boron	mg/L	0.94	0.02 – 0.05	2	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0002	0.0001 – 0.0010	2	<0.0001	0.0002	0.0002
Chromium	mg/L	0.001	0.010 – 0.010	2	<0.001	**0.002**	0.0015
Copper	mg/L	0.0014	0.002 – 0.055	2	**0.002**	**0.006**	**0.004**
Iron (filtered)	mg/L	-	0.02 – 4.50	2	0.22	0.22	0.22
Mercury	mg/L	0.00006	0.000025 – 0.0002	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	0.046 – 0.2	2	0.014	0.088	0.051
Molybdenum	mg/L	0.034	NM	-	-	-	-
Nickel	mg/L	0.011	NM	2	<0.001	0.002	0.0015
Lead	mg/L	0.0034	0.0005 – 0.0160	2	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	0.001 – 0.001	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	0.030 – 0.240	2	**0.17**	**0.19**	**0.18**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples. The baseline range assumed to relate to the total metal concentrations.

5.3.2 Groundwater monitoring location WGM1/D2

Groundwater monitoring bore WGM1/D2 is located to the south of KVAR/KVAD (see Figure 5.1). The bore is screened in the regional groundwater system (Table 5.1). The groundwater flow direction at this bore is interpreted to be to the west (EMM 2023a). As the bore is located near the KVAR and downgradient from SSCAD, there is potential for groundwater quality impacts.

Two samples were collected from WGM1/D2 over the AEMR Period with most analytes being sampled on at least two occasions. Table 5.5 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The groundwater quality is characterised as having a pH of 5.1 and low salinity. Median concentrations of aluminium, nickel, copper and zinc exceeded DGVs but were generally within the baseline range. These concentrations were significantly higher than concentrations at monitoring bore D1 (which is located upgradient of SSCAD). Accordingly, groundwater at WGM1/D2 may be degraded, relative to baseline water quality.

The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in recent AEMR periods (i.e. 2018 to the current period).

Table 5.5 Groundwater monitoring location WGM1/D2 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Maximum	Median
Physico-chemical parameters							
pH	-	6.5–8.0	3.7 – 5.1	2	**5.1**	**5.1**	**5.1**
EC	µS/cm	350	278 – 502	2	217	363	290
Total dissolved solids	mg/L	-	120 – 315	2	268	282	275
Anions							
Chloride	mg/L		12 – 104	2	31	32	32
Fluoride	mg/L		0.001 – 0.1	2	<0.1	<0.1	<0.1
Sulfate	mg/L		57 – 180	2	120	152	136
Cations							
Sodium	mg/L	-	17 – 58	2	42	45	44
Potassium	mg/L	-	0.03– 5	2	4	4	4
Calcium	mg/L	-	1 – 5	2	2	2	2
Magnesium	mg/L	-	7 – 22	2	15	19	17
Metals[1]							
Aluminium	mg/L	0.055	NM	2	**0.12**	**0.21**	**0.165**
Arsenic	mg/L	0.013	0.001 – 0.025	2	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	0.00025 – 0.00500	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	0.04 – 0.13	2	0.031	0.034	0.033
Boron	mg/L	0.94	0.01 – 0.15	2	0.05	0.08	0.07
Cadmium	mg/L	0.0002	0.0001 – 0.0010	2	0.0002	0.0002	0.0002
Chromium	mg/L	0.001	0.001 – 0.010	2	0.001	0.001	0.001
Copper	mg/L	0.0014	0.001 – 0.005	2	<0.001	**0.003**	**0.002**
Iron (filtered)	mg/L	-	0.03 – 5.70	2	0.05	0.14	0.10
Mercury	mg/L	0.00006	0.000025 – 0.0002	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	0.3 – 0.7	2	0.431	0.523	0.477
Molybdenum	mg/L	0.034	NM	-	-	-	-
Nickel	mg/L	0.011	NM	2	**0.044**	**0.057**	**0.051**
Lead	mg/L	0.0034	0.0020 – 0.0080	2	<0.001	0.001	0.001
Selenium	mg/L	0.005	0.001 – 0.003	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	0.048 – 0.130	2	**0.052**	**0.065**	**0.059**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples. The baseline range assumed to relate to the total metal concentrations.

5.3.3 Groundwater monitoring location WGM1/D3

Groundwater monitoring bore WGM1/D3 is located between SSCAD and KVAR (see Figure 5.1). The bore is screened in the regional groundwater system (Table 5.1). There is potential for groundwater quality impacts at this location due to its proximity to both the KVAR/KVAD and SSCAD.

Two samples were collected from WGM1/D3 over the AEMR Period. Table 5.6 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The groundwater quality is characterised as having a pH that ranges between 5.4 to 5.5 and salinity concentrations above the DGV. Median concentrations of most metals sampled exceed the DGV and for zinc the baseline range was also exceeded at the median concentration. These concentrations were significantly higher than concentrations at monitoring bore WGM1/D1 (which is located upgradient of SSCAD). The groundwater at WGM1/D3 may be degraded relative to baseline water quality. It is noted that the parameters have been elevated relative to the baseline since 2017 when monitoring resumed.

Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in recent AEMR periods (i.e. 2018 to the current period).

Table 5.6 Groundwater monitoring location WGM1/D3 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Maximum	Median
Physico-chemical parameters							
pH	-	6.5–8.0	5.8 – 6.7	2	**5.4**	**5.5**	**5.4**
EC	µS/cm	350	332 – 773	2	**506**	**725**	**616**
Total dissolved solids	mg/L	-	238 – 538	2	388	413	401
Anions							
Chloride	mg/L		32 – 140	2	42	44	43
Fluoride	mg/L		0.1 – 0.2	2	0.2	0.2	0.2
Sulfate	mg/L		54 – 130	2	217	219	218
Cations							
Sodium	mg/L	-	35 – 96	2	58	64	61
Potassium	mg/L	-	5 – 12	2	8	9	9
Calcium	mg/L	-	11 – 27	2	25	26	26
Magnesium	mg/L	-	11 – 30	2	23	24	24
Metals[1]							
Aluminium	mg/L	0.055	NM	2	**0.12**	**0.32**	**0.22**
Arsenic	mg/L	0.013	0.001 – 0.025	2	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	0.00025 – 0.00500	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	0.05 – 0.13	2	0.022	0.026	0.024
Boron	mg/L	0.94	0.01 – 0.06	2	0.24	0.26	0.25
Cadmium	mg/L	0.0002	0.0001 – 0.0010	2	**0.0004**	**0.0005**	**0.0005**

	Units	DGV	Baseline range	No. samples	Minimum	Maximum	Median
Chromium	mg/L	0.001	0.001 – 0.010	2	<0.001	**0.002**	**0.002**
Copper	mg/L	0.0014	0.001 – 0.006	2	<0.001	0.001	0.001
Iron (filtered)	mg/L	-	0.01 – 6.50	2	3.19	8.5	5.85
Mercury	mg/L	0.00006	0.000025 – 0.0002	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	0.2 – 1.1	2	0.671	0.737	0.704
Molybdenum	mg/L	0.034	NM	-	-	-	-
Nickel	mg/L	0.011	NM	2	**0.069**	**0.076**	**0.073**
Lead	mg/L	0.0034	0.0005 – 0.0080	2	0.002	**0.004**	0.003
Selenium	mg/L	0.005	0.001 – 0.003	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	0.030 – 0.061	2	**0.028**	**0.103**	**0.066**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples. The baseline range assumed to relate to the total metal concentrations.

5.3.4 Groundwater monitoring location WGM1/D4

Groundwater monitoring bore WGM1/D4 is located to the north-east of the KVAD, to the west of the northern end of the SSCAD embankment and near the Sawyers Swamp Creek Diversion (see Figure 5.1). The bore is shallow and is screened in the local groundwater system (Figure 5.1). The groundwater flow direction at this bore is interpreted to be to the south-west, towards Sawyers Swamp Creek (EMM 2023a). There is potential for groundwater quality impacts at this location due to its proximity to the SSCAD embankment.

Two samples were collected from WGM1/D4 over the AEMR Period with most analytes being tested on both occasions. Table 5.7 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range. The groundwater quality is characterised as having a pH that ranges between 6.1 and 6.2 and salinity that is elevated relative to the DGV and just below the baseline range.

Median concentrations of boron, copper, manganese, nickel and zinc exceeded DGVs with boron also outside the baseline data range. Time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in recent AEMR periods (i.e. 2018 to the current period).

Table 5.7 Groundwater monitoring location WGM1/D4 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Maximum	Median
Physico-chemical parameters							
pH	-	6.5–8.0	5.0 – 6.6	2	**6.1**	**6.2**	**6.1**
EC	µS/cm	350	492 – 1,331	2	**989**	**1270**	**1130**
Total dissolved solids	mg/L	-	270 – 1210	2	800	924	862
Anions							
Chloride	mg/L		16 – 86	2	37	38	38
Fluoride	mg/L		0.001 – 0.1	2	<0.1	<0.1	<0.1

	Units	DGV	Baseline range	No. samples	Minimum	Maximum	Median
Sulfate	mg/L		77 – 770	2	473	528	501
Cations							
Sodium	mg/L	-	27 – 91	2	104	119	112
Potassium	mg/L	-	5 -10	2	8	9	9
Calcium	mg/L	-	38 – 100	2	70	71	71
Magnesium	mg/L	-	21 – 73	2	42	45	44
Metals[1]							
Aluminium	mg/L	0.055	NM	2	0.01	0.04	0.025
Arsenic	mg/L	0.013	0.001 – 0.025	2	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	0.00025 – 0.00500	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	0.03 – 0.13	2	0.015	0.024	0.020
Boron	mg/L	0.94	0.23 – 1.30	2	**1.34**	**1.44**	**1.39**
Cadmium	mg/L	0.0002	0.0001 – 0.0010	2	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	0.001 – 0.010	2	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	0.001 – 0.005	2	<0.001	**0.002**	**0.002**
Iron (filtered)	mg/L	-	22.– 71	2	44	66	55
Mercury	mg/L	0.00006	0.000025 – 0.0002	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	6.0 – 20.0	2	**5.81**	**7.66**	**6.74**
Molybdenum	mg/L	0.034	NM	-	-	-	-
Nickel	mg/L	0.011	NM	2	**0.021**	**0.030**	**0.026**
Lead	mg/L	0.0034	0.0005 – 0.0100	2	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	0.001 – 0.003	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	0.020 – 0.090	2	**0.027**	**0.034**	**0.031**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples. The baseline range assumed to relate to the total metal concentrations.

5.3.5 Groundwater monitoring location WGM1/D5

Groundwater monitoring bore WGM1/D5 is located to the north-west of the KVAD and is near the Sawyers Swamp Creek Diversion (see Figure 5.1). The bore is screened in the regional groundwater system (see Figure 5.1) downgradient of the KVAR/KVAD and SSCAD, but upgradient from Lidsdale Cut. The groundwater flow direction at this bore is interpreted to be to the north-west, away from the KVAR/KVAD (EMM 2023b). There is potential for groundwater quality impacts at this location due to its proximity to the KVAR/KVAD.

Two samples were collected from WGM1/D5 over the AEMR Period with most analytes being sampled on at least two occasions. Table 5.8 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The groundwater quality is characterised as having a pH between 5.1 to 5.9 and salinity that is elevated relative to the DGV and the baseline range. Median concentrations of aluminium, nickel and zinc exceeded DGVs, with manganese and boron also outside the baseline range. Median concentrations of chloride, fluoride, sulfate, sodium, potassium, calcium, magnesium and iron exceeded the baseline range. The elevated parameters suggest the groundwater quality at the bore location may be affected by KVAD seepage.

There is significant change in the recent groundwater quality compared to the previous AEMR periods (i.e. 2022 to the current period) with increases in concentrations of metals and salinity. However, the water quality is comparable to earlier AEMR periods between 2017 to 2022. This site will be continued to be monitored to determine if the water quality changes are attributed to changes in site operations.

Table 5.8 Groundwater monitoring location WGM1/D5 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Maximum	Median
Physico-chemical parameters							
pH	-	6.5–8.0	3.7 – 4.7	2	**5.1**	**5.9**	**5.5**
EC	µS/cm	350	229– 634	2	**692**	**1473**	**1083**
Total dissolved solids	mg/L	-	170–1913	2	532	940	736
Anions							
Chloride	mg/L		3– 26	2	24	65	45
Fluoride	mg/L		0.2 – 0.4	2	<0.1	1.1	0.6
Sulfate	mg/L		86–274	2	306	574	440
Cations							
Sodium	mg/L	-	6–55	2	58	94	76
Potassium	mg/L	-	4–23	2	7	43	25
Calcium	mg/L	-	12–21	2	30	72	51
Magnesium	mg/L	-	5–24	2	28	54	41
Metals[1]							
Aluminium	mg/L	0.055	NM	2	0.05	**1.15**	**0.60**
Arsenic	mg/L	0.013	0.001 – 0.025	2	<0.001	0.004	0.003
Silver	mg/L	0.00005	0.00100 – 0.00500	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	0.02 – 0.07	2	0.034	0.095	0.065
Boron	mg/L	0.94	0.08 – 1.10	2	0.49	**3.07**	**1.78**
Cadmium	mg/L	0.0002	0.0010 – 0.0430	2	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	0.005 – 0.010	2	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	0.005 – 0.072	2	<0.001	0.001	0.001
Iron (filtered)	mg/L	-	0.06 – 5.32	2	16	40	28
Mercury	mg/L	0.00006	0.00005 – 0.0002	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	0.8 – 2.1	2	1.88	**8.14**	**5.01**

	Units	DGV	Baseline range	No. samples	Minimum	Maximum	Median
Molybdenum	mg/L	0.034	NM	-	-	-	-
Nickel	mg/L	0.011	NM	2	**0.036**	**0.229**	**0.133**
Lead	mg/L	0.0034	0.0050 – 0.0760	2	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	0.001 – 0.003	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	0.240 – 2.630	2	**0.012**	**0.012**	**0.012**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples. The baseline range assumed to relate to the total metal concentrations.

5.3.6 Groundwater monitoring location WGM1/D6

Groundwater monitoring bore WGM1/D6 is located to the west of the KVAR/KVAD (see Figure 5.1). The bore is screened in the regional system (see Figure 5.1), downgradient of the KVAR/KVAD and SSCAD, but upgradient from Lidsdale Cut. The groundwater flow direction at this bore is interpreted to be to the west, away from the KVAR/KVAD (EMM 2023a). There is potential for groundwater quality impacts at this location due to its proximity to the KVAR/KVAD.

Two samples were collected from WGM1/D6 over the AEMR Period with most analytes being sampled on at least two occasions. Table 5.9 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The groundwater quality is characterised as having a pH ranging between 4.4 to 4.5 and salinity (as indicated by EC) that is elevated relative to the DGV. Median concentrations of most metals sampled exceed the DGV but were generally within the baseline range. The concentrations of both zinc samples were elevated above the baseline range. Median concentrations of fluoride, sulfate, sodium and magnesium exceeded the baseline range. The water quality is consistent with ash affected water.

The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in recent AEMR periods (i.e. 2018 to the current period).

Table 5.9 Groundwater monitoring location WGM1/D6 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Maximum	Median
Physico-chemical parameters							
pH	-	6.5–8.0	3.1 – 5.5	2	**4.4**	**4.5**	**4.5**
EC	µS/cm	350	283 – 1,013	2	176	**731**	**454**
Total dissolved solids	mg/L	-	200 – 902	2	456	646	551
Anions							
Chloride	mg/L		14 – 118	2	22	26	24
Fluoride	mg/L		0.001 – 0.2	2	0.4	0.4	0.4
Sulfate	mg/L		89 – 360	2	442	444	443
Cations							

	Units	DGV	Baseline range	No. samples	Minimum	Maximum	Median
Sodium	mg/L	-	25 – 58	2	60	80	70
Potassium	mg/L	-	4 – 9	2	5	6	6
Calcium	mg/L	-	4 – 24	2	12	14	13
Magnesium	mg/L	-	12 – 29	2	30	49	40
Metals[1]							
Aluminium	mg/L	0.055	NM	2	**2.02**	**3.16**	**2.59**
Arsenic	mg/L	0.013	0.004 – 0.025	2	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	0.00100 – 0.00500	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	0.02 – 0.07	2	0.018	0.018	0.018
Boron	mg/L	0.94	0.12 – 0.82	2	0.54	0.56	0.55
Cadmium	mg/L	0.0002	0.0010 – 0.0010	2	0.0002	0.0007	0.0005
Chromium	mg/L	0.001	0.002 – 0.010	2	<0.001	0.001	0.001
Copper	mg/L	0.0014	0.002 – 0.010	2	<0.001	<0.001	<0.001
Iron (filtered)	mg/L	-	13 – 104	2	1.4	18.6	10.0
Mercury	mg/L	0.00006	0.0001 – 0.0002	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	0.6 – 4.3	2	0.49	1.26	0.87
Molybdenum	mg/L	0.034	NM	-	-	-	-
Nickel	mg/L	0.011	NM	2	**0.244**	**0.428**	**0.336**
Lead	mg/L	0.0034	0.0020 – 0.0110	2	<0.001	0.003	0.002
Selenium	mg/L	0.005	0.001 – 0.003	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	0.050 – 0.566	2	**0.635**	**0.685**	**0.660**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples.

5.3.7 Groundwater monitoring location WH_MW02

Groundwater monitoring bore WH_MW02 is located on the down gradient western boundary of KVAR/KVAD (see Figure 5.1). The bore is screened in the regional – upper ICM groundwater system (Table 5.1). The groundwater flow direction at this bore is interpreted to be to the north-west (EMM 2023a).

Two samples were collected from WH_MW02 over the period with most analytes being sampled on at least two occasions. Table 5.10 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The results indicate that groundwater pH ranged from 5.8 to 5.9, and salinity was elevated relative to the DGV. Median concentrations of manganese exceeded DGVs, while no other analytes exceeded DGVs during the period. The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in previous periods (i.e. 2018 to the current period).

Table 5.10 Groundwater monitoring location WH_MW02 – results summary

	Units	DGV	No. samples	Minimum	Maximum	Median
Physico-chemical parameters						
pH	-	6.5–8.0	2	**5.8**	**5.9**	**5.9**
EC	µS/cm	350	2	**447**	**466**	**456**
Total dissolved solids*	mg/L	-	2	240	292	266
Anions						
Chloride	mg/L	-	2	28	29	29
Fluoride	mg/L	-	2	<0.1	<0.1	<0.1
Sulfate	mg/L	-	2	108	116	112
Cations						
Sodium	mg/L	-	2	20	21	21
Potassium	mg/L	-	2	5	5	5
Calcium	mg/L	-	2	13	14	14
Magnesium	mg/L	-	2	19	19	19
Metals[1]						
Aluminium	mg/L	0.055	2	<0.01	0.04	0.025
Arsenic	mg/L	0.013	2	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	2	0.024	0.025	0.025
Boron	mg/L	0.94	2	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0002	2	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	2	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	2	<0.001	<0.001	<0.001
Iron	mg/L	-	2	37.8	38.3	38.1
Mercury	mg/L	0.00006	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	2	**2.4**	**2.6**	**2.5**
Molybdenum	mg/L	0.034	-	-	-	-
Nickel	mg/L	0.011	2	<0.001	<0.001	<0.001
Lead	mg/L	0.0034	2	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	2	0.005	0.006	0.006

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples.

5.3.8 Groundwater monitoring location WH_MW03

Groundwater monitoring bore WH_MW03 is located on the down gradient western boundary of KVAR/KVAD (see Figure 5.1). The bore is screened in the regional – upper ICM groundwater system (Table 5.1). The groundwater flow direction at this bore is interpreted to be to the north-west (EMM 2023a).

Two samples were collected from WH_MW03 over the period with most analytes being sampled on at least two occasions. Table 5.11 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The results indicate that groundwater pH ranged from 5.1 to 5.6 and low salinity. Median concentrations of aluminium, copper, nickel, and zinc exceeded DGVs. The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in previous AEMR periods (i.e. 2018 to the current period).

Table 5.11 Groundwater monitoring location WH_MW03 – results summary

	Units	DGV	No. samples	Minimum	Maximum	Median
Physico-chemical parameters						
pH	-	6.5–8.0	2	**5.1**	**5.6**	**5.4**
EC	µS/cm	350	2	147	175	161
Total dissolved solids*	mg/L	-	2	118	309	214
Anions						
Chloride	mg/L	-	2	10	19	15
Fluoride	mg/L	-	2	<0.1	0.2	0.2
Sulfate	mg/L	-	2	66	116	91
Cations						
Sodium	mg/L	-	2	12	20	16
Potassium	mg/L	-	2	4	5	5
Calcium	mg/L	-	2	8	9	9
Magnesium	mg/L	-	2	6	12	9
Metals[1]						
Aluminium	mg/L	0.055	2	**0.090**	**0.160**	**0.125**
Arsenic	mg/L	0.013	2	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	2	0.048	0.062	0.055
Boron	mg/L	0.94	2	<0.05	0.06	0.06
Cadmium	mg/L	0.0002	2	0.0001	0.0002	0.0002
Chromium	mg/L	0.001	2	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	2	<0.001	**0.002**	**0.002**
Iron	mg/L	-	2	0.16	9.23	4.70

	Units	DGV	No. samples	Minimum	Maximum	Median
Mercury	mg/L	0.00006	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	2	0.91	**1.96**	1.43
Molybdenum	mg/L	0.034	-	-	-	-
Nickel	mg/L	0.011	2	**0.016**	**0.038**	**0.027**
Lead	mg/L	0.0034	2	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	2	**0.06**	**0.134**	**0.097**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples.

5.3.9 Groundwater monitoring location WI_MW03R

Groundwater monitoring bore WI_MW03 is located on the down gradient northwestern boundary of KVAR/KVAD (see Figure 5.1). The bore is screened in the local groundwater system (Table 5.1). The groundwater flow direction at this bore is interpreted to be to the north-west (EMM 2023a). WI_MW03 was found to be damaged in November 2023 and was replaced in June 2024 and the new borehole is referred to as WI_MW03R.

Two samples were collected from WI_MW03R over the period with most analytes being sampled on at least two occasions. Table 5.12 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The groundwater quality is characterised as having a pH of 5.9 and salinity (as indicated by EC) that is elevated relative to the DGV. Median concentrations of nickel, and zinc exceeded DGVs. The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in previous AEMR period.

Table 5.12 Groundwater monitoring location WI_MW03R – results summary

	Units	DGV	No. samples	Minimum	Maximum	Median
Physico-chemical parameters						
pH	-	6.5–8.0	2	**5.9**	**5.9**	**5.9**
EC	µS/cm	350	2	**383**	**512**	**448**
Total dissolved solids*	mg/L	-	2	276	308	292
Anions						
Chloride	mg/L	-	2	2	9	11
Fluoride	mg/L	-	2	2	0.6	0.8
Sulfate	mg/L	-	2	2	129	147
Cations						
Sodium	mg/L	-	2	24	30	27
Potassium	mg/L	-	2	13	14	14

	Units	DGV	No. samples	Minimum	Maximum	Median
Calcium	mg/L	-	2	22	23	23
Magnesium	mg/L	-	2	24	24	24
Metals[1]						
Aluminium	mg/L	0.055	2	0.04	0.06	0.05
Arsenic	mg/L	0.013	2	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	2	0.037	0.042	0.040
Boron	mg/L	0.94	2	0.45	0.61	0.53
Cadmium	mg/L	0.0002	2	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	2	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	2	<0.001	<0.001	<0.001
Iron	mg/L	-	2	9.5	16.0	12.8
Mercury	mg/L	0.00006	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	2	1.39	1.62	1.51
Molybdenum	mg/L	0.034	-	-	-	-
Nickel	mg/L	0.011	2	**0.102**	**0.106**	**0.104**
Lead	mg/L	0.0034	2	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	2	**0.012**	**0.107**	**0.060**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples.

5.3.10 Groundwater monitoring location WJ_MW03

Groundwater monitoring bore WJ_MW03 is located on the down gradient northwestern boundary of KVAR/KVAD (see Figure 5.1). The bore is screened in the local groundwater system (Table 5.1). The groundwater flow direction at this bore is interpreted to be to the north-west (EMM 2023a).

Two samples were collected from WJ_MW03 over the period with most analytes being sampled on at least two occasions. Table 5.13 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The results indicate that groundwater pH of 5.1 and salinity (as indicated by EC) that is elevated relative to the DGV. Median concentrations of manganese, nickel, lead and zinc exceeded DGVs. The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in previous 2024 AEMR period.

Table 5.13 Groundwater monitoring location WJ_MW03 – results summary

	Units	DGV	No. samples	Minimum	Maximum	Median
Physico-chemical parameters						
pH	-	6.5–8.0	1	**5.1**	**5.1**	**5.1**
EC	µS/cm	350	1	**954**	**954**	**954**
Total dissolved solids*	mg/L	-	2	758	896	827
Anions						
Chloride	mg/L	-	2	40	98	69
Fluoride	mg/L	-	2	<0.1	<0.1	<0.1
Sulfate	mg/L	-	2	409	577	493
Cations						
Sodium	mg/L	-	2	81	96	89
Potassium	mg/L	-	2	11	12	12
Calcium	mg/L	-	2	57	68	63
Magnesium	mg/L	-	2	49	54	52
Metals[1]						
Aluminium	mg/L	0.055	2	**0.30**	**0.64**	**0.47**
Arsenic	mg/L	0.013	2	0.001	0.002	0.002
Silver	mg/L	0.00005	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	2	0.011	0.024	0.018
Boron	mg/L	0.94	2	0.10	0.11	0.11
Cadmium	mg/L	0.0002	2	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	2	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	2	0.001	0.013	0.007
Iron	mg/L	-	2	31.4	41.9	36.7
Mercury	mg/L	0.00006	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	2	2.1	**2.4**	**2.3**
Molybdenum	mg/L	0.034	-	-	-	-
Nickel	mg/L	0.011	2	**0.169**	**0.178**	**0.174**
Lead	mg/L	0.0034	2	0.002	**0.006**	**0.004**
Selenium	mg/L	0.005	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	2	**0.922**	**0.972**	**0.947**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples.

5.3.11 Groundwater monitoring location WK_MW01

Groundwater monitoring bore WK_MW01 is located on the down gradient southern boundary of SCCAD (see Figure 5.1). The bore is screened in the local - upper ICM groundwater system (Table 5.1). The groundwater flow direction at this bore is interpreted to be to the north-west (EMM 2023a).

Two samples were collected from WK_MW01 over the period with most analytes being sampled on at least two occasions. Table 5.14 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The results indicate that groundwater pH ranged from 6.5 to 6.6 and salinity (as indicated by EC) that is elevated relative to the DGV. Median concentrations of nickel, and zinc exceeded DGVs. The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in previous 2024 AEMR period.

Table 5.14 Groundwater monitoring location WK_MW01 – results summary

	Units	DGV	No. samples	Minimum	Maximum	Median
Physico-chemical parameters						
pH	-	6.5–8.0	2	6.5	6.6	6.6
EC	µS/cm	350	2	**1526**	**1861**	**1694**
Total dissolved solids*	mg/L	-	2	1290	1440	1365
Anions						
Chloride	mg/L	-	2	150	161	156
Fluoride	mg/L	-	2	0.2	0.2	0.2
Sulfate	mg/L	-	2	425	536	481
Cations						
Sodium	mg/L	-	2	94	105	100
Potassium	mg/L	-	2	19	20	20
Calcium	mg/L	-	2	168	174	171
Magnesium	mg/L	-	2	102	108	105
Metals[1]						
Aluminium	mg/L	0.055	2	<0.01	0.04	0.03
Arsenic	mg/L	0.013	2	<0.001	0.001	0.001
Silver	mg/L	0.00005	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	2	0.020	0.034	0.027
Boron	mg/L	0.94	2	0.74	0.80	0.77
Cadmium	mg/L	0.0002	2	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	2	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	2	<0.001	0.001	0.001
Iron	mg/L	-	2	5.1	11.3	8.2

	Units	DGV	No. samples	Minimum	Maximum	Median
Mercury	mg/L	0.00006	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	2	1.0	1.8	1.4
Molybdenum	mg/L	0.034	-	-	-	-
Nickel	mg/L	0.011	2	**0.015**	**0.016**	**0.016**
Lead	mg/L	0.0034	2	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	2	**0.009**	**0.010**	**0.010**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples.

5.3.12 Groundwater monitoring location WK_MW04

Groundwater monitoring bore WK_MW04 is located on the down gradient southern boundary of KVAR/KVAD (see Figure 5.1). The bore is screened in the local - upper ICM groundwater system (Table 5.1). The groundwater flow direction at this bore is interpreted to be to the north-west (EMM 2023a).

Two samples were collected from WK_MW04 over the period with most analytes being sampled on at least two occasions. Table 5.15 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The results indicate that groundwater pH ranged from 6.3 to 6.4 and salinity (as indicated by EC) that is elevated relative to both the DGV and baseline range. Median concentrations of copper and zinc exceeded DGVs. The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in previous 2024 AEMR period.

Table 5.15 Groundwater monitoring location WK_MW04 – results summary

	Units	DGV	No. samples	Minimum	Maximum	Median
Physico-chemical parameters						
pH	-	6.5–8.0	2	**6.3**	**6.4**	**6.3**
EC	µS/cm	350	2	**2054**	**2672**	**2363**
Total dissolved solids*	mg/L	-	2	1690	1720	1705
Anions						
Chloride	mg/L	-	2	584	635	610
Fluoride	mg/L	-	2	0.2	0.2	0.2
Sulfate	mg/L	-	2	116	133	125
Cations						
Sodium	mg/L	-	2	236	255	246
Potassium	mg/L	-	2	17	19	18
Calcium	mg/L	-	2	88	99	94

	Units	DGV	No. samples	Minimum	Maximum	Median
Magnesium	mg/L	-	2	131	143	137
Metals[1]						
Aluminium	mg/L	0.055	2	<0.01	0.02	0.02
Arsenic	mg/L	0.013	2	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	2	0.064	0.078	0.071
Boron	mg/L	0.94	2	0.07	0.08	0.08
Cadmium	mg/L	0.0002	2	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	2	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	2	<0.001	**0.002**	**0.002**
Iron	mg/L	-	2	<0.05	0.78	0.42
Mercury	mg/L	0.00006	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	2	0.17	0.90	0.53
Molybdenum	mg/L	0.034	-	-	-	-
Nickel	mg/L	0.011	2	0.006	0.008	0.007
Lead	mg/L	0.0034	2	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	2	**0.031**	**0.032**	**0.032**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples.

5.3.13 Groundwater monitoring location WK_MW06

Groundwater monitoring bore WK_MW06 is located in the vicinity of the demolition landfill south of the SCCAD (see Figure 5.1). The bore is screened in the local - upper ICM groundwater system (Table 5.1). The groundwater flow direction at this bore is interpreted to be to the north-west (EMM 2023a).

Two samples were collected from WK_MW06 over the period with most analytes being sampled on at least two occasions. Table 5.16 provides the minimum, median and maximum values for each analyte and compares the results to DGVs and the baseline water quality range.

The groundwater quality is characterised as having a pH of 6.7 and salinity that is elevated relative to the DGV. The bore has historically recorded a high concentration of arsenic and may be attributed the nearby landfill. Concentrations of arsenic exceeded the respective DGV in November 2024 but decreased to below the DGV in May 2025. The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in the previous 2024 AEMR period.

Table 5.16 Groundwater monitoring location WK_MW06 – results summary

	Units	DGV	No. samples	Minimum	Maximum	Median
Physico-chemical parameters						
pH	-	6.5–8.0	2	6.7	6.7	6.7
EC	µS/cm	350	2	**784**	**1002**	**893**
Total dissolved solids*	mg/L	-	2	527	581	554
Anions						
Chloride	mg/L	-	2	33	41	37
Fluoride	mg/L	-	2	0.2	0.3	0.3
Sulfate	mg/L	-	2	6	12	9
Cations						
Sodium	mg/L	-	2	13	14	14
Potassium	mg/L	-	2	22	22	22
Calcium	mg/L	-	2	126	127	127
Magnesium	mg/L	-	2	46	48	47
Metals[1]						
Aluminium	mg/L	0.055	2	<0.01	0.02	0.02
Arsenic	mg/L	0.013	2	0.002	**0.047**	**0.025**
Silver	mg/L	0.00005	1	**<0.001**	**<0.001**	**<0.001**
Barium	mg/L	-	2	0.756	0.823	0.790
Boron	mg/L	0.94	2	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0002	2	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	2	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	2	<0.001	<0.001	<0.001
Iron	mg/L	-	2	2.0	2.5	2.2
Mercury	mg/L	0.00006	1	**<0.0001**	**<0.0001**	**<0.0001**
Manganese	mg/L	1.9	2	0.059	0.073	0.066
Molybdenum	mg/L	0.034	-	-	-	-
Nickel	mg/L	0.011	2	<0.001	<0.001	<0.001
Lead	mg/L	0.0034	2	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	2	**<0.01**	**<0.01**	**<0.01**
Zinc	mg/L	0.008	2	<0.005	<0.005	<0.005

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

1. Reported metal concentrations for the current AEMR Period are from filtered samples.

5.3.14 Groundwater levels

Groundwater levels are manually monitored at all monitoring bores with 13 of these bores additionally monitored with a data level logger (refer to Table 5.1). The hydrographs (refer to Appendix B) are presented along with the cumulative rainfall departure (CRD) which shows how much total rainfalls deviate from the long-term average, showing trends of above average or below average rainfall. The groundwater level trends indicate the following:

- Groundwater levels were consistent with historical trends and generally followed the CRD rainfall trend showing a decrease between September to October 2024, increasing between November 2024 and January 2025 corresponding to the above average rainfalls, and a slightly declining trend to the end of the AEMR period.
- WWD5A and WWD14A were predominantly dry during the AEMR period.
- At bores equipped with loggers, a more pronounced response to rainfall events were observed in bores in the SSCAD (WWD1A/B and WWD2A/B) and at WWD12.

5.4 Summary

The groundwater quality results for the AEMR Period indicate that:

- The groundwater chemistry varied across the thirteen groundwater monitoring bores. The salinity levels ranged from 108 to 2,672 µS/cm and pH ranged from 4.4 to 6.7. This variability is consistent with expectations given the bores are screened in multiple lithologies (refer to Figure 5.1) and is also consistent with the results from the prior AEMR Period (refer to time series graphs provided in Appendix B).
- The concentrations of several metals that are known to occur in ash affected water (copper, nickel and zinc) exceeded the DGVs at most groundwater monitoring bores. The highest concentration of nickel occurred at WGM1/D6 (located to the west of the KVAR/KVAD) and the highest concentration of copper and zinc occurred at WJ_MW03 (located downgradient of KVAD and Lidsdale Cut). The pH at each of these bores was also acidic, varying between 4.4 and 5.1. These trends are consistent with previous results of AEMR periods.
- The arsenic concentration at WK_MW06 (located to the south of KVAR) was elevated in November 2024 (0.047 mg/L) relative to the DGV of 0.013 mg/L. Arsenic is not known to occur in ash affected water (EMM 2023a). The arsenic concentration was either below detection or the DGV at all other locations. The presence of arsenic at WK_MW06 and no other bore is consistent with previous results of AEMR periods.
- The groundwater quality at bore WGM1/D3, located between SSCAD and KVAR, continues to show a degraded water quality compared to the baseline with elevated salinity and metal concentration.
- The groundwater quality at bore WGM1/D5, located to the north-west and downgradient of the KVAD, has shown a change compared to the previous AEMR periods with elevated EC and elevated concentrations of aluminium, nickel, zinc, manganese, boron, chloride fluoride, sulfate, sodium, potassium, calcium, magnesium and iron. The water quality is comparable to the period between 2017 to 2022 and will be continued to be monitored to determine if the changes are attributed to site operations.
- The groundwater level trends were consistent with historical trends and generally reflect the CRD.

In summary, the groundwater quality trends during the AEMR Period were generally consistent with recent AEMR periods (i.e. 2018 to the current period).

Potential groundwater contamination sources, pathways and receptors are being investigated as part of the VMP process (see section 1.3.4).

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Appendix A
Surface water quality charts

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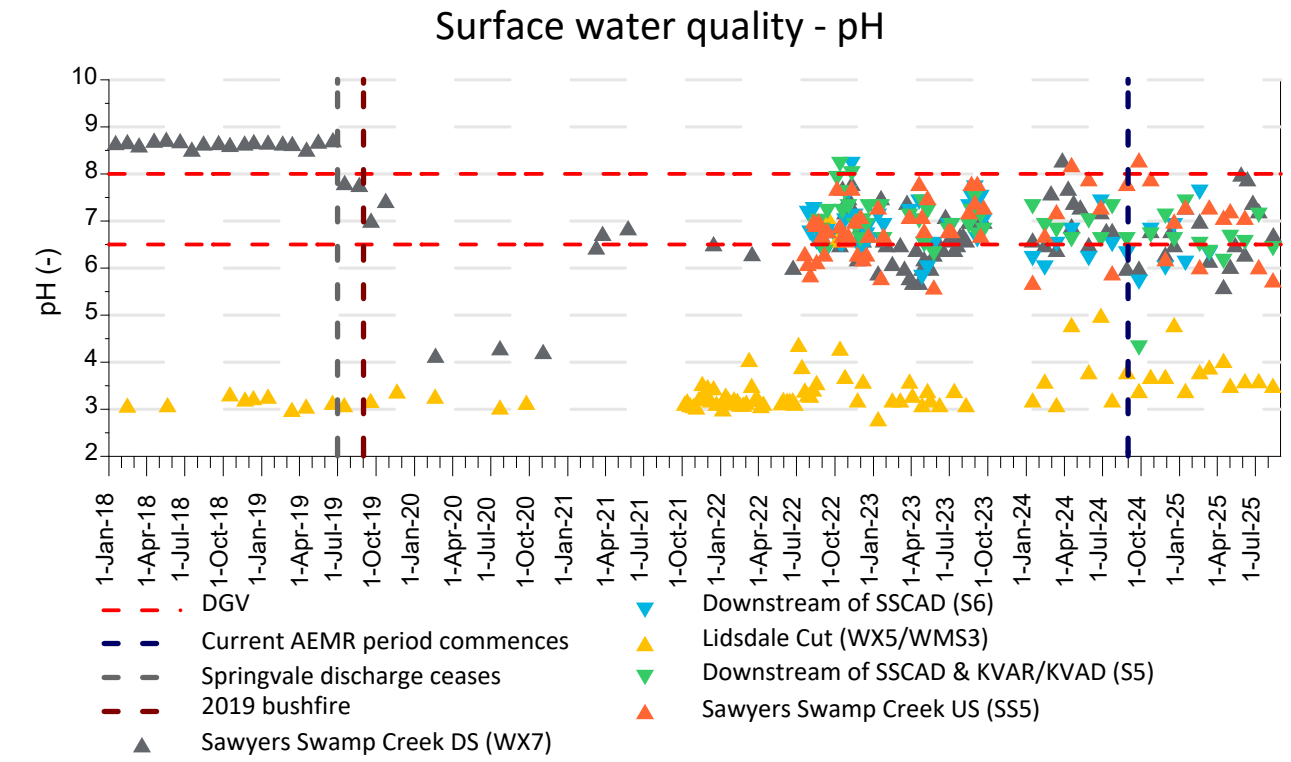
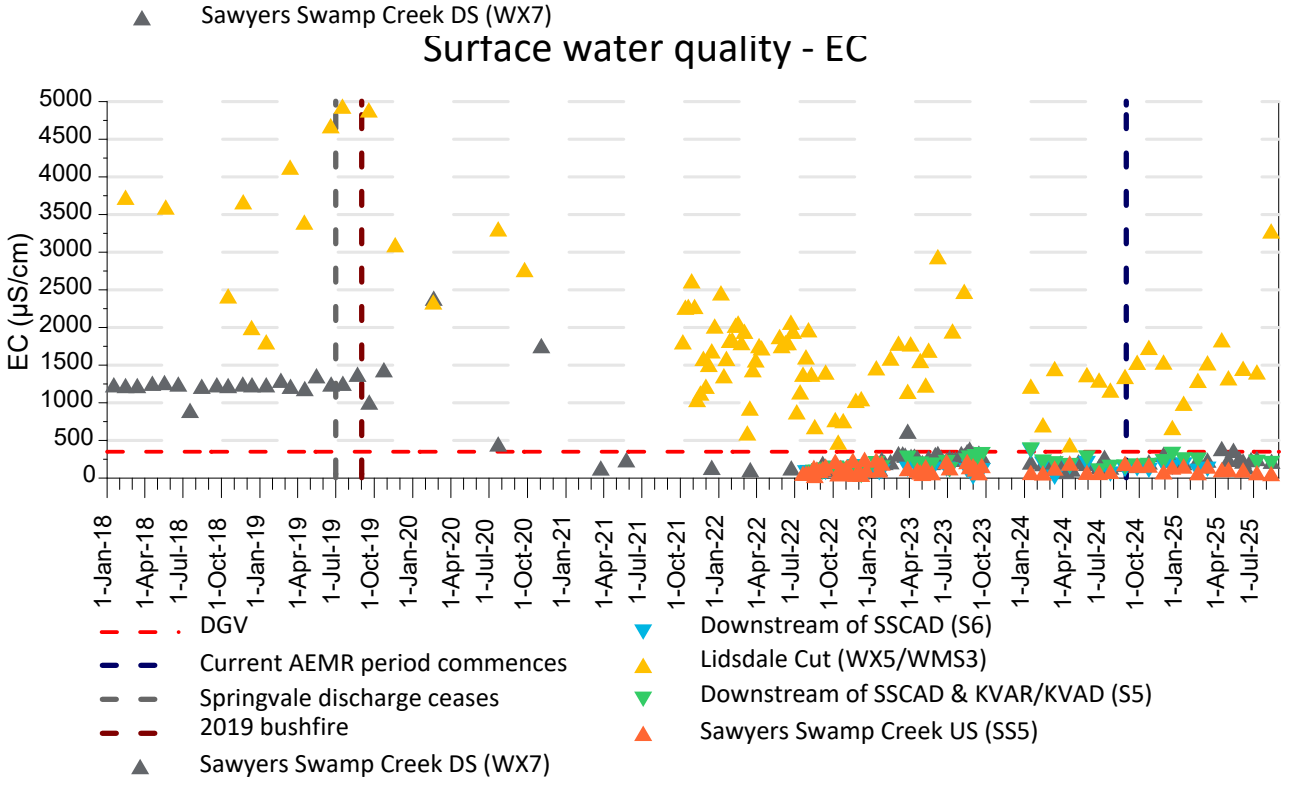
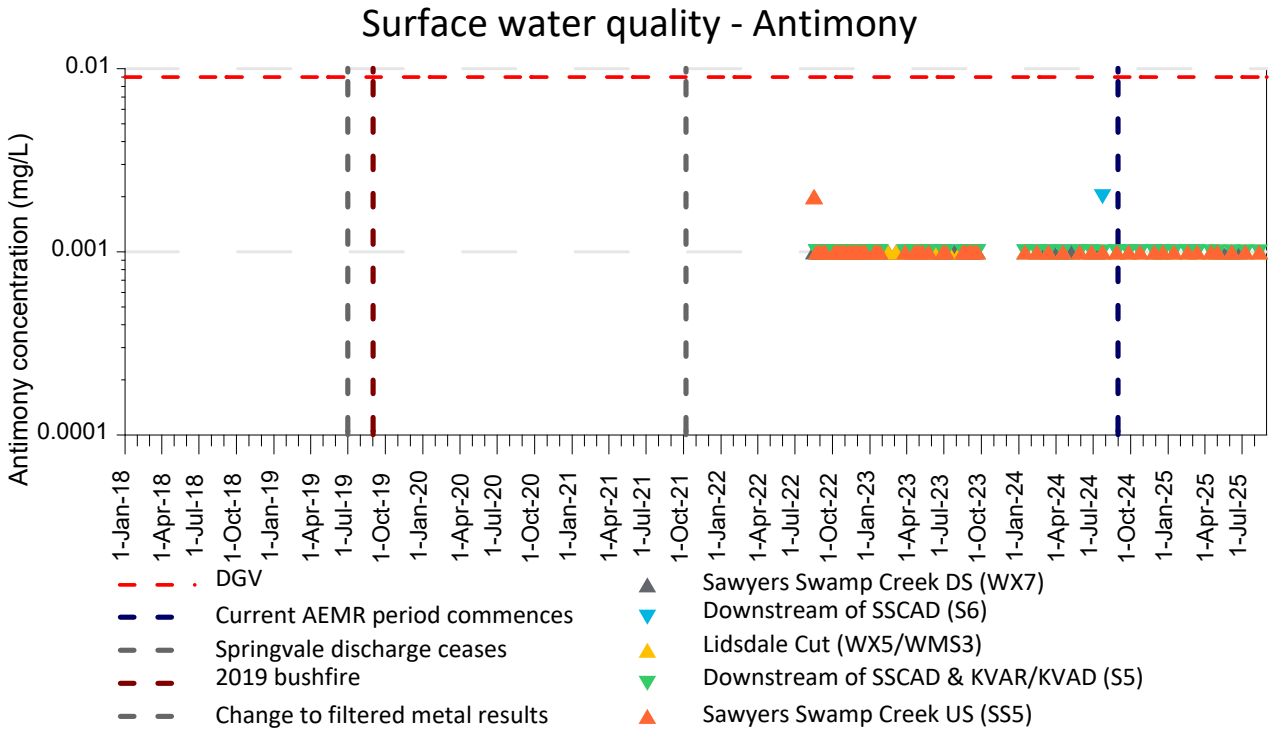
A.1 Sawyer Swamp Creek

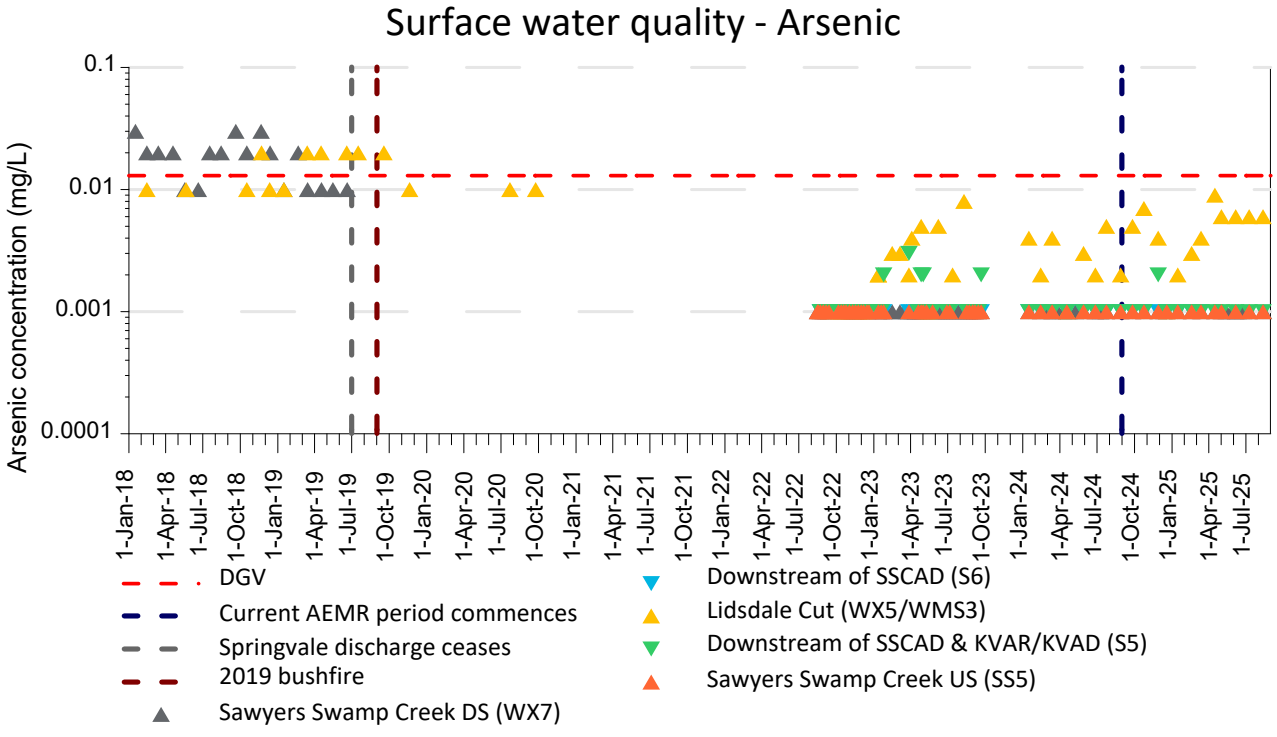
A.1.1 Physico-chemical parameters charts



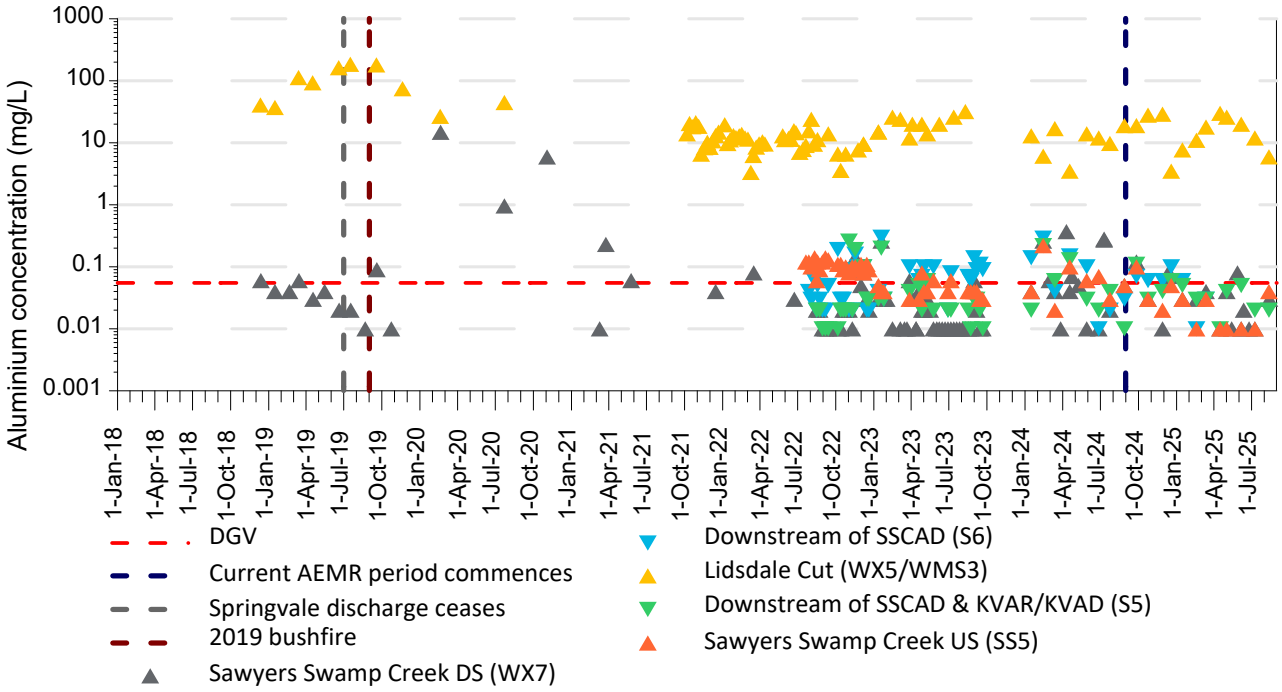


A.1.2 Metal charts

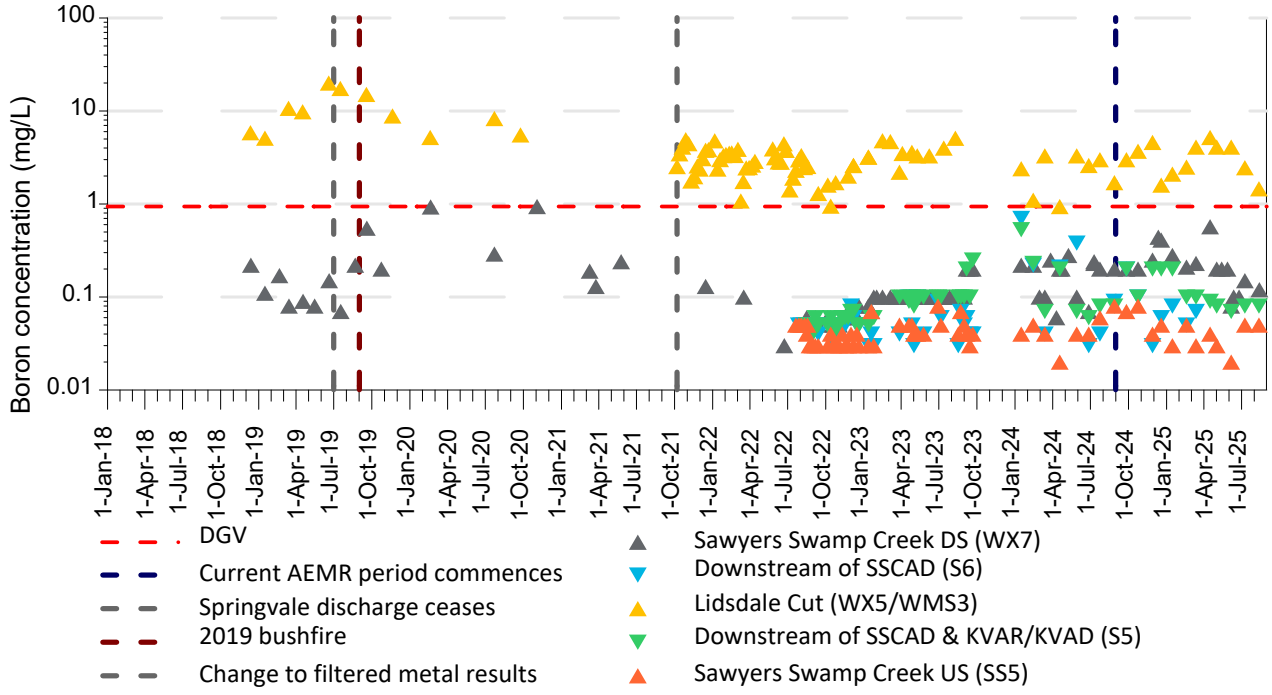




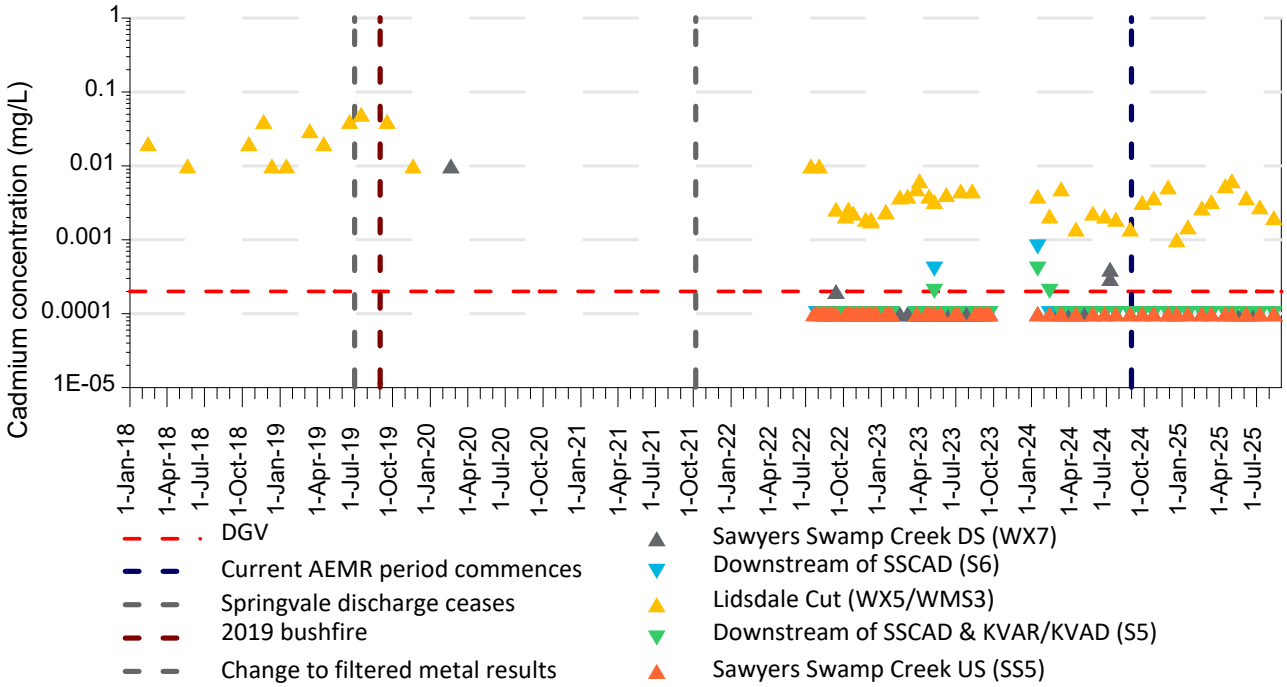
Surface water quality - Aluminium



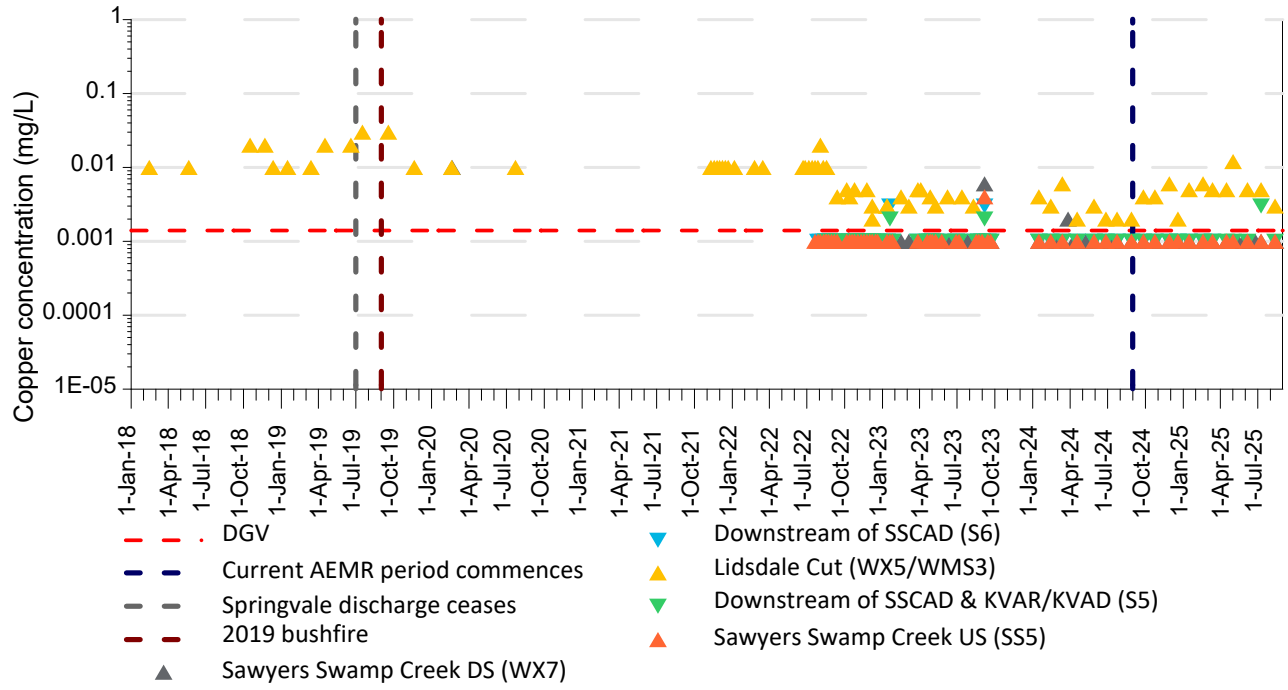
Surface water quality - Boron



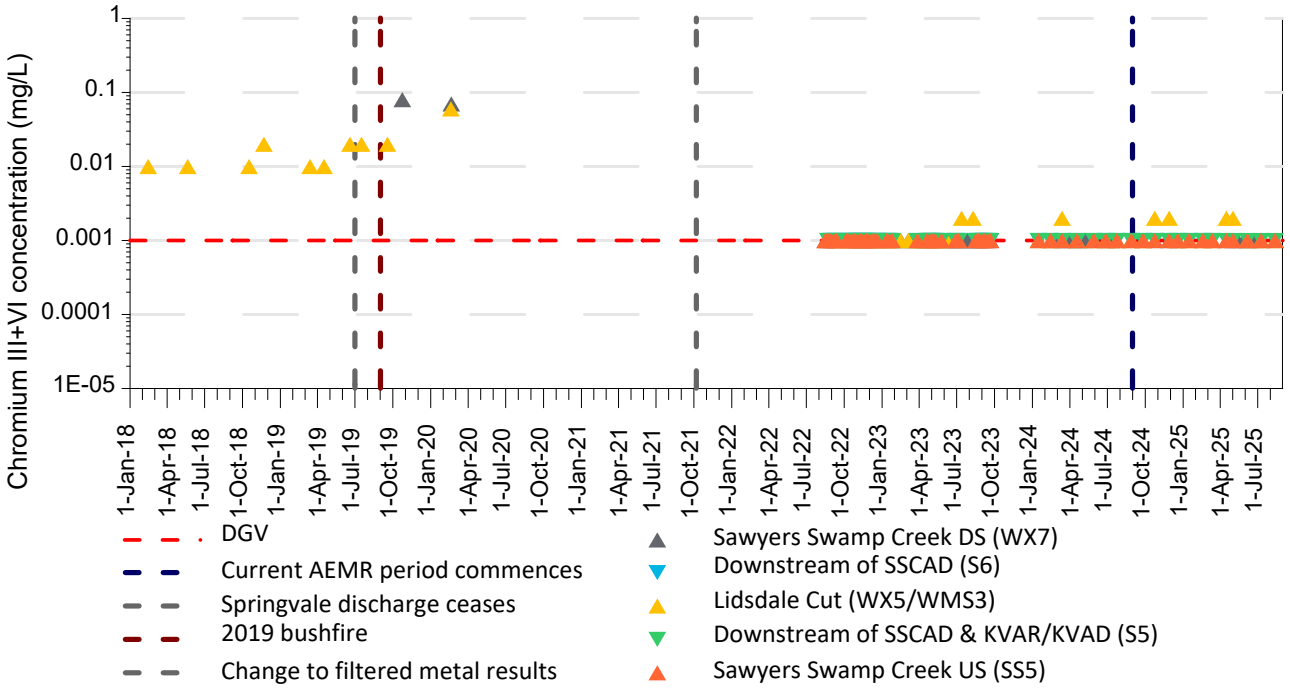
Surface water quality - Cadmium



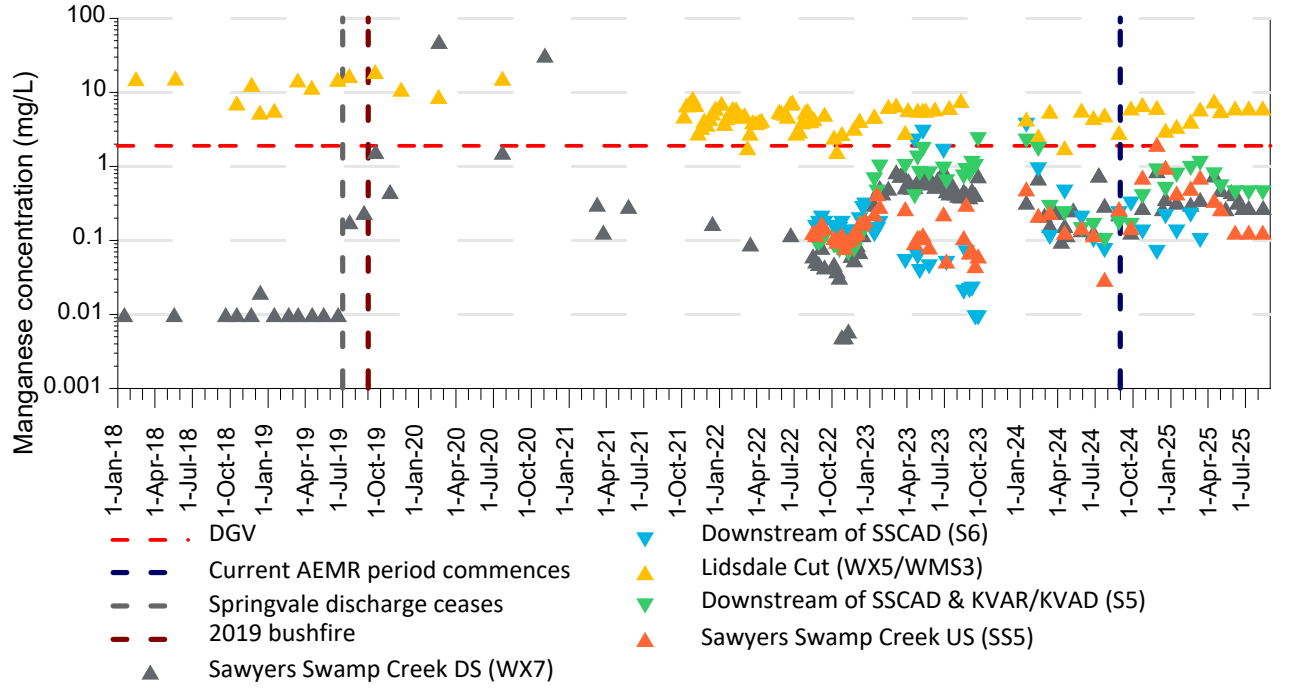
Surface water quality - Copper



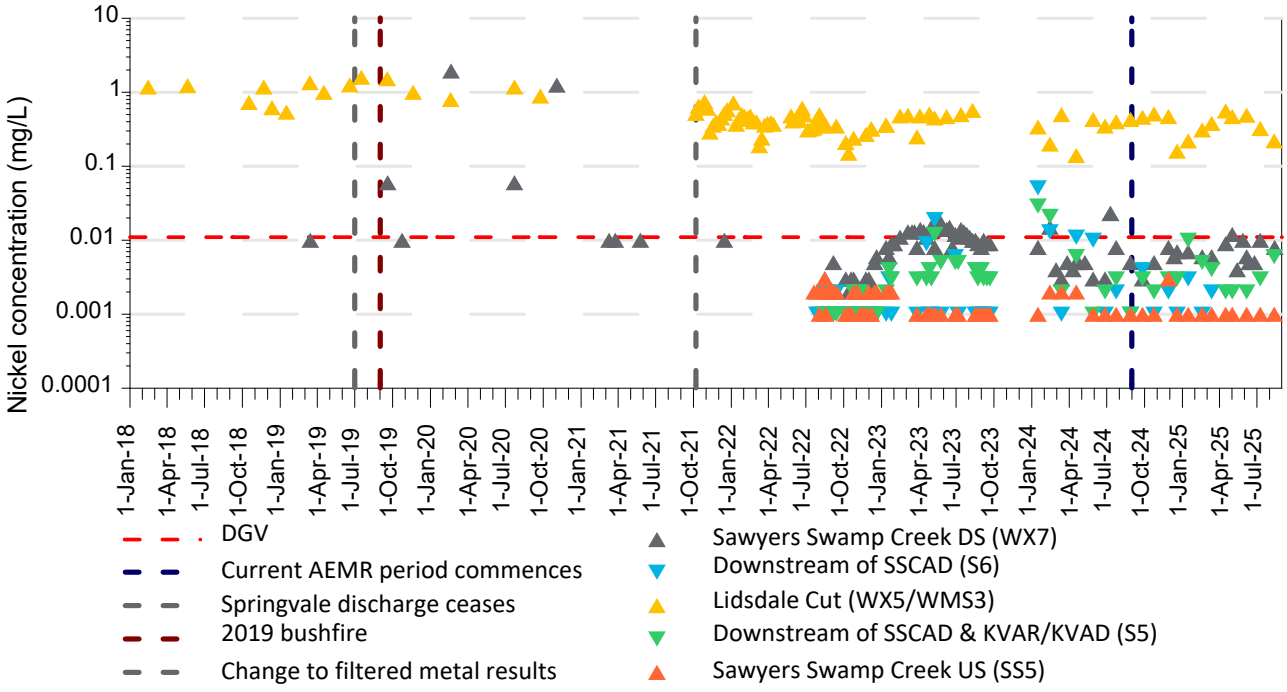
Surface water quality - Chromium



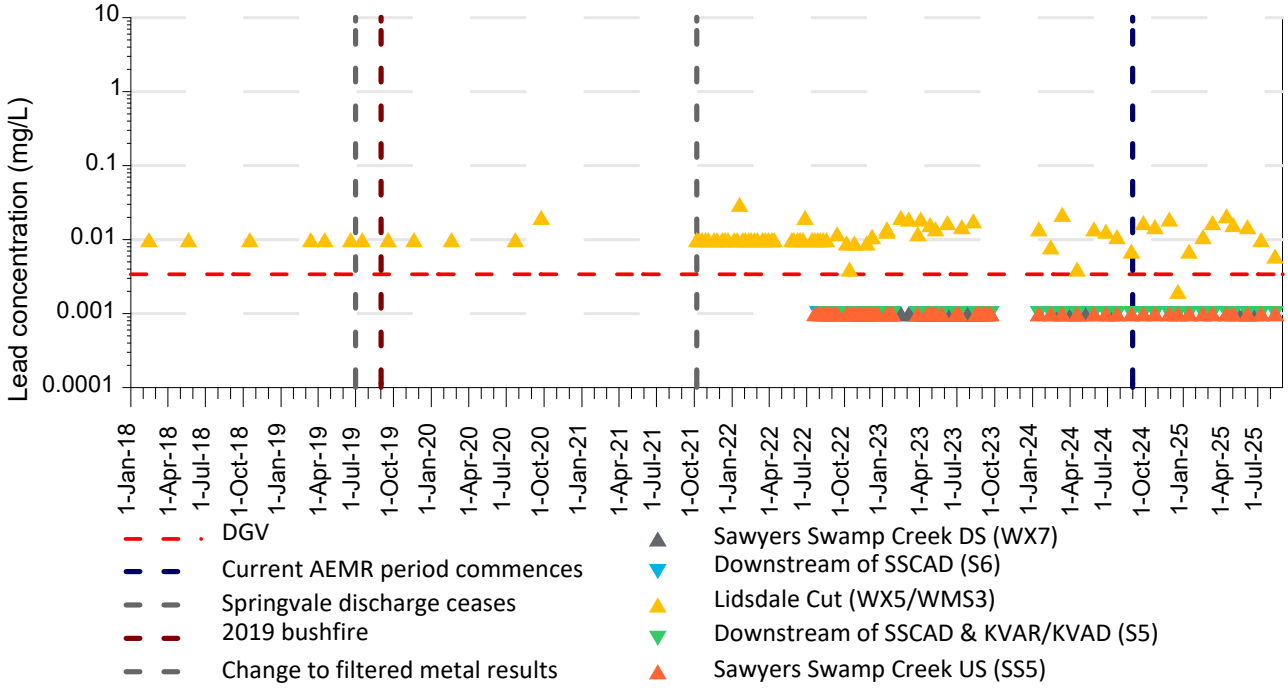
Surface water quality - Manganese

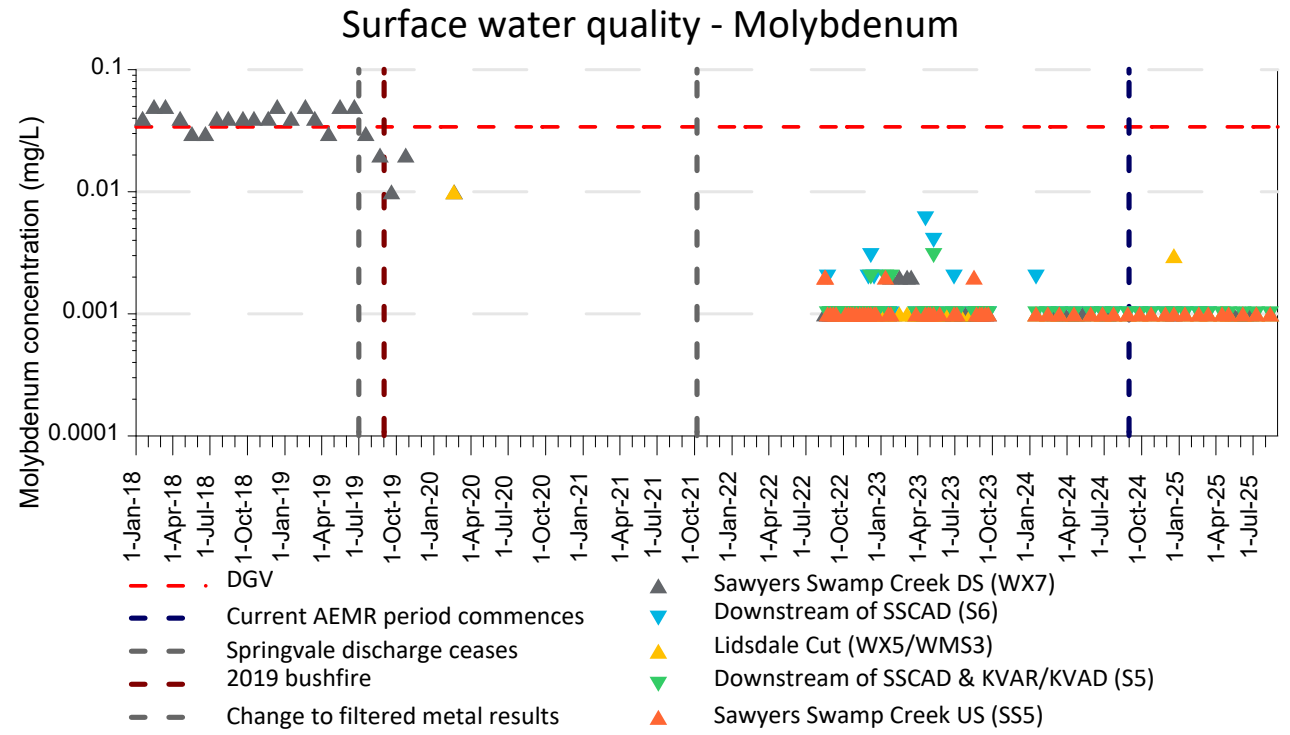


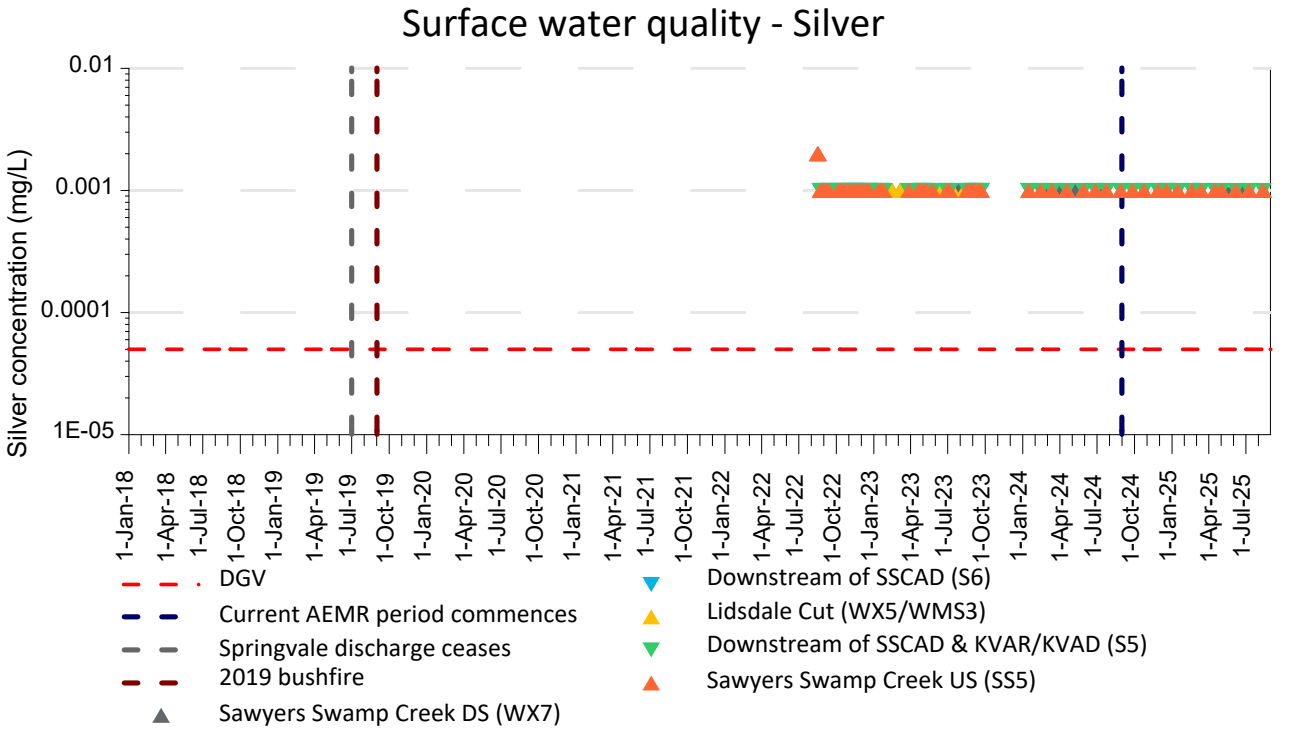
Surface water quality - Nickel

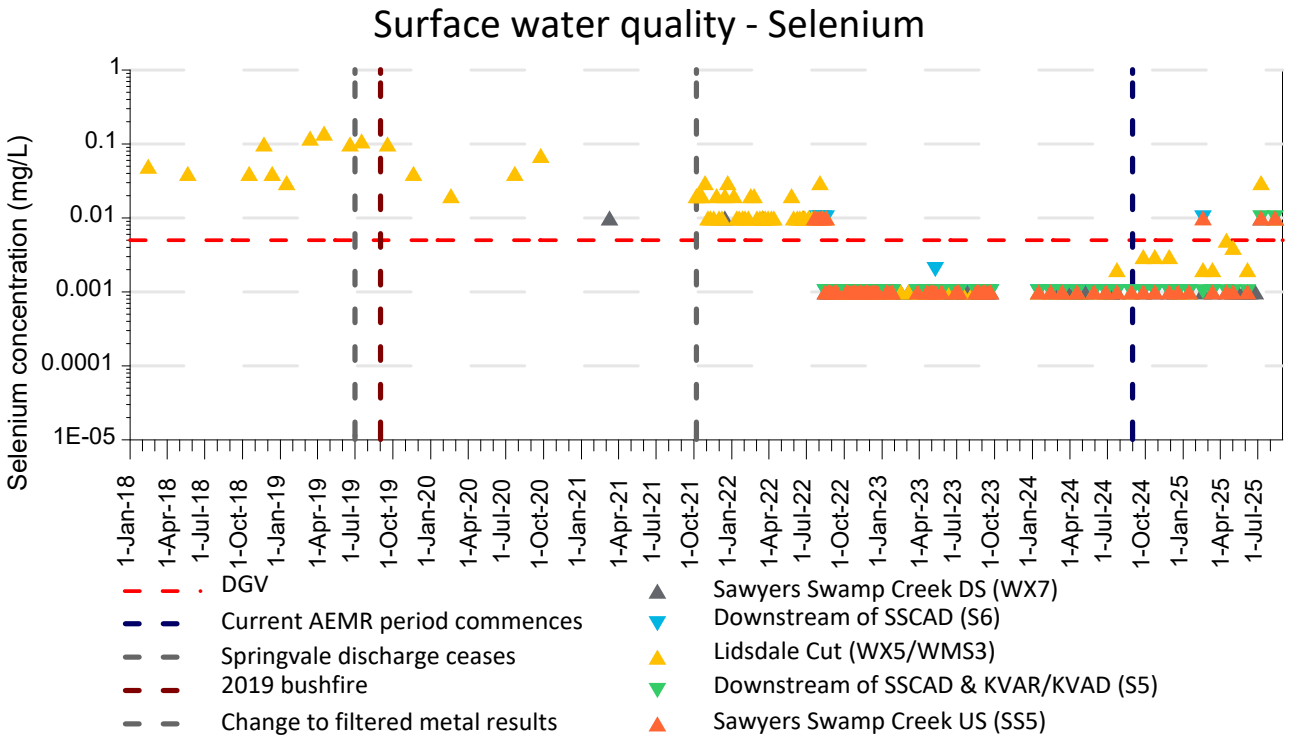


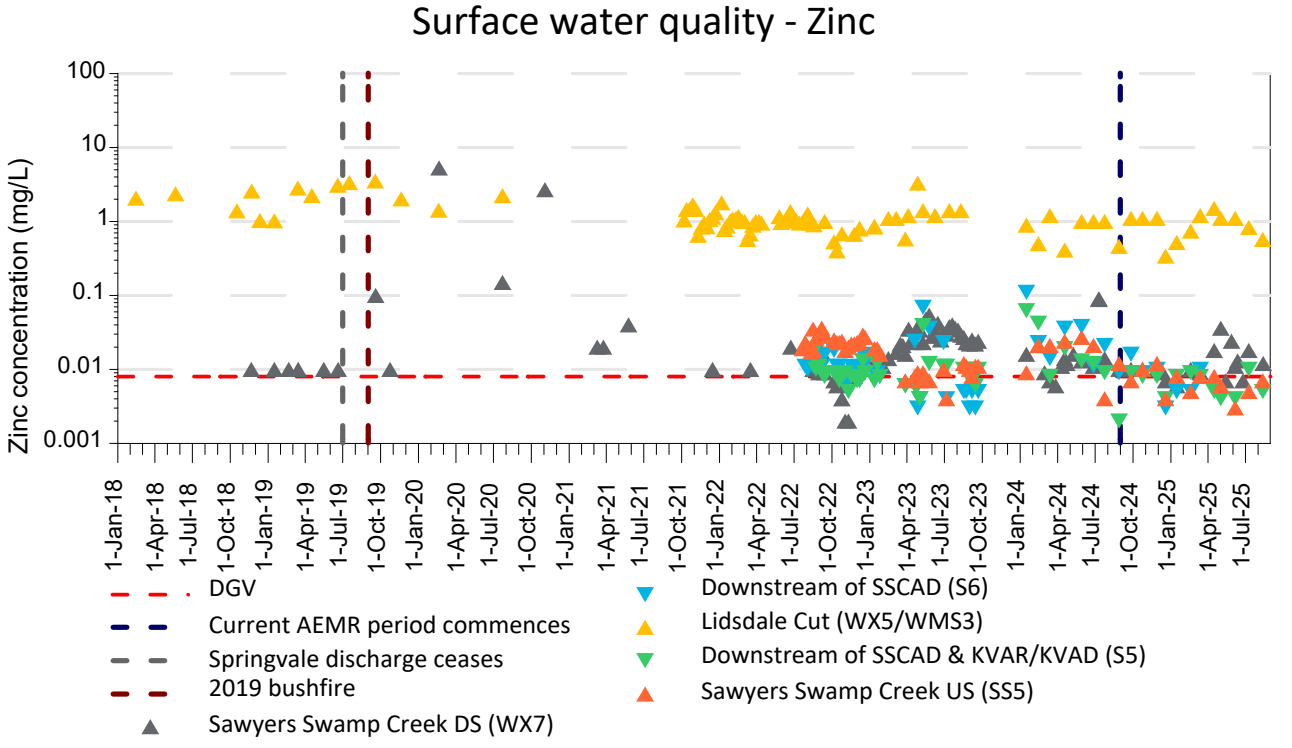
Surface water quality - Lead




Surface water quality - Molybdenum
Molybdenum concentration (mg/L)
0.1
0.01
0.001
0.0001
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Change to filtered metal results
Sawyers Swamp Creek DS (WX7)
Downstream of SSCAD (S6)
Lidsdale Cut (WX5/WMS3)
Downstream of SSCAD & KVAR/KVAD (S5)
Sawyers Swamp Creek US (SS5)

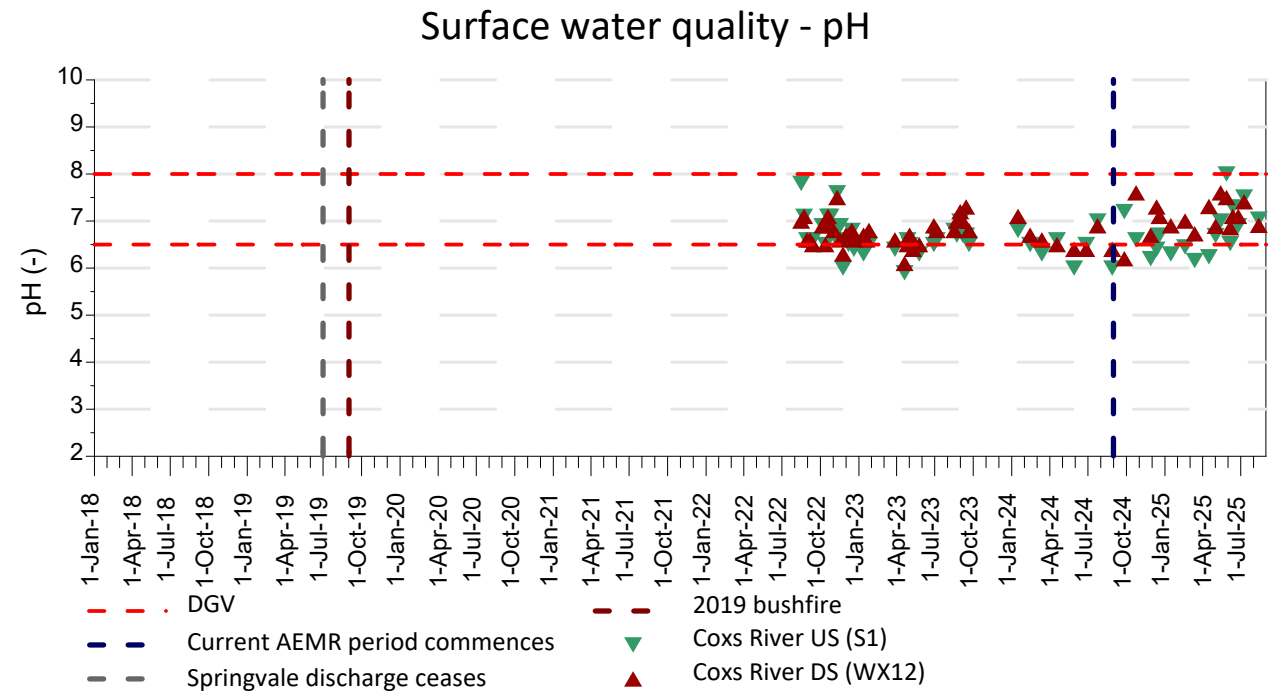

Surface water quality - Silver
Silver concentration (mg/L)
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek DS (WX7)
Downstream of SSCAD (S6)
Lidsdale Cut (WX5/WMS3)
Downstream of SSCAD & KVAR/KVAD (S5)
Sawyers Swamp Creek US (SS5)

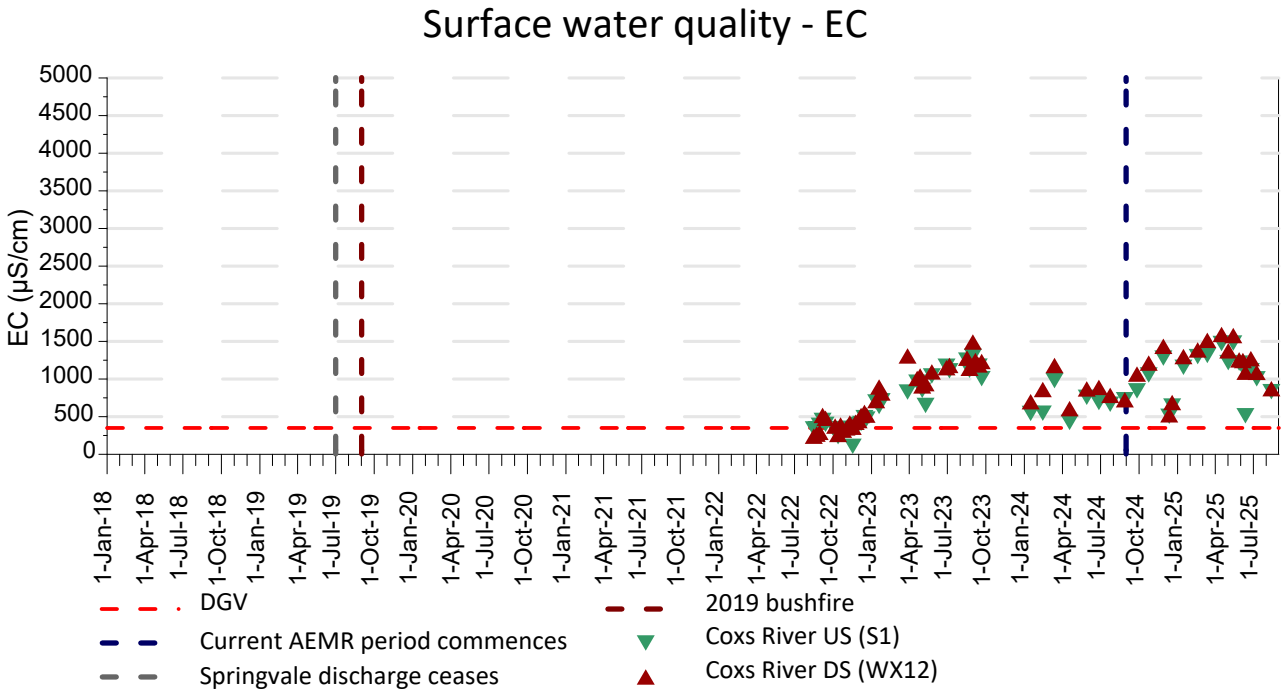

Surface water quality - Selenium
Selenium concentration (mg/L)
1
0.1
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Change to filtered metal results
Sawyers Swamp Creek DS (WX7)
Downstream of SSCAD (S6)
Lidsdale Cut (WX5/WMS3)
Downstream of SSCAD & KVAR/KVAD (S5)
Sawyers Swamp Creek US (SS5)


Surface water quality - Zinc
Zinc concentration (mg/L)
100
10
1
0.1
0.01
0.001
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek DS (WX7)
Downstream of SSCAD (S6)
Lidsdale Cut (WX5/WMS3)
Downstream of SSCAD & KVAR/KVAD (S5)
Sawyers Swamp Creek US (SS5)

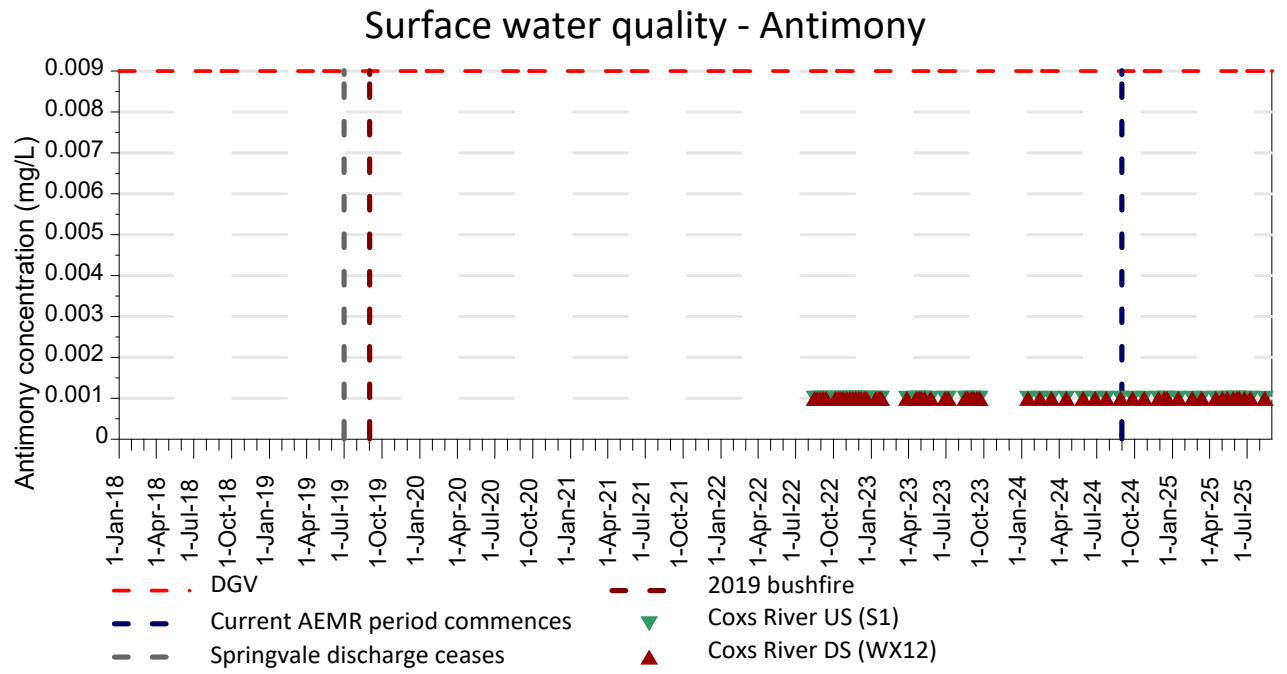
A.2 Coxs River

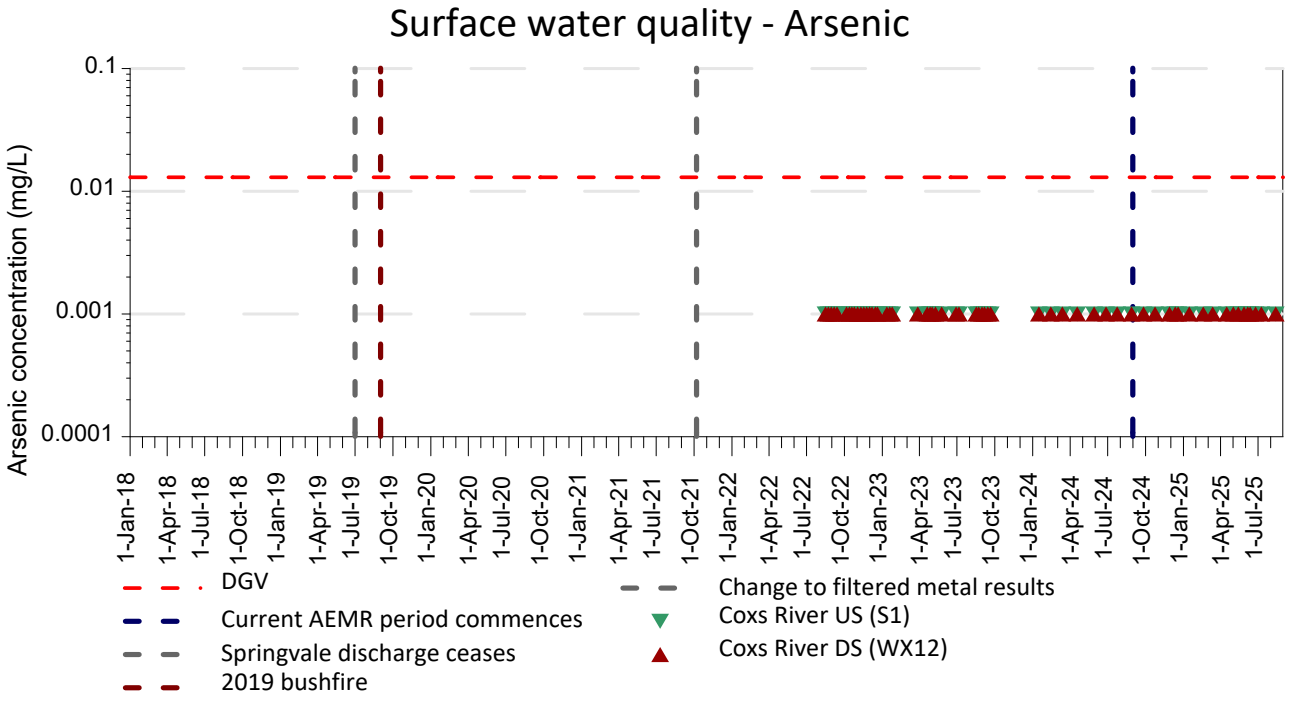
A.2.1 Physico-chemical parameters charts

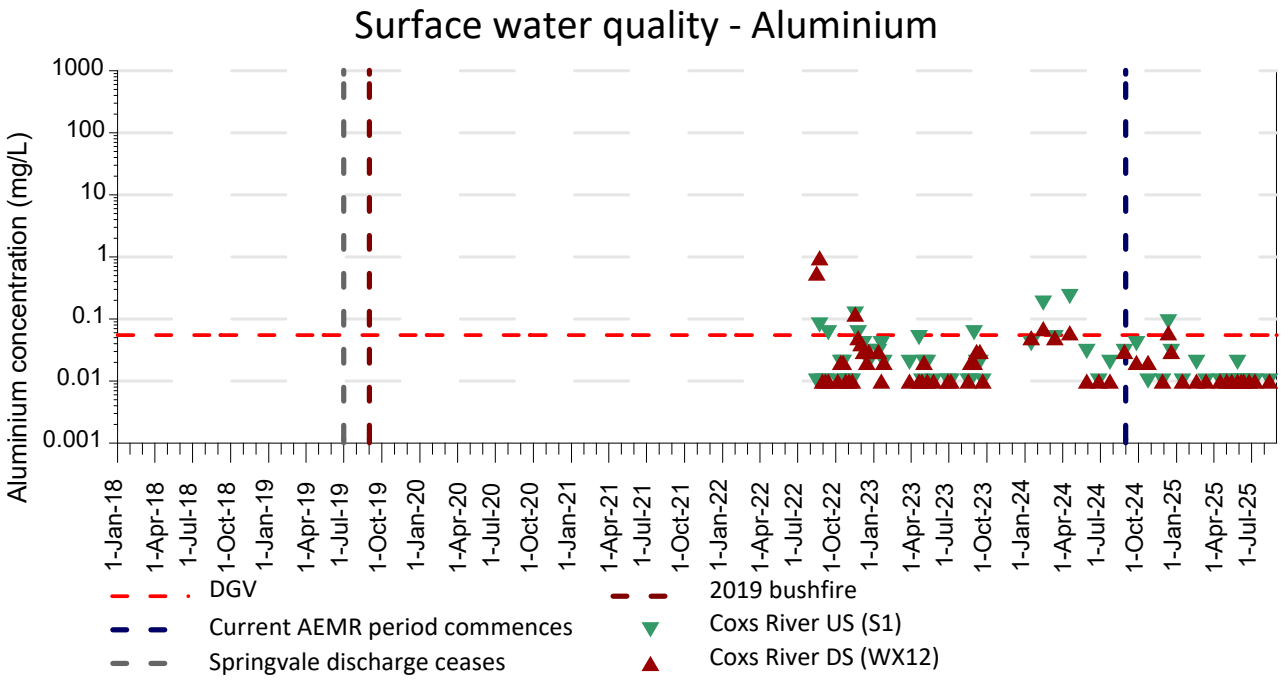


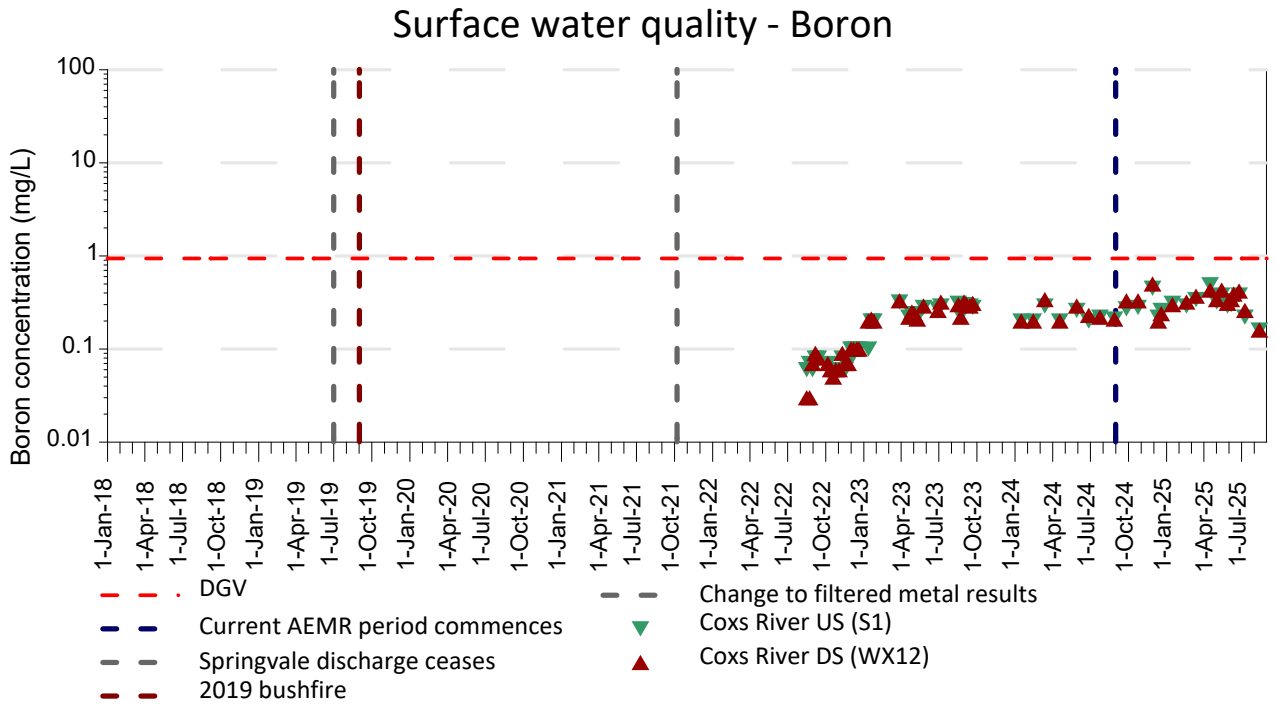


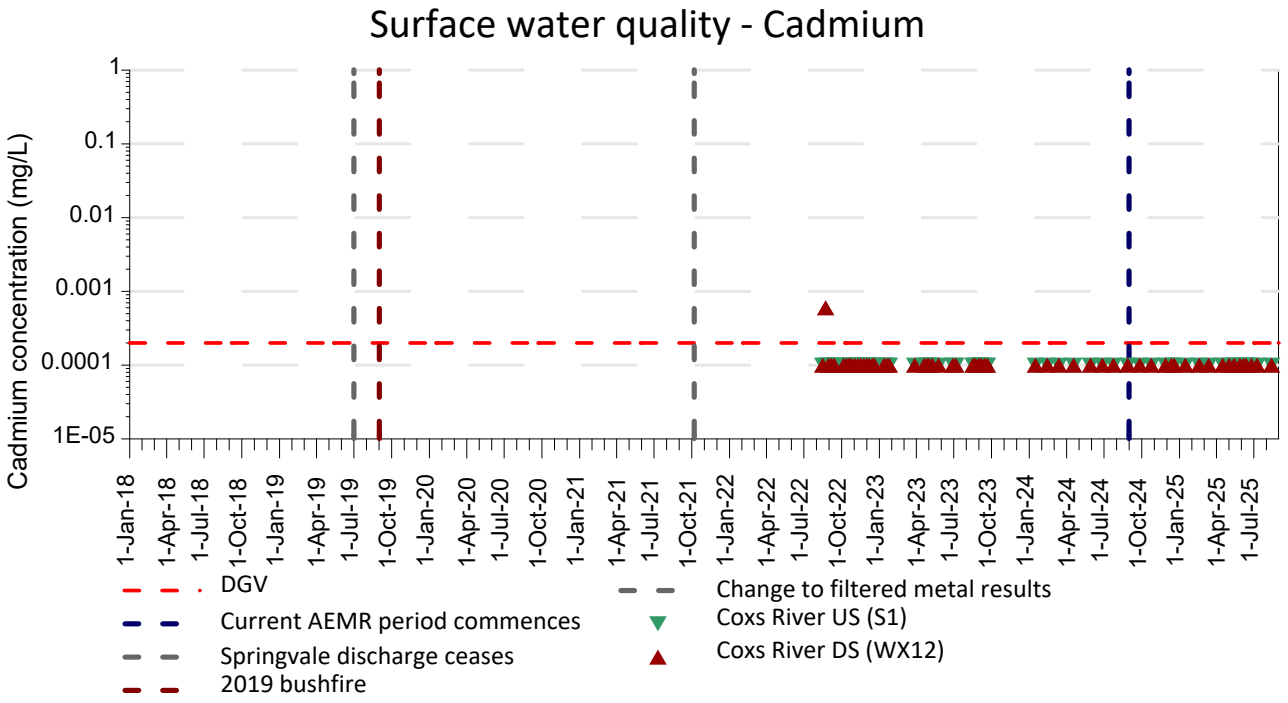
A.2.2 Metal charts

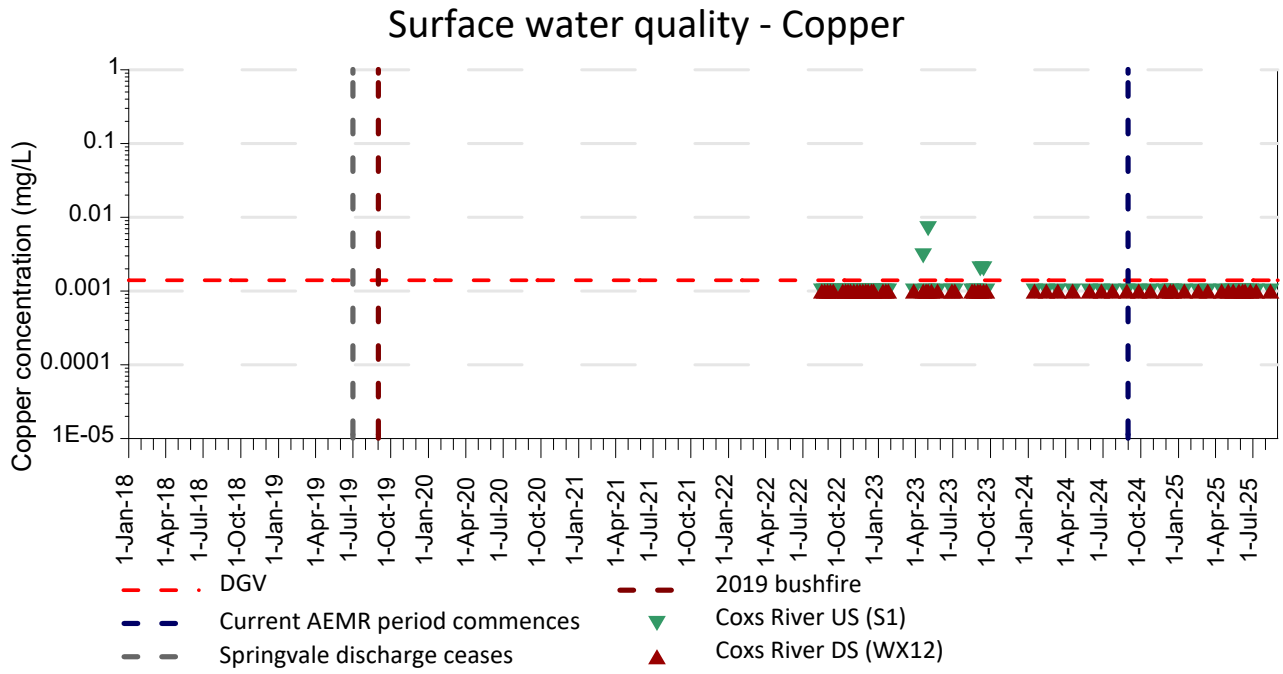




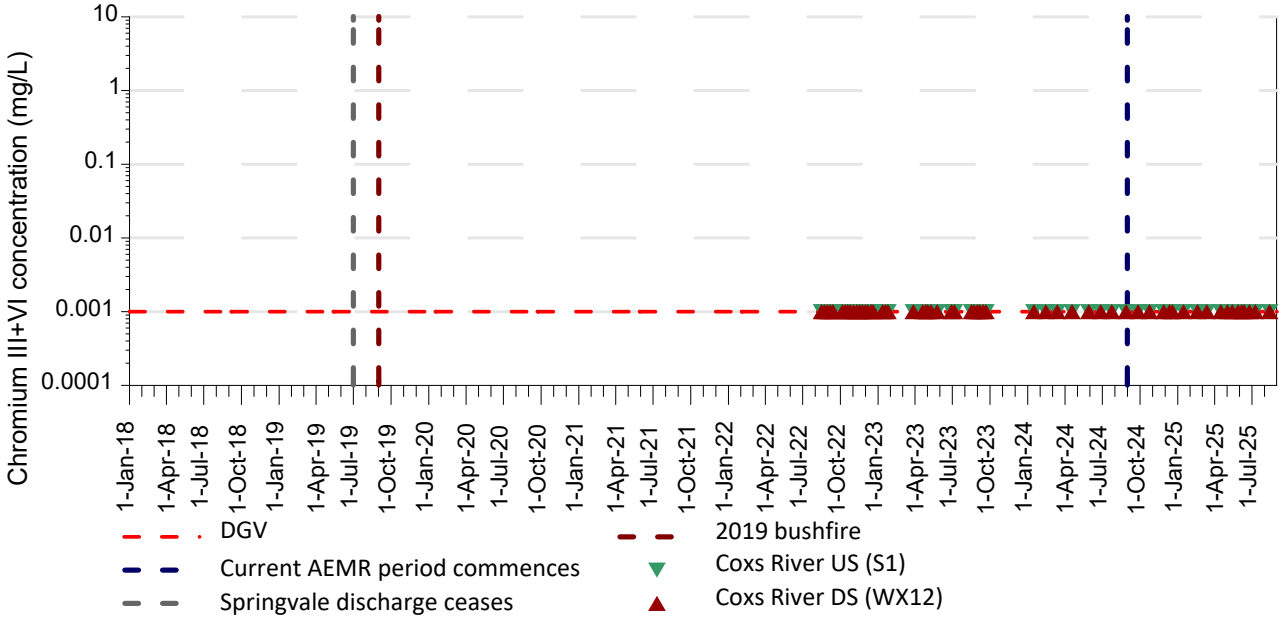

Surface water quality - Aluminium
Aluminium concentration (mg/L)
1000
100
10
1
0.1
0.01
0.001
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Coxs River US (S1)
Coxs River DS (WX12)


Surface water quality - Boron
Boron concentration (mg/L)
100
10
1
0.1
0.01
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Change to filtered metal results
Coxs River US (S1)
Coxs River DS (WX12)

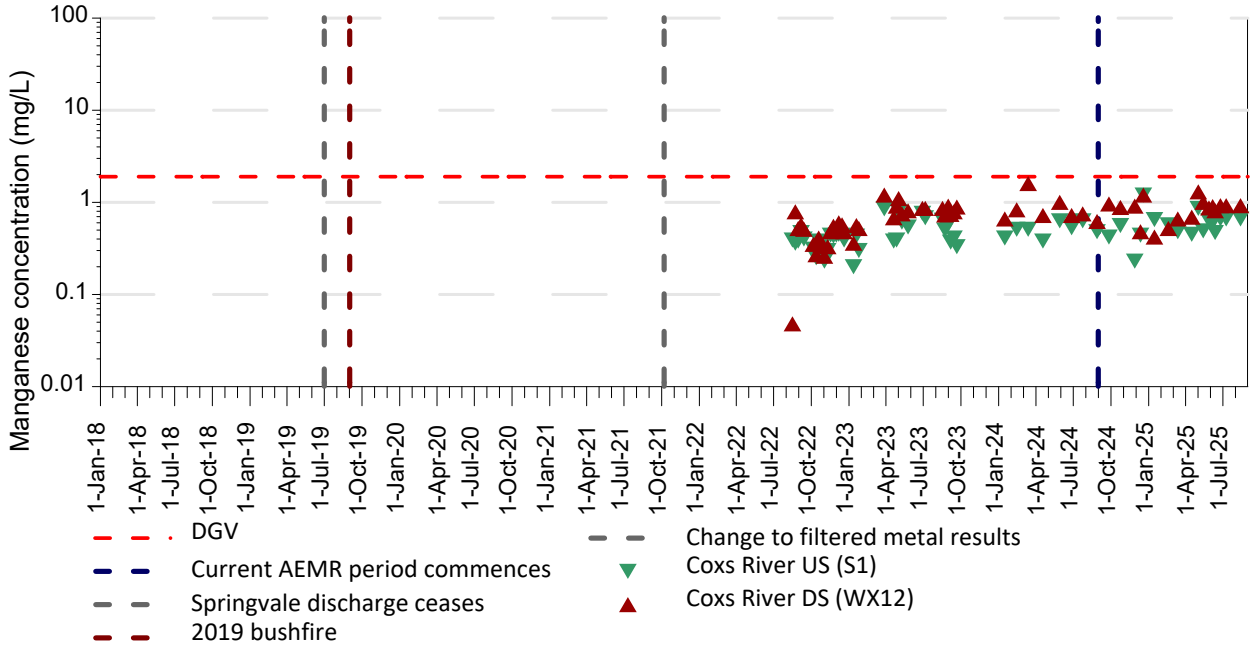

Surface water quality - Cadmium
Cadmium concentration (mg/L)
1
0.1
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Change to filtered metal results
Coxs River US (S1)
Coxs River DS (WX12)


Surface water quality - Copper
Copper concentration (mg/L)
1
0.1
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Coxs River US (S1)
Coxs River DS (WX12)

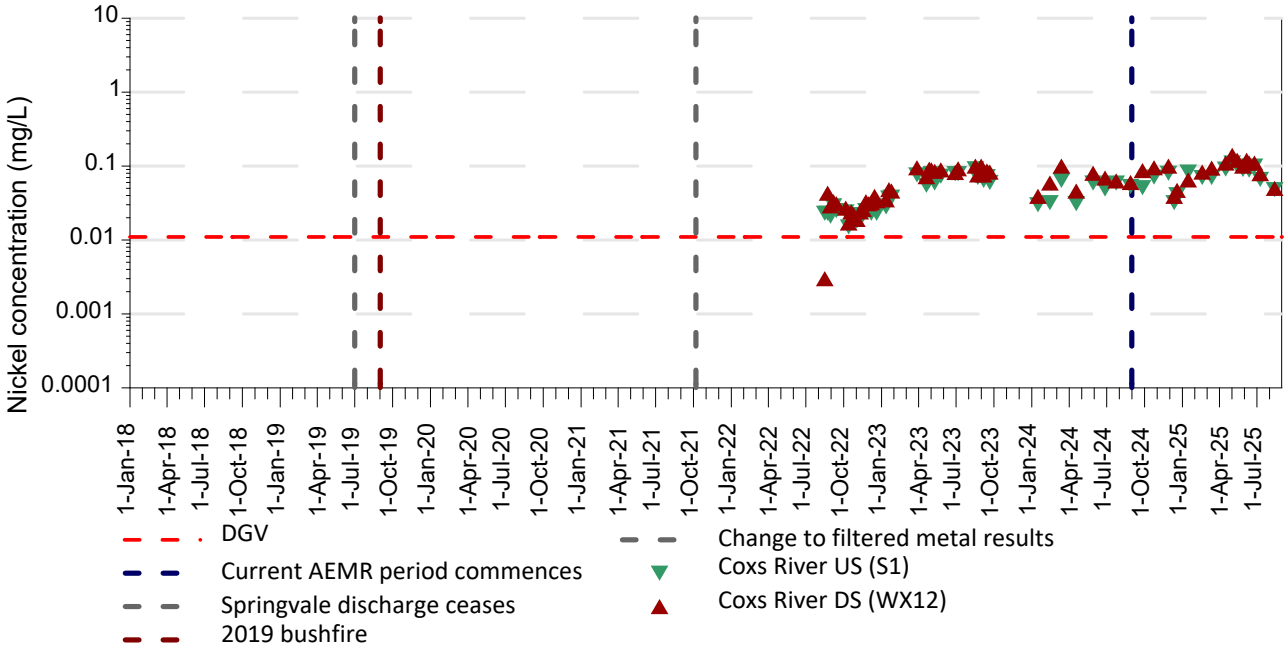
Surface water quality - Chromium



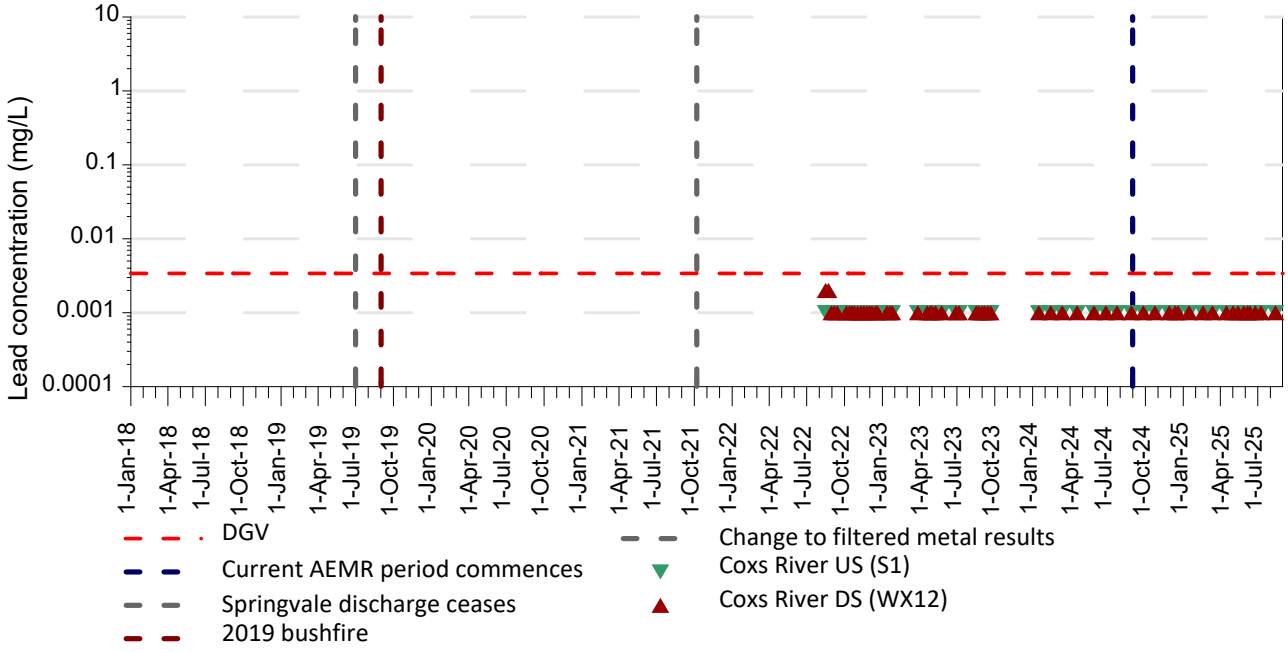
Surface water quality - Manganese

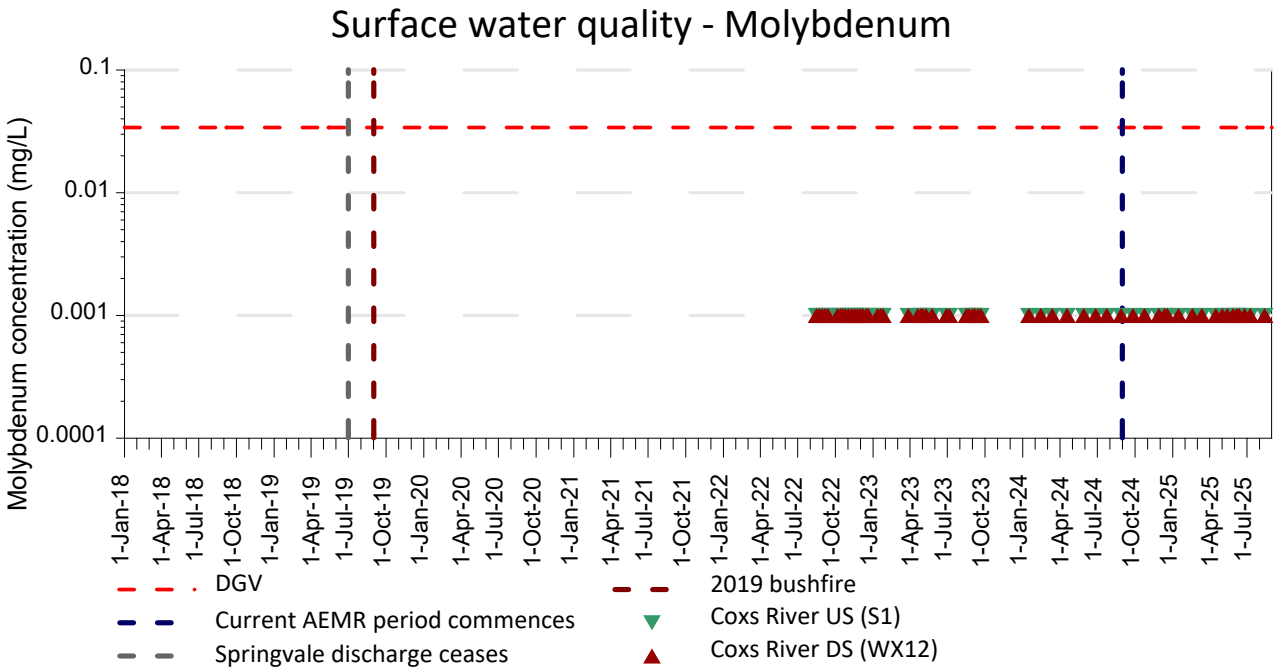


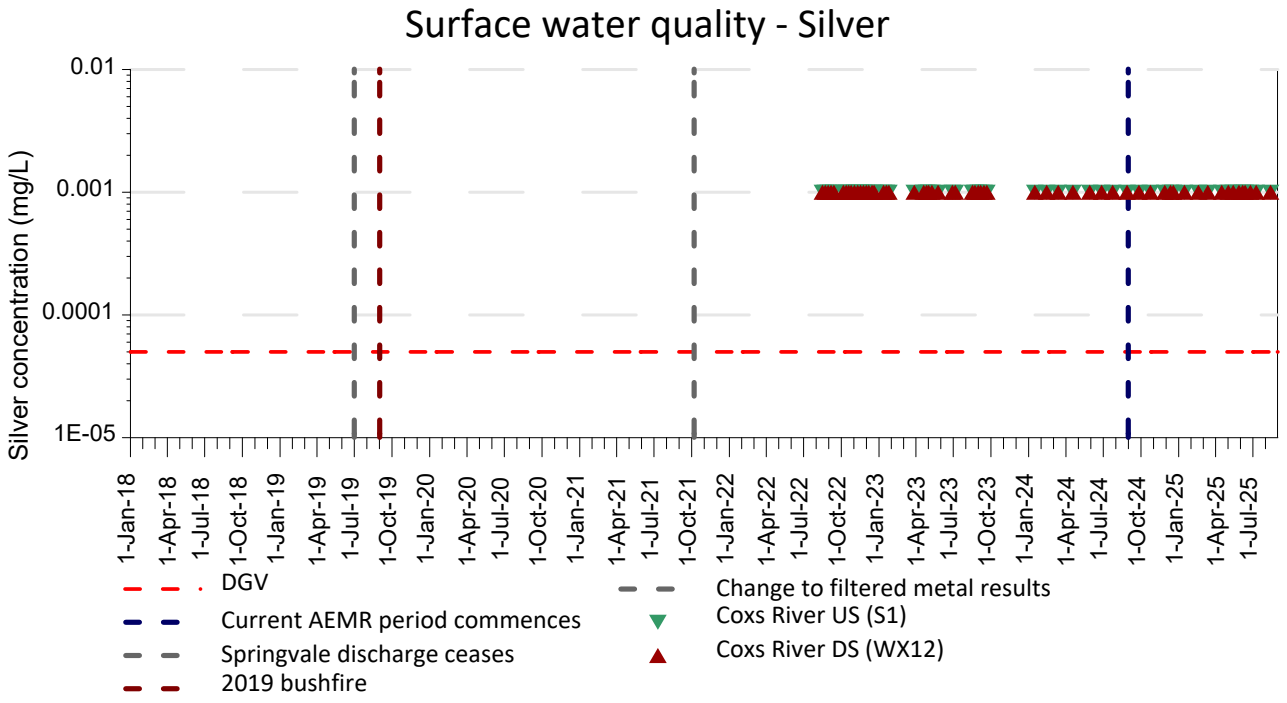
Surface water quality - Nickel

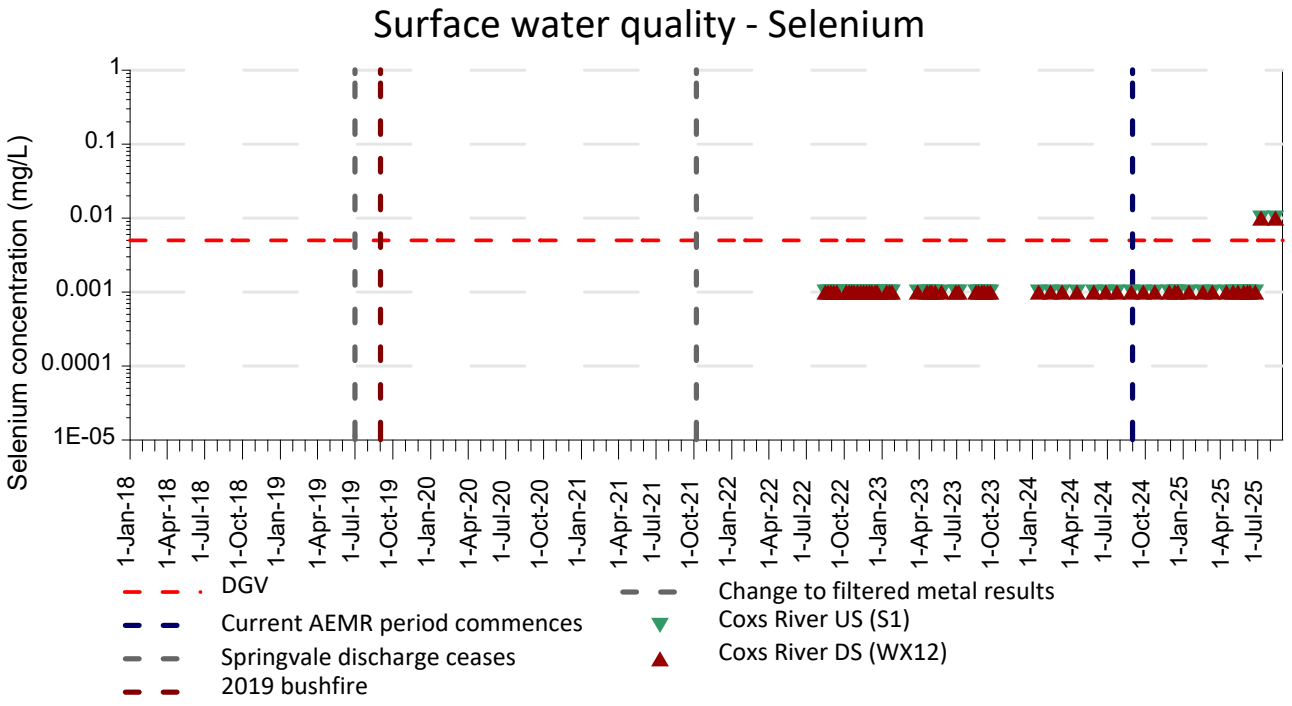


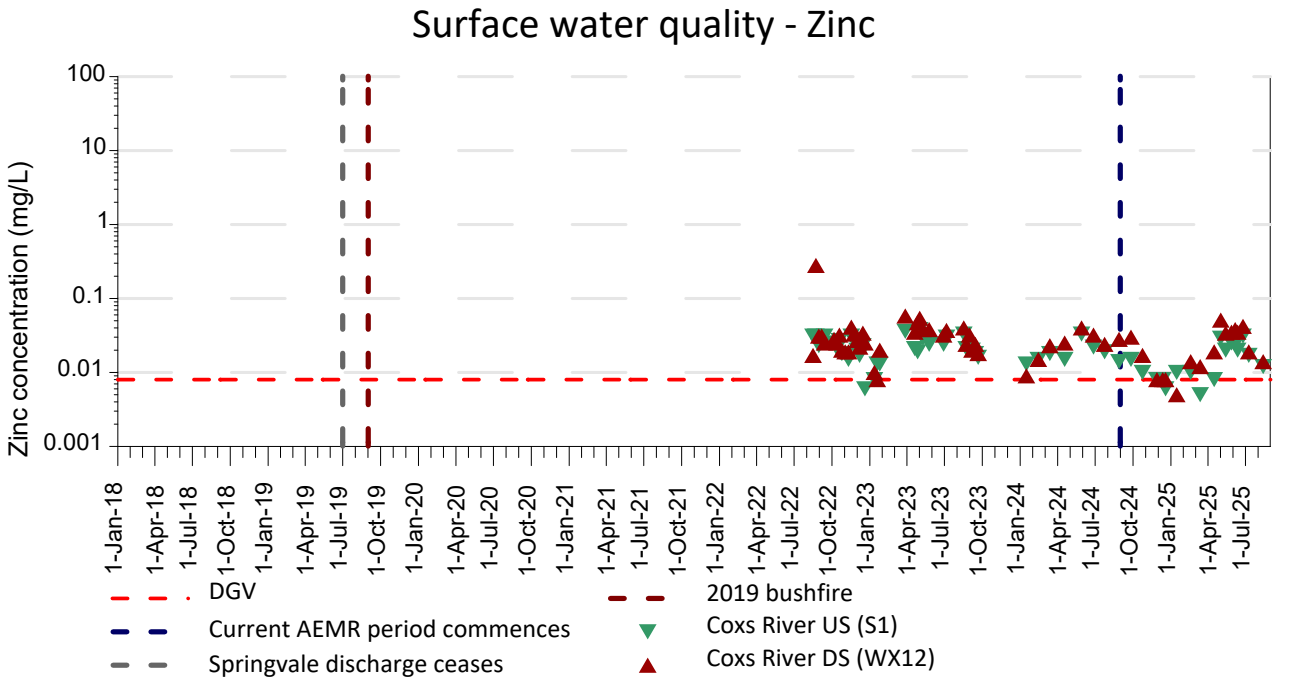
Surface water quality - Lead




Surface water quality - Molybdenum
Molybdenum concentration (mg/L)
0.1
0.01
0.001
0.0001
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Coxs River US (S1)
Coxs River DS (WX12)


Surface water quality - Silver
Silver concentration (mg/L)
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Change to filtered metal results
Coxs River US (S1)
Coxs River DS (WX12)


Surface water quality - Selenium
Selenium concentration (mg/L)
1
0.1
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Change to filtered metal results
Coxs River US (S1)
Coxs River DS (WX12)


Surface water quality - Zinc
Zinc concentration (mg/L)
100
10
1
0.1
0.01
0.001
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
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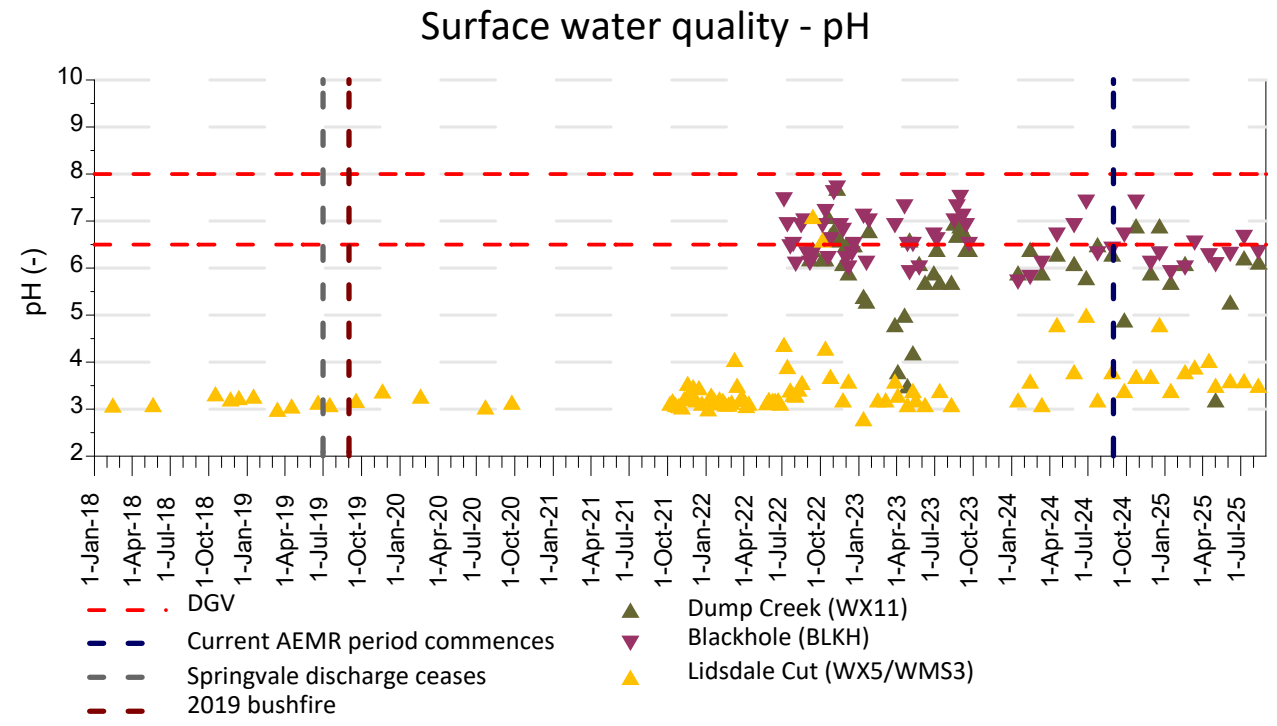
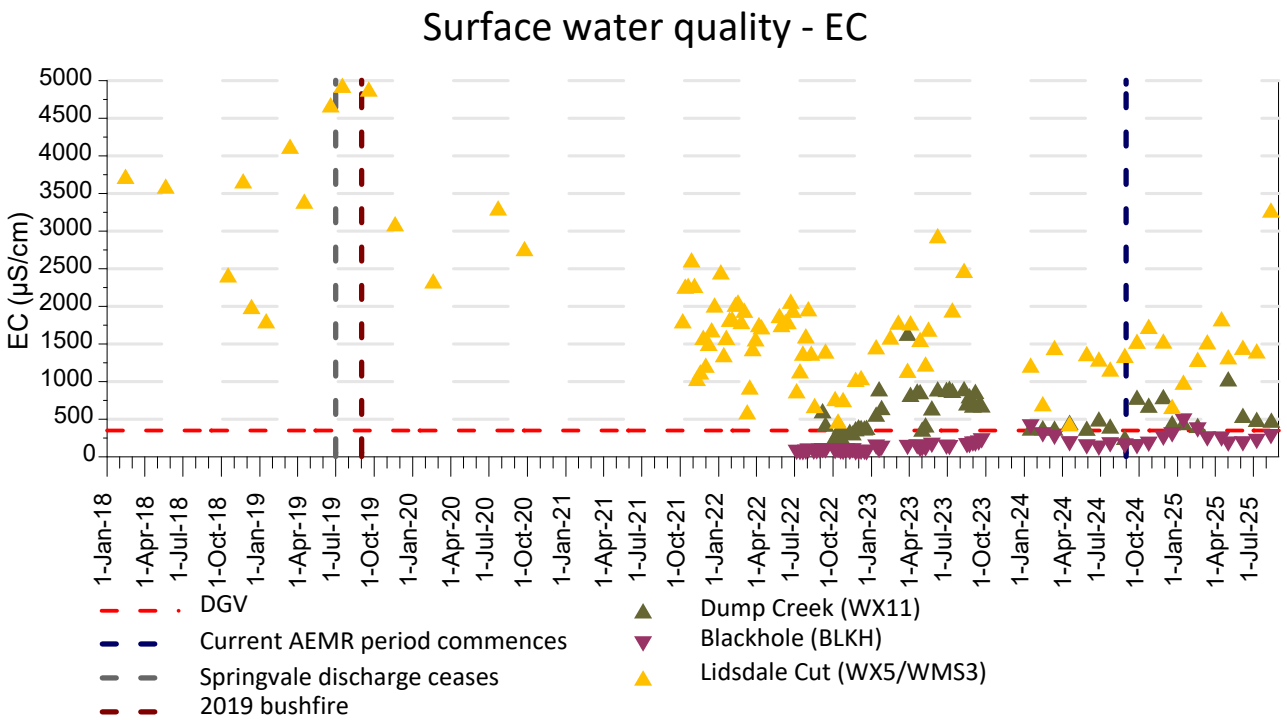
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Coxs River US (S1)
Coxs River DS (WX12)

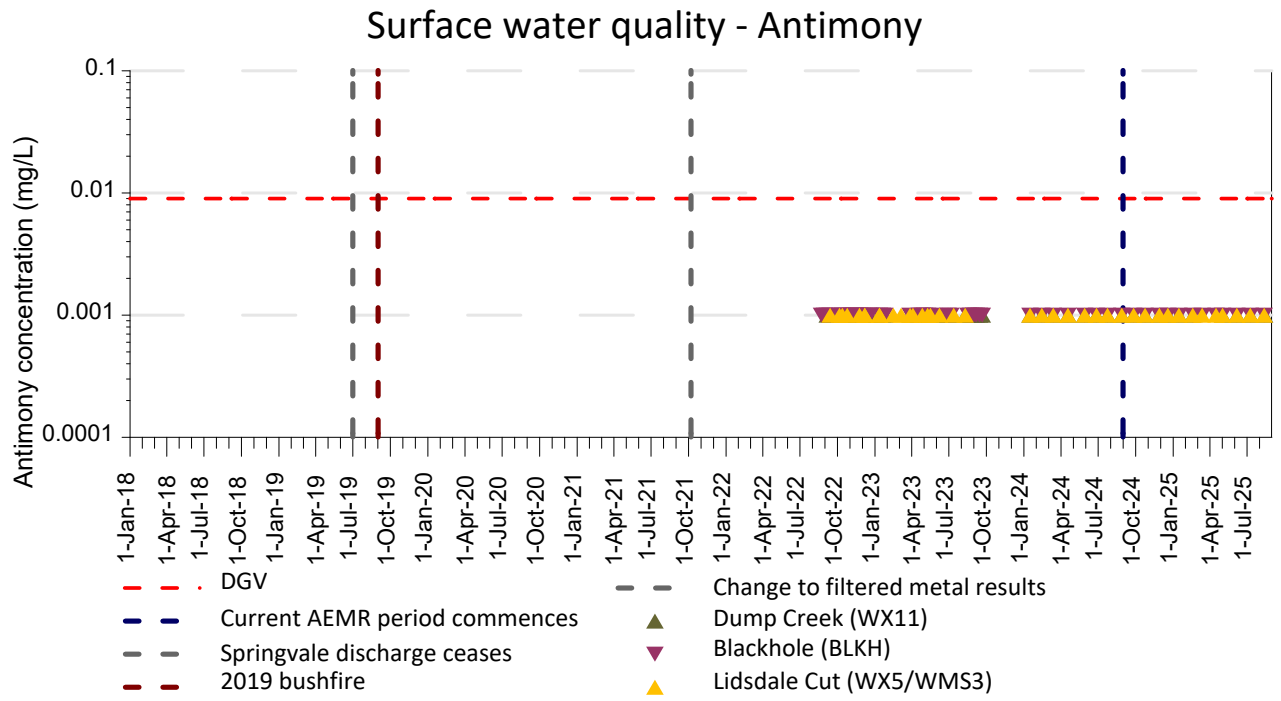
A.3 Water management systems

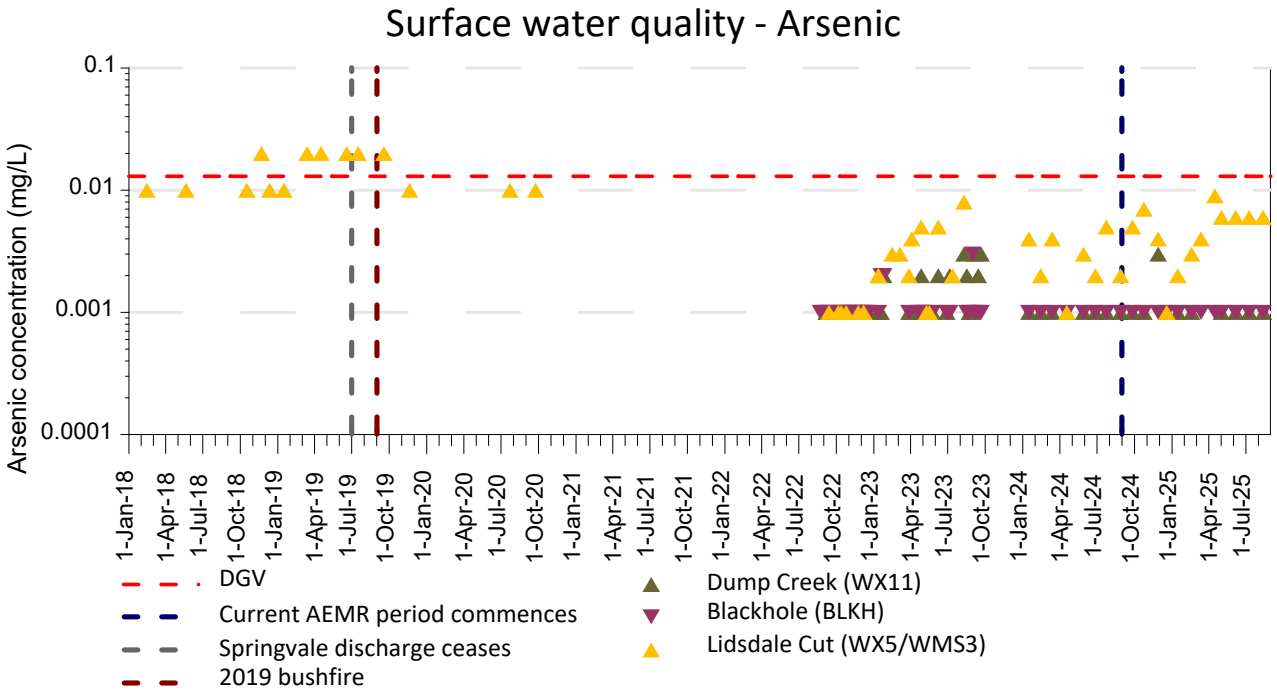
A.3.1 Physico-chemical parameters charts



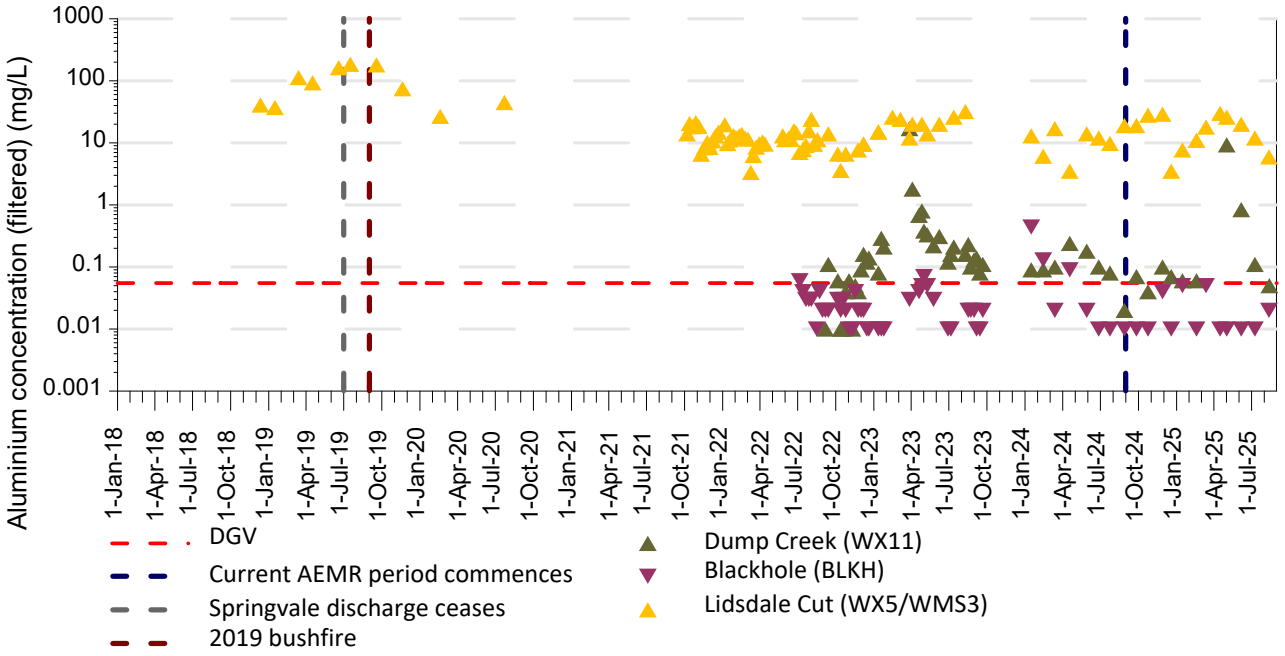


A.3.2 Metals charts

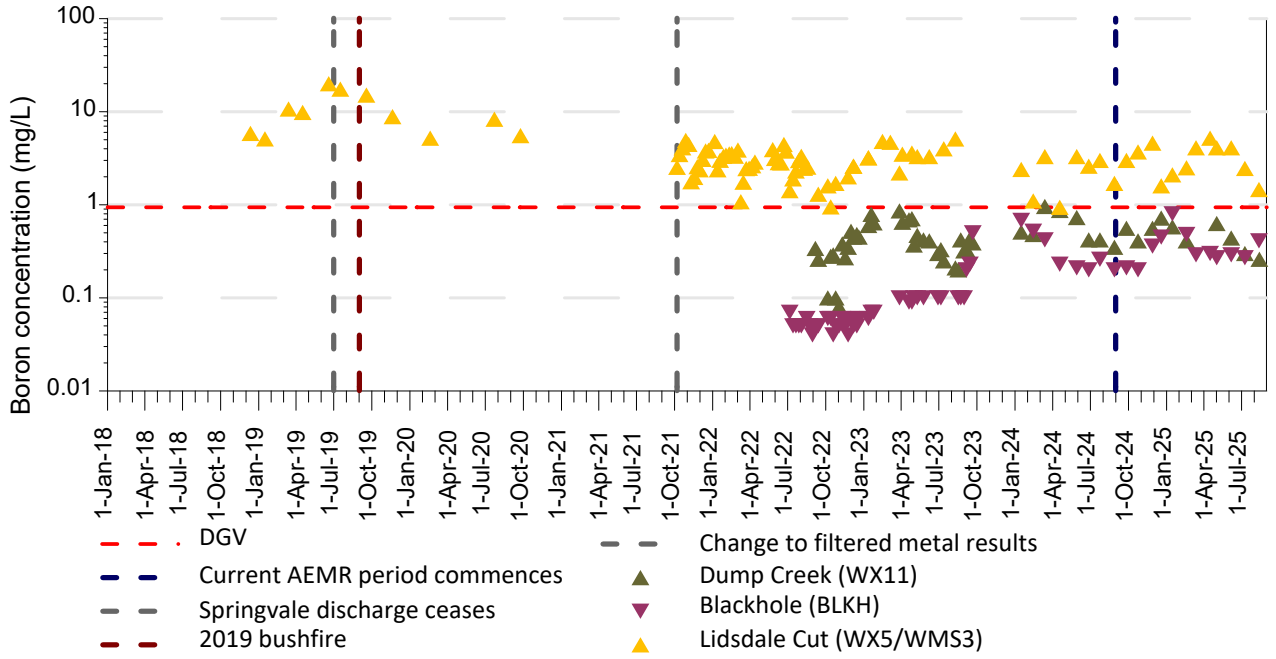


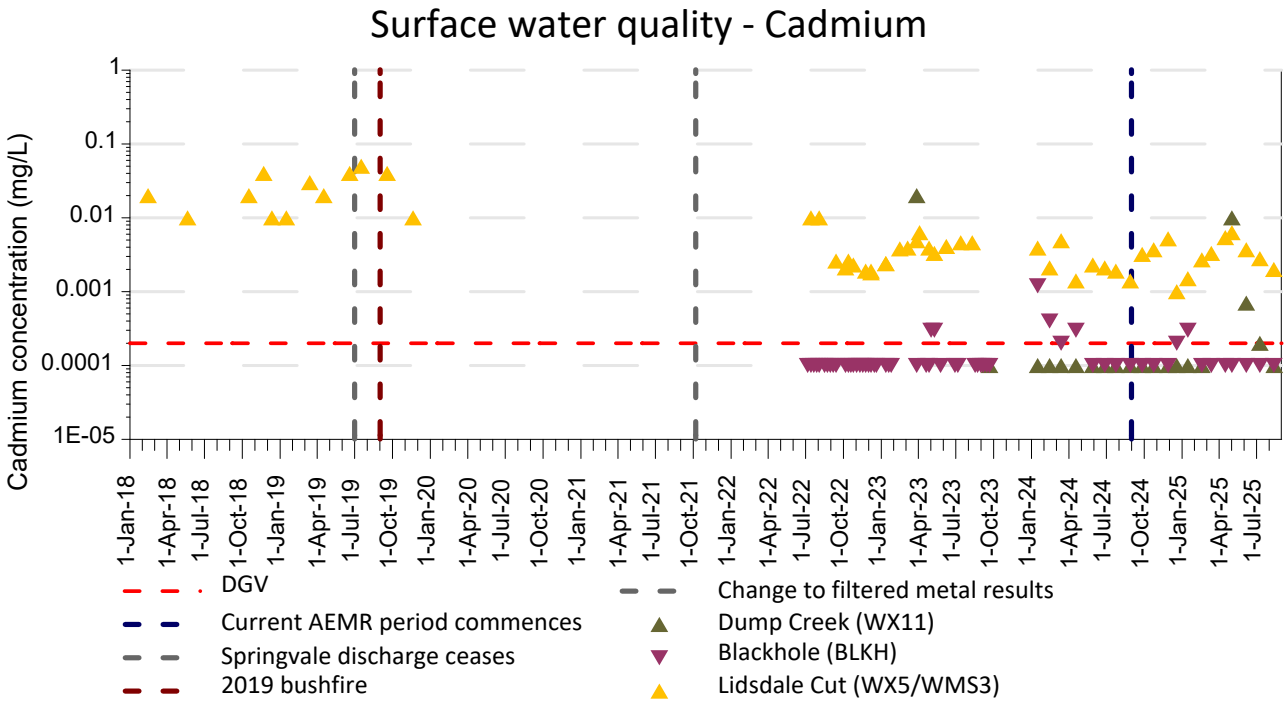


Surface water quality - Aluminium



Surface water quality - Boron




Surface water quality - Cadmium
Cadmium concentration (mg/L)
1
0.1
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
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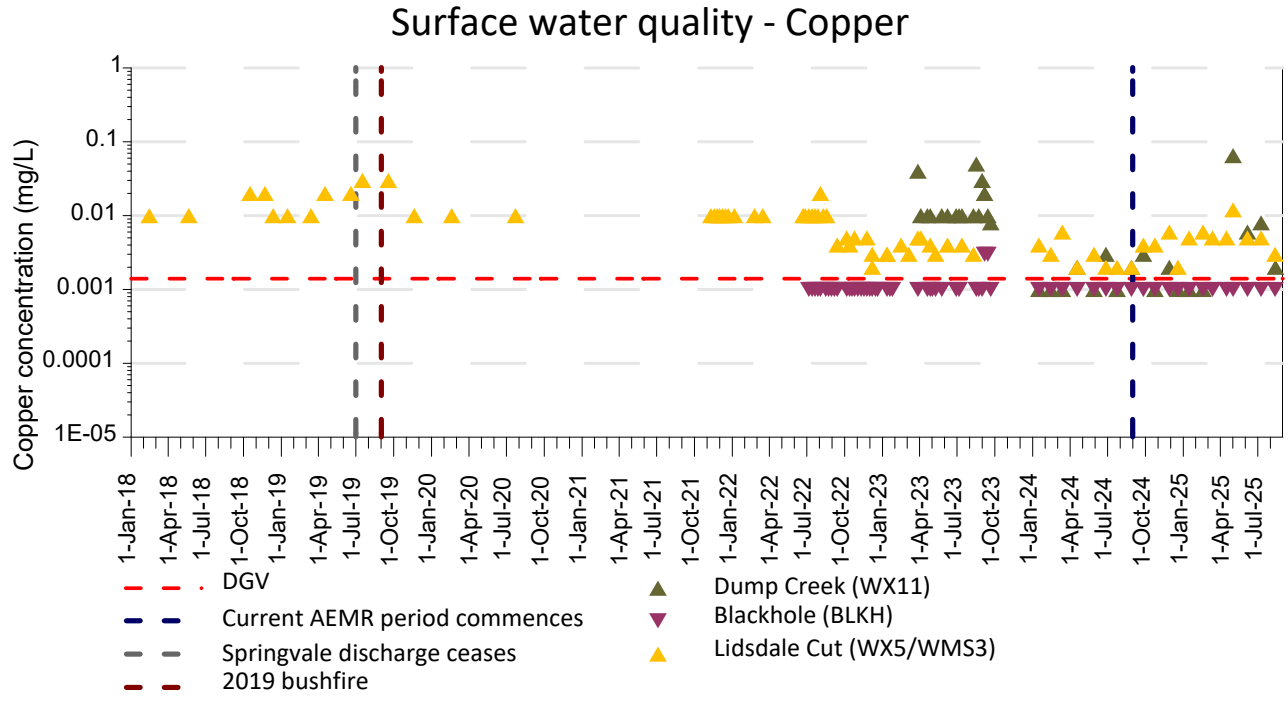
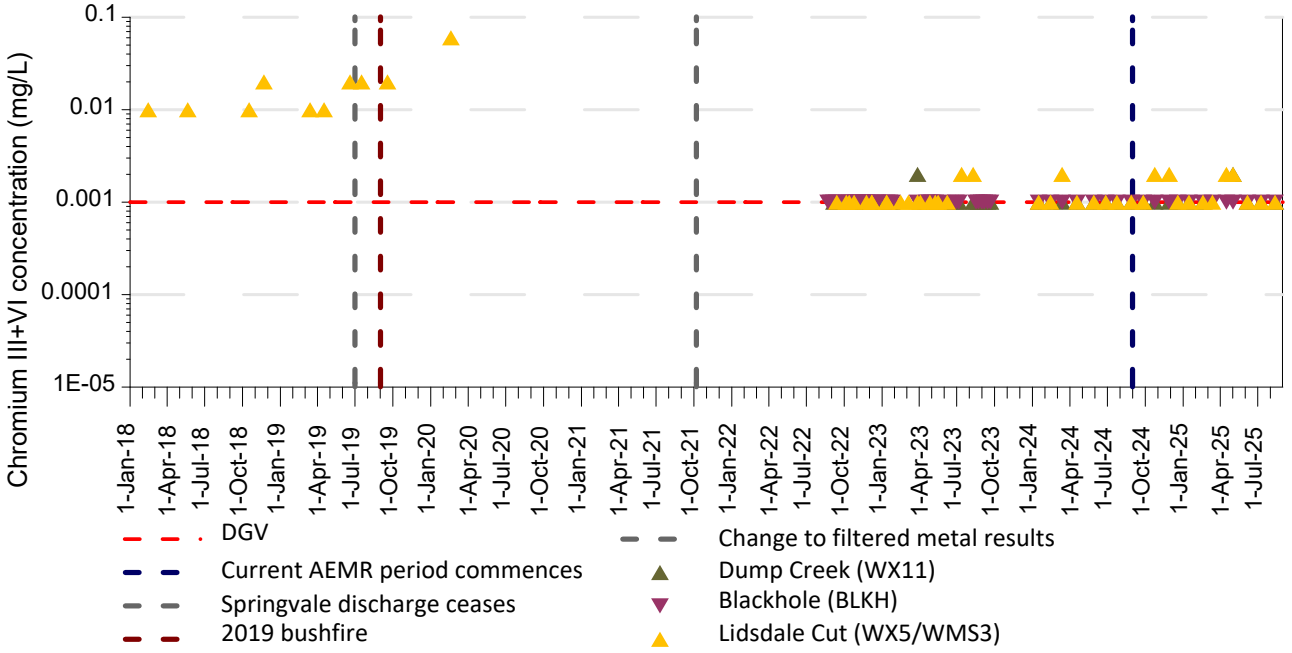
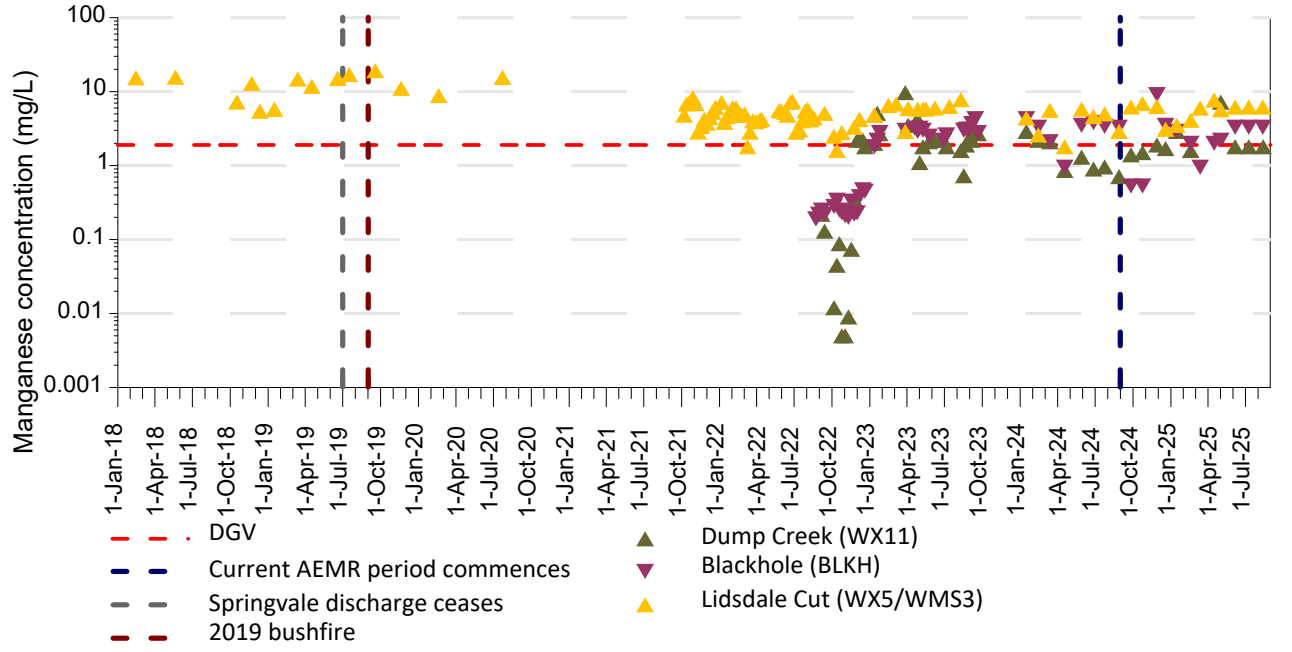
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Change to filtered metal results
Dump Creek (WX11)
Blackhole (BLKH)
Lidsdale Cut (WX5/WMS3)


Surface water quality - Copper
Copper concentration (mg/L)
1
0.1
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Dump Creek (WX11)
Blackhole (BLKH)
Lidsdale Cut (WX5/WMS3)

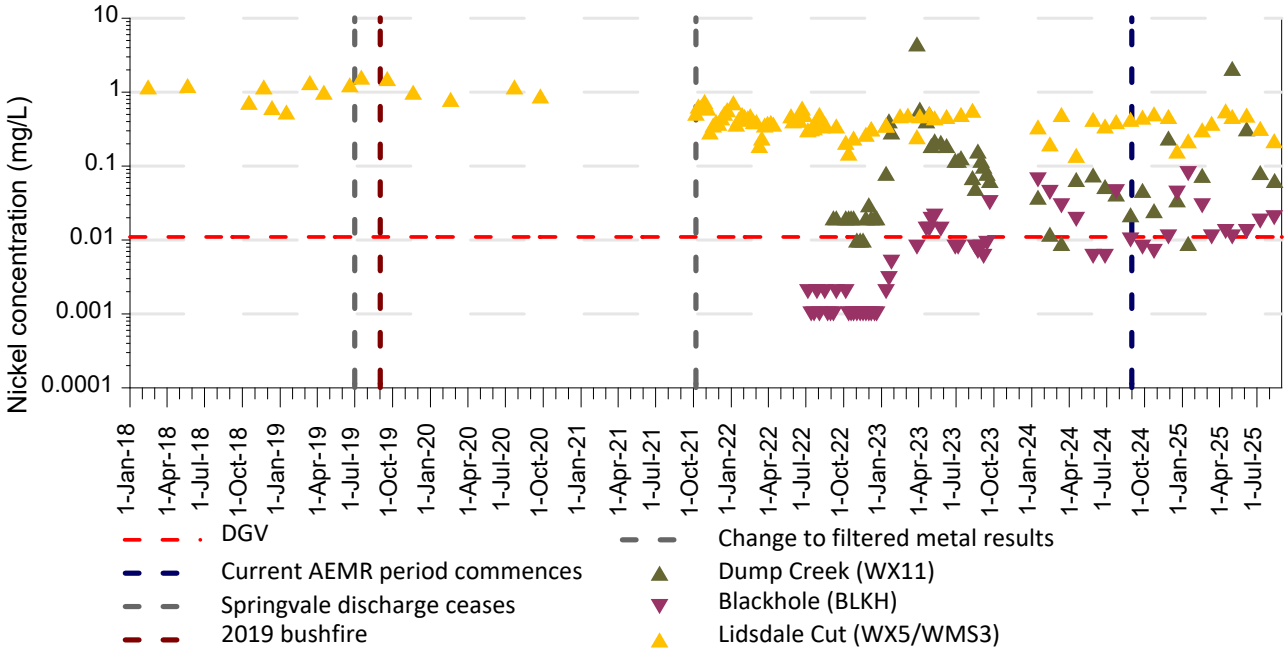
Surface water quality - Chromium



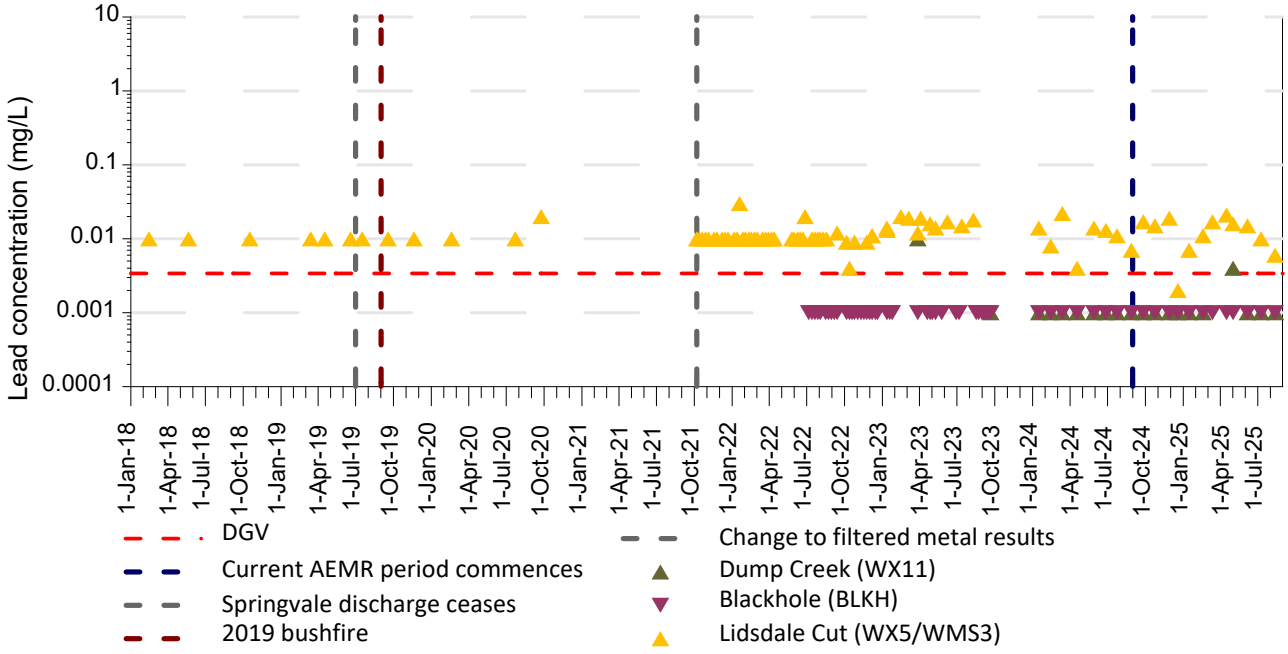
Surface water quality - Manganese

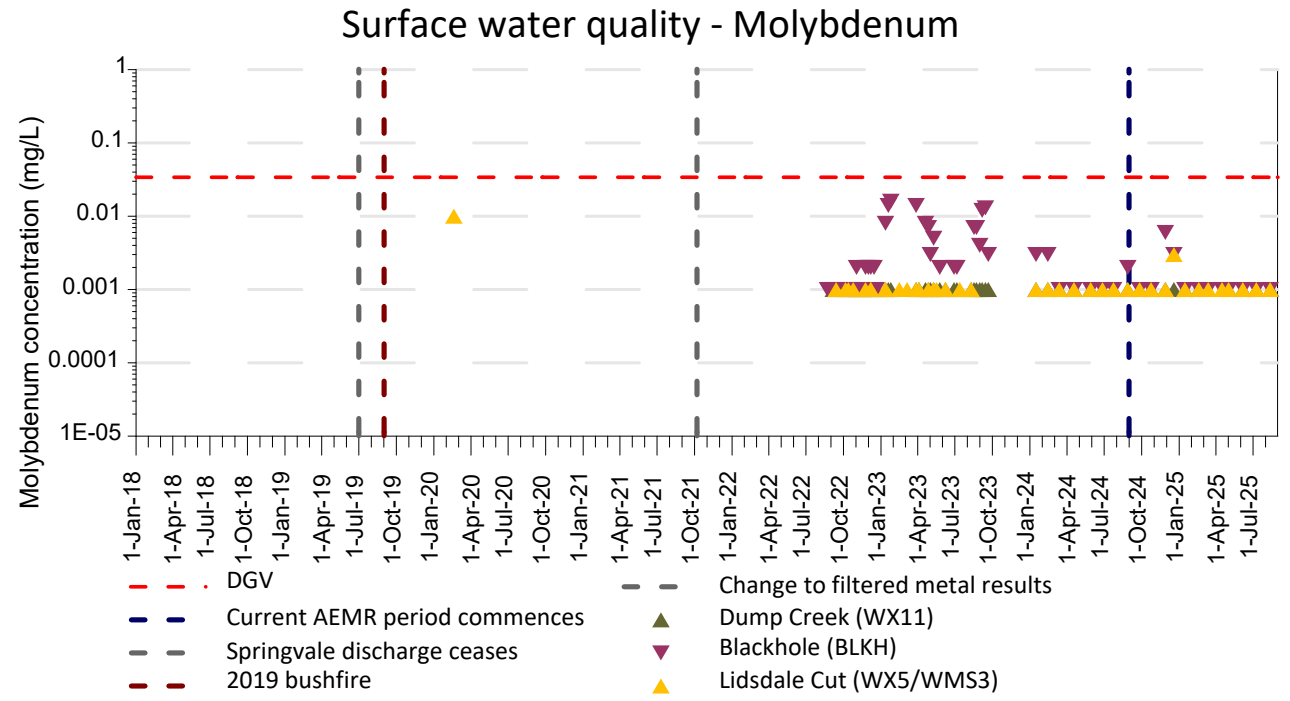


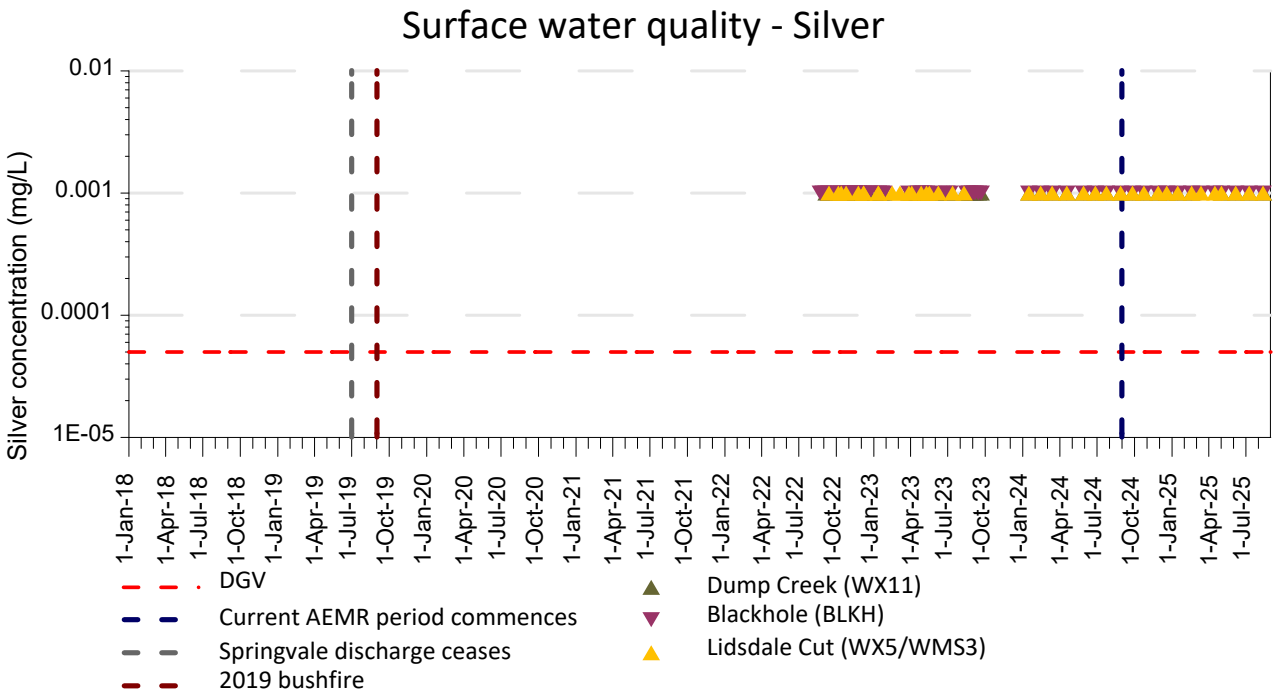
Surface water quality - Nickel

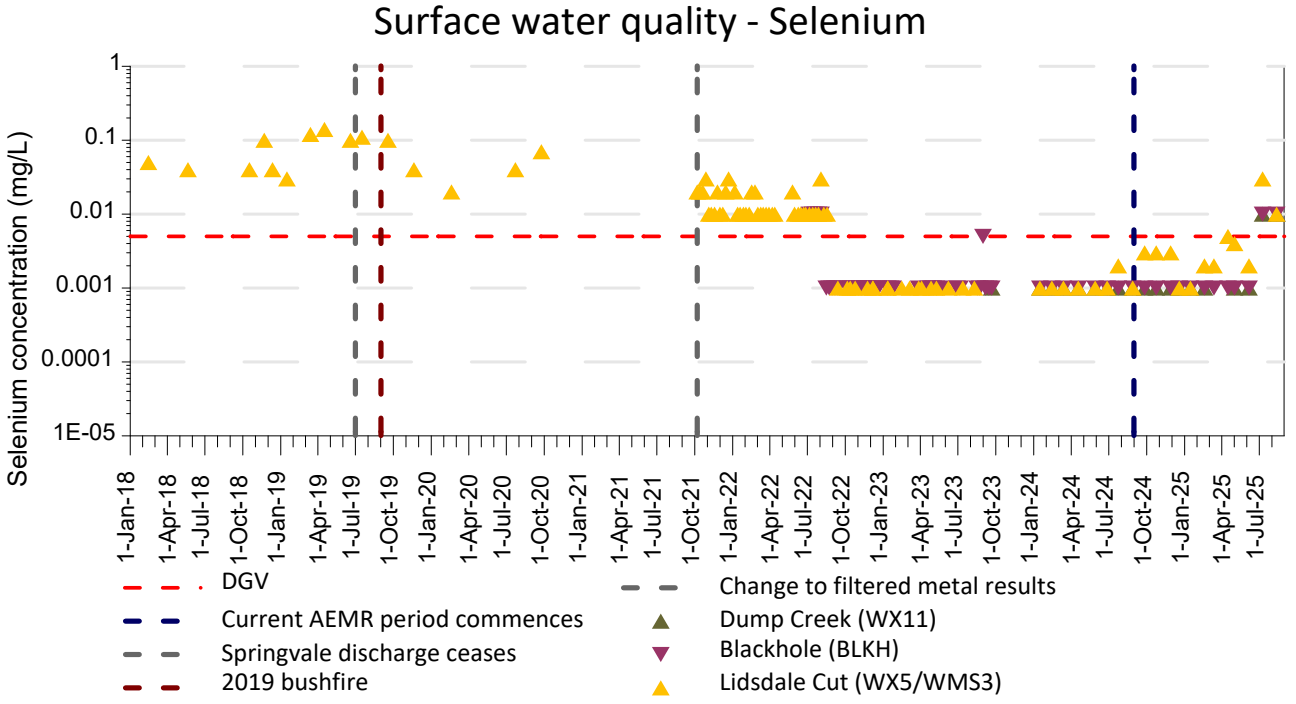


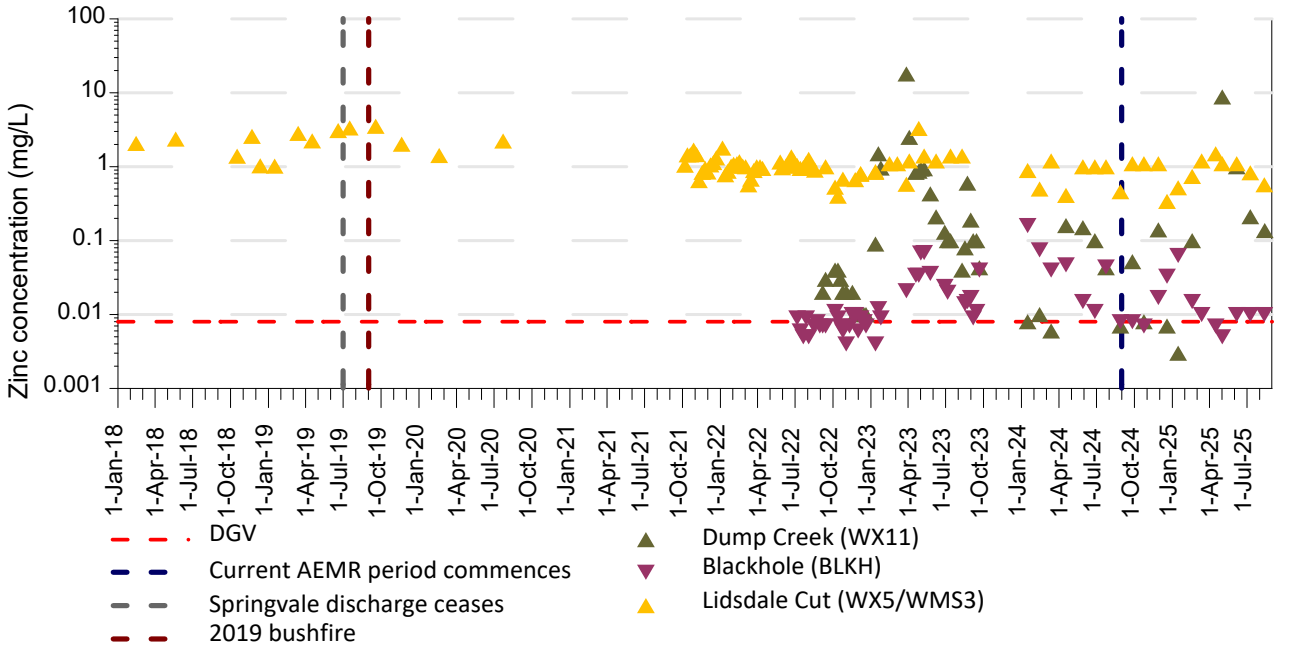
Surface water quality - Lead




Surface water quality - Molybdenum
Molybdenum concentration (mg/L)
1
0.1
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Change to filtered metal results
Dump Creek (WX11)
Blackhole (BLKH)
Lidsdale Cut (WX5/WMS3)


Surface water quality - Silver
Silver concentration (mg/L)
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Dump Creek (WX11)
Blackhole (BLKH)
Lidsdale Cut (WX5/WMS3)


Surface water quality - Selenium
Selenium concentration (mg/L)
1
0.1
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Change to filtered metal results
Dump Creek (WX11)
Blackhole (BLKH)
Lidsdale Cut (WX5/WMS3)


Surface water quality - Zinc
Zinc concentration (mg/L)
100
10
1
0.1
0.01
0.001
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Dump Creek (WX11)
Blackhole (BLKH)
Lidsdale Cut (WX5/WMS3)

Appendix B
Groundwater quality charts

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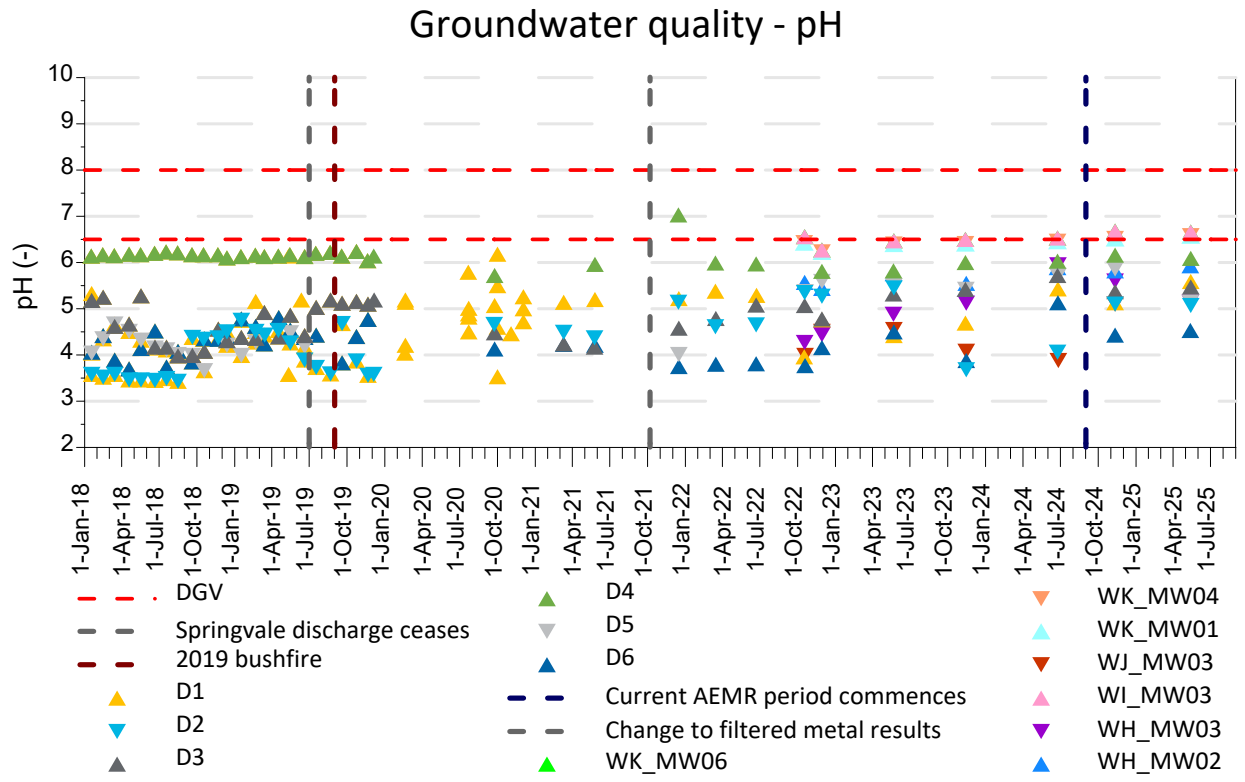
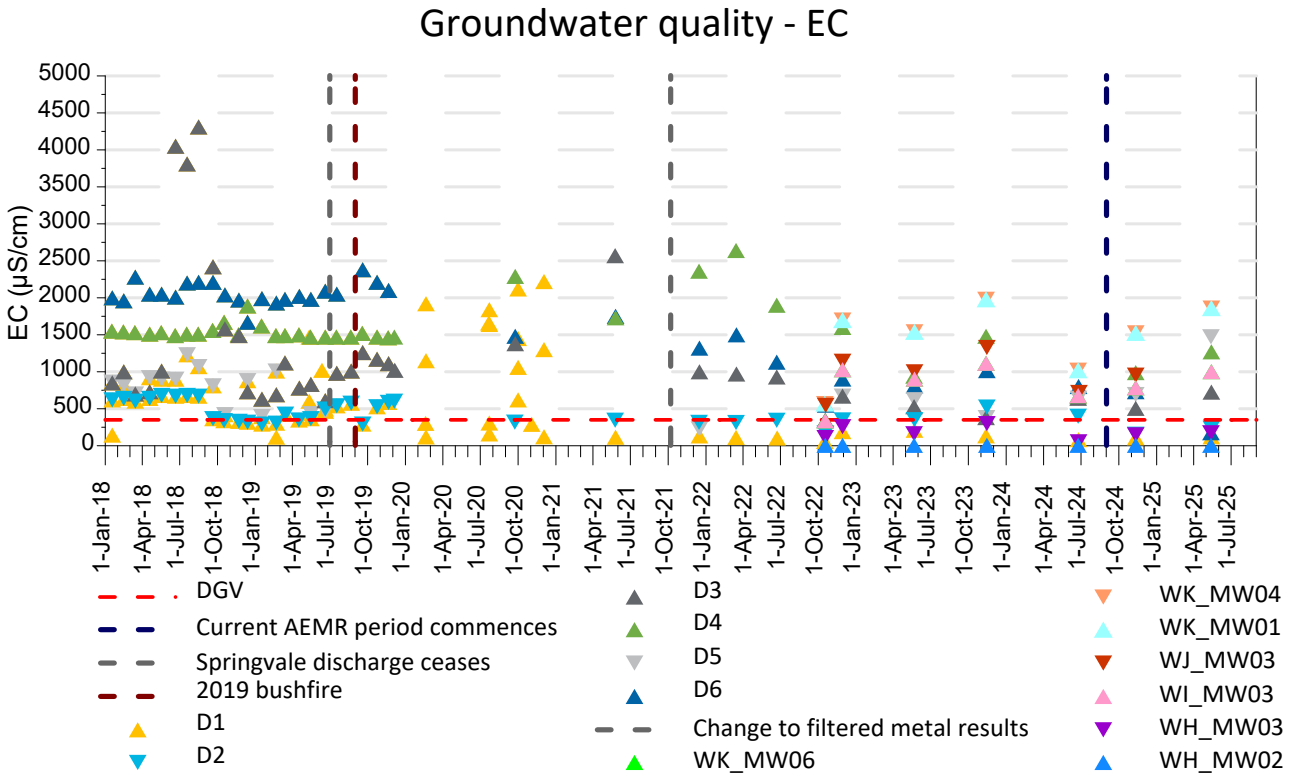
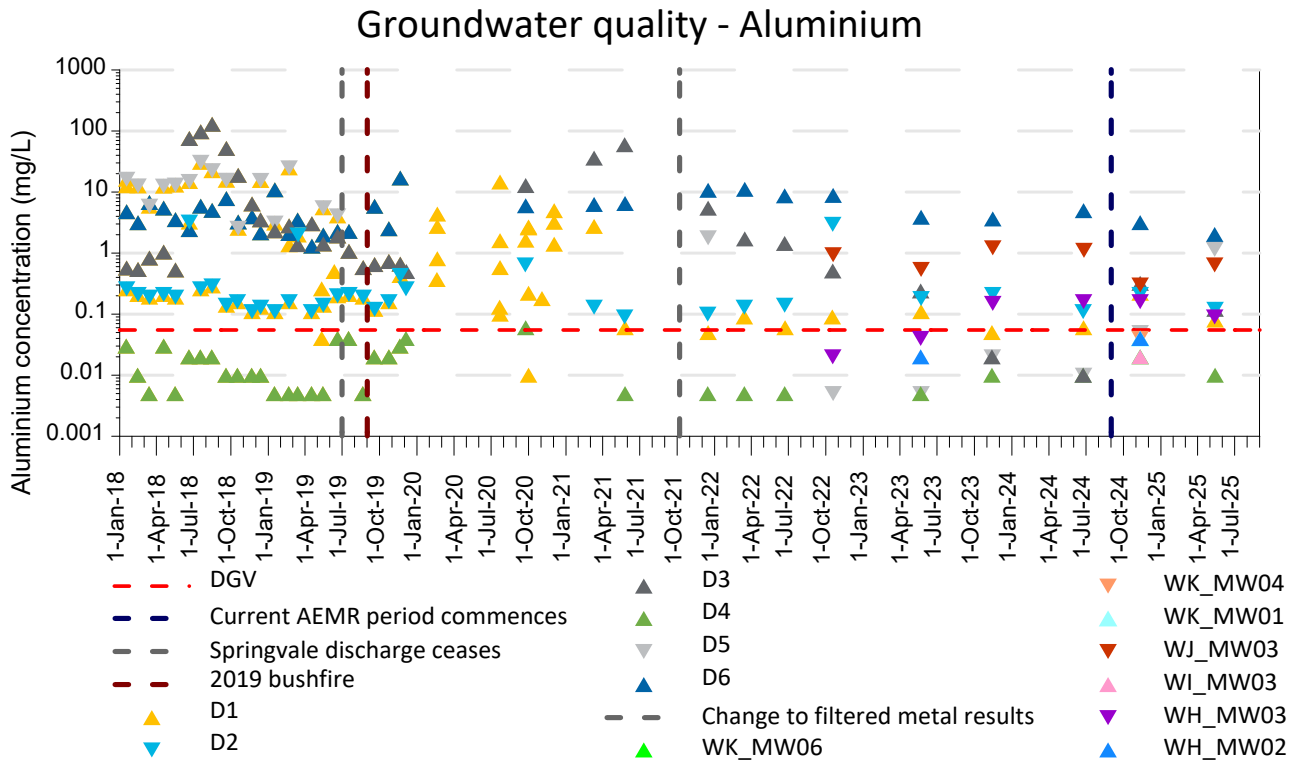
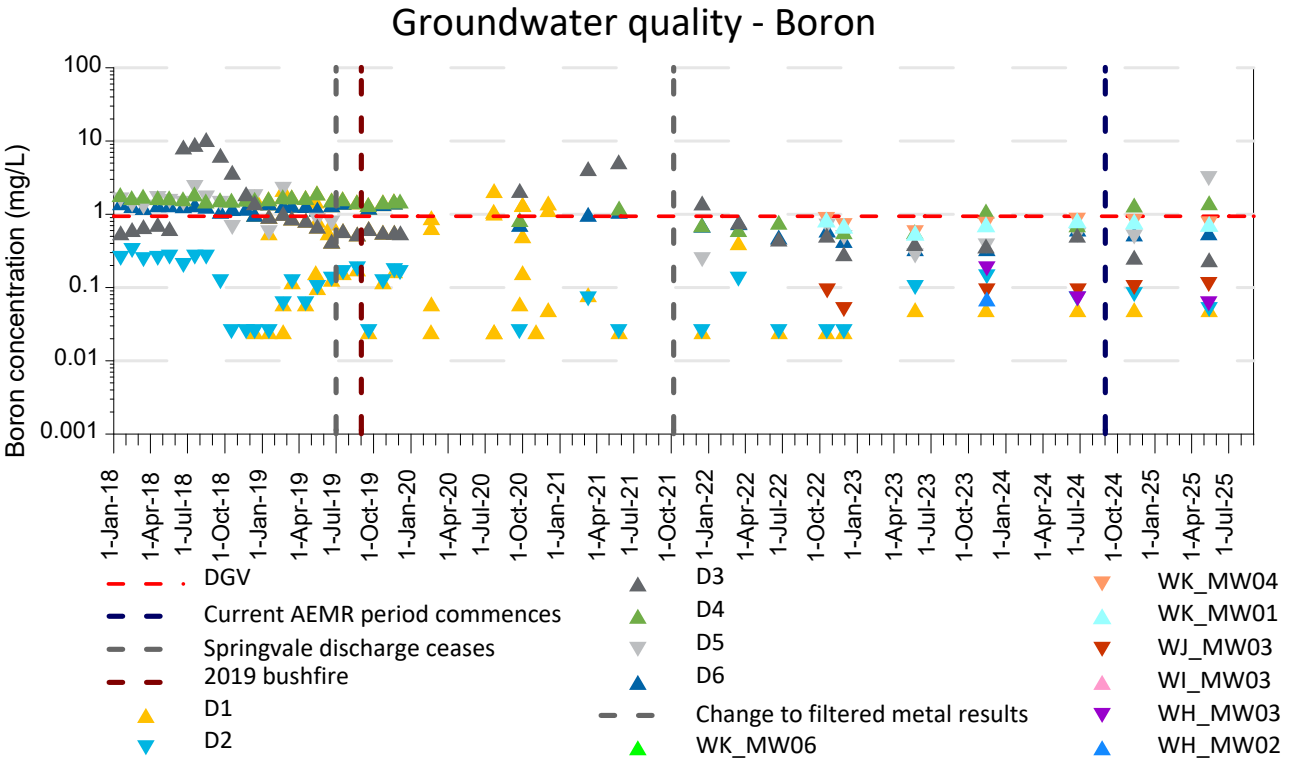
B.1 Physico-chemical parameter chart

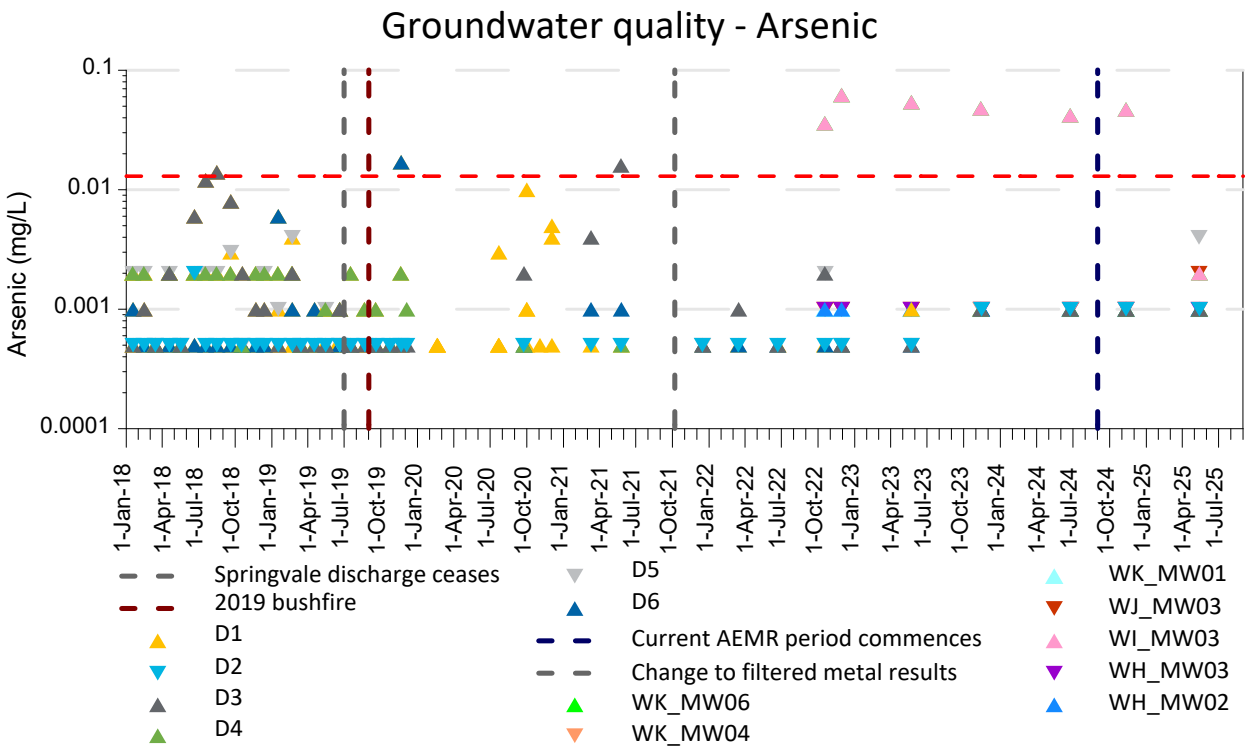


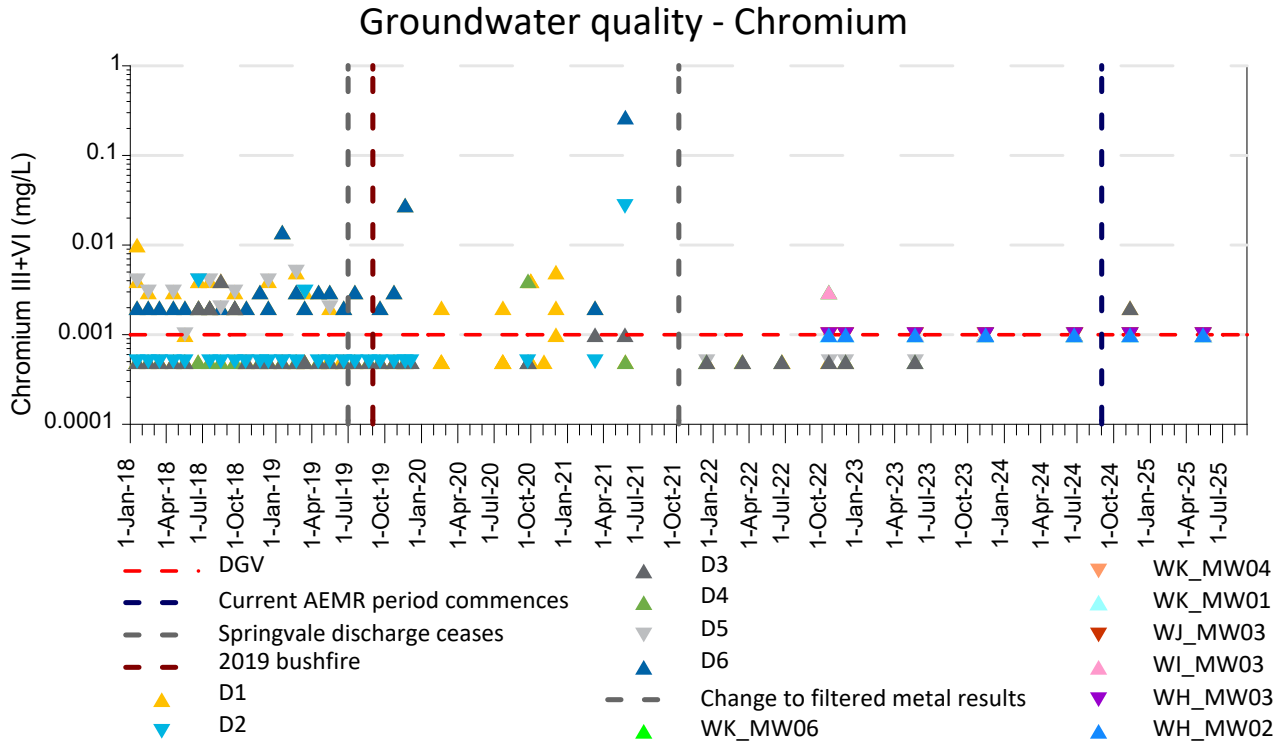


B.2 Metals charts

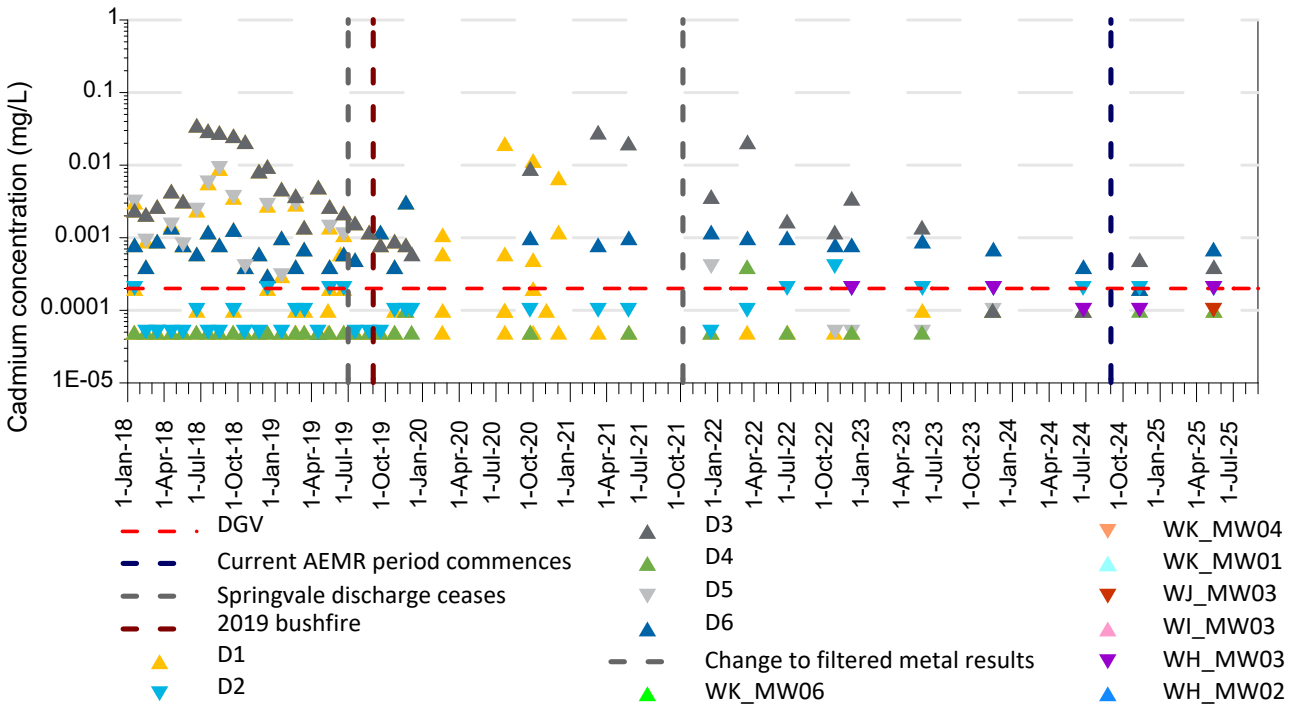




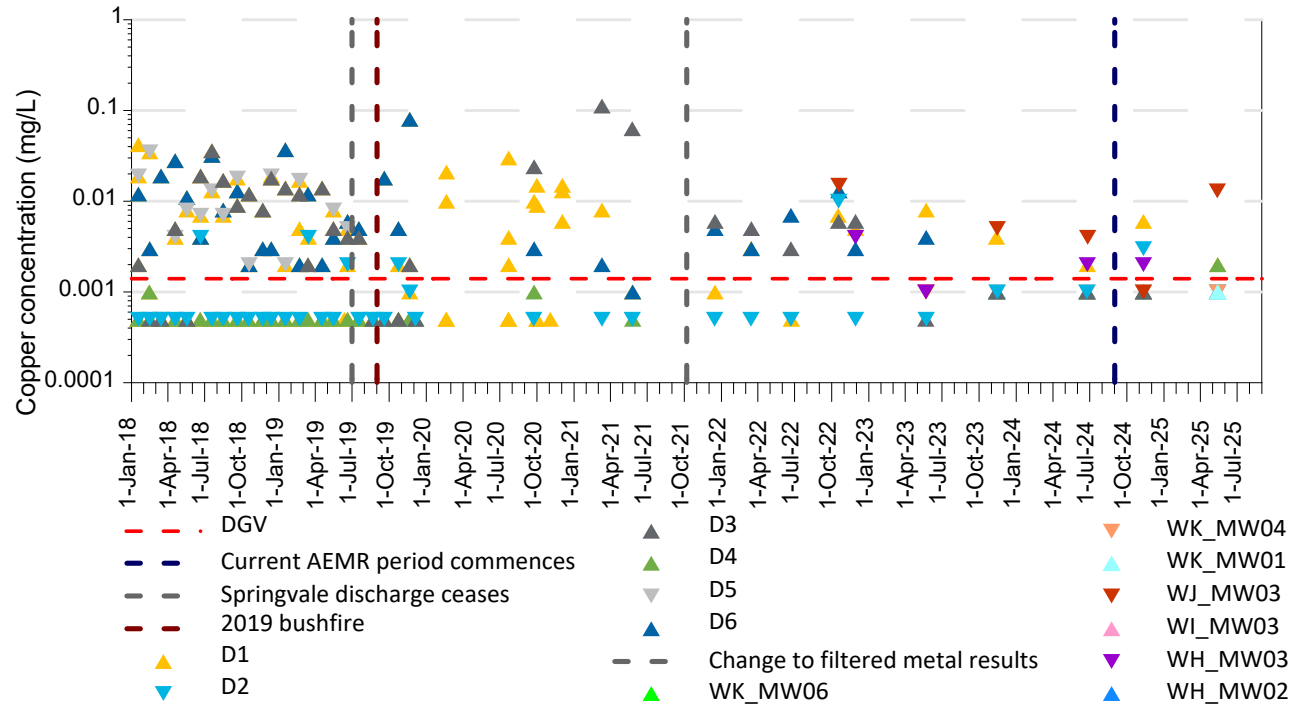

Groundwater quality - Arsenic
Arsenic (mg/L)
0.1
0.01
0.001
0.0001
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Current AEMR period commences
Change to filtered metal results
WK_MW06
WK_MW04
WK_MW01
WJ_MW03
WI_MW03
WH_MW03
WH_MW02

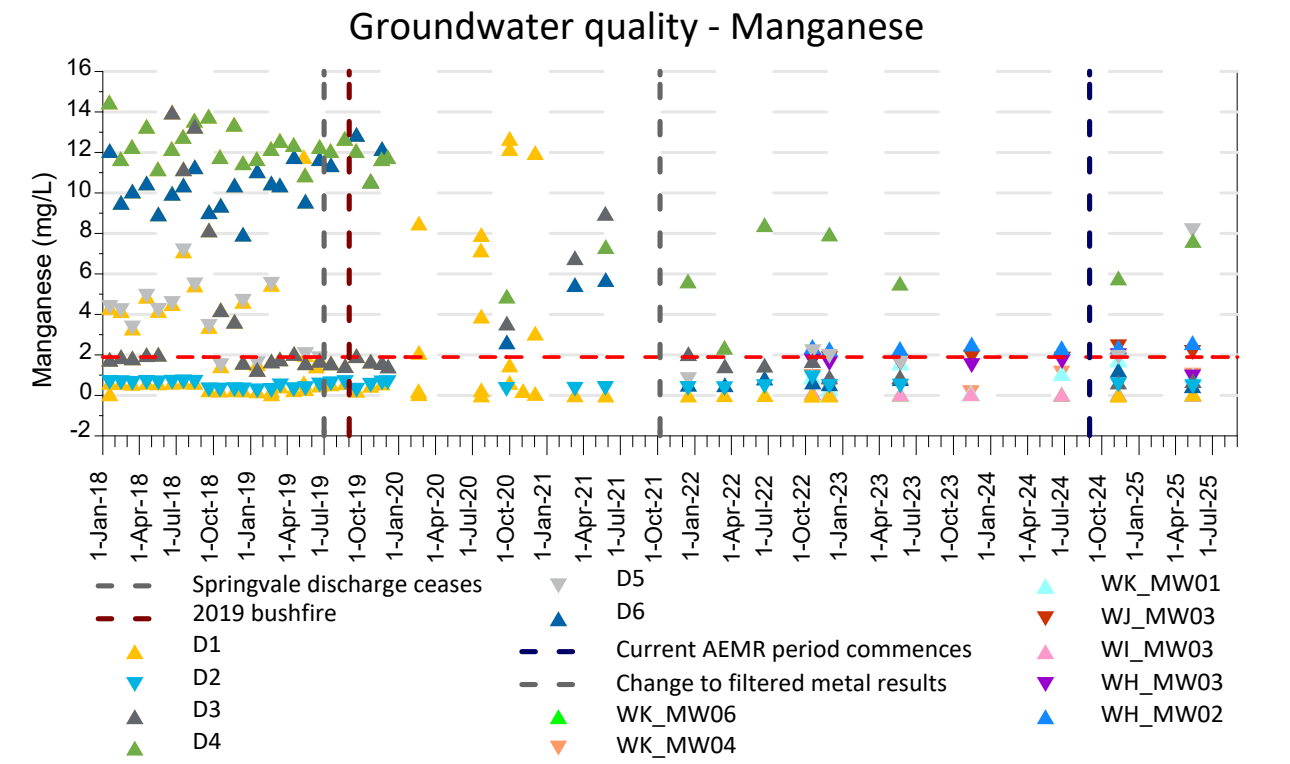

Groundwater quality - Chromium
Chromium III+VI (mg/L)
1
0.1
0.01
0.001
0.0001
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Change to filtered metal results
WK_MW06
WK_MW04
WK_MW01
WJ_MW03
WI_MW03
WH_MW03
WH_MW02

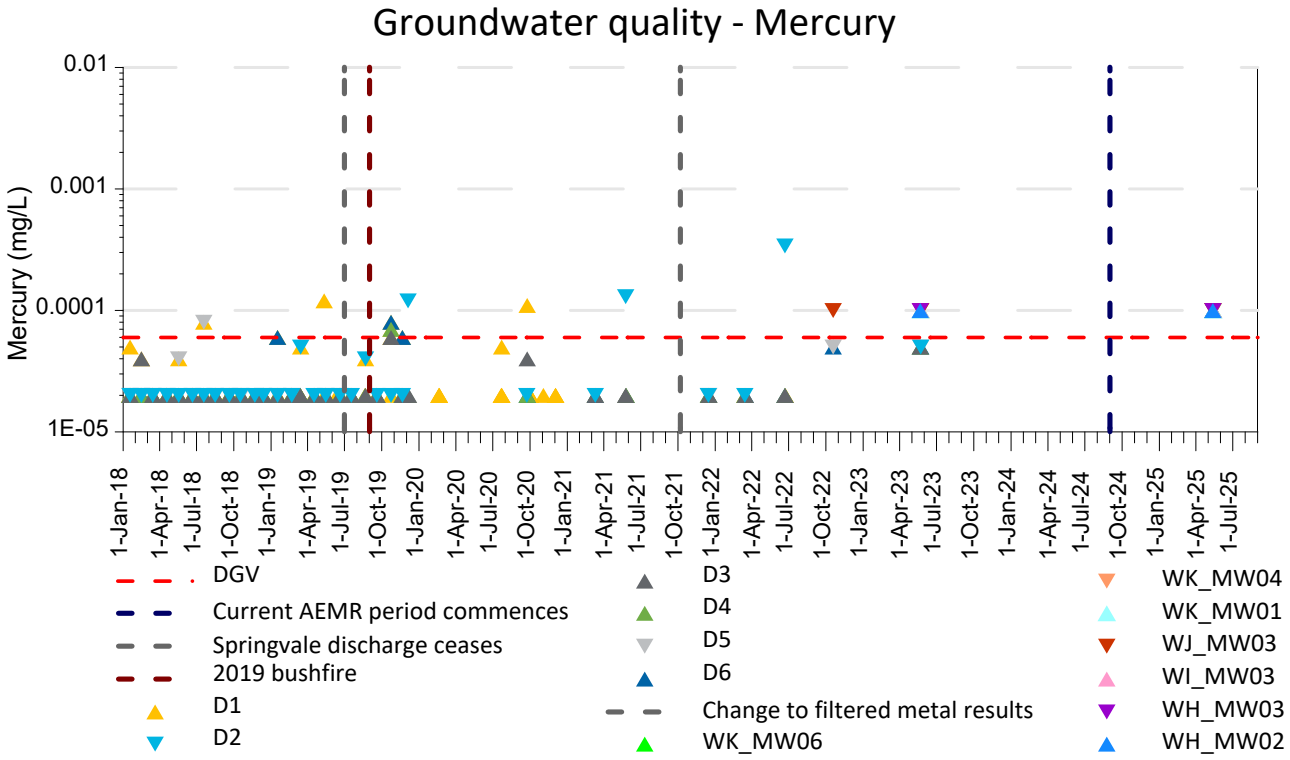
Groundwater quality - Cadmium



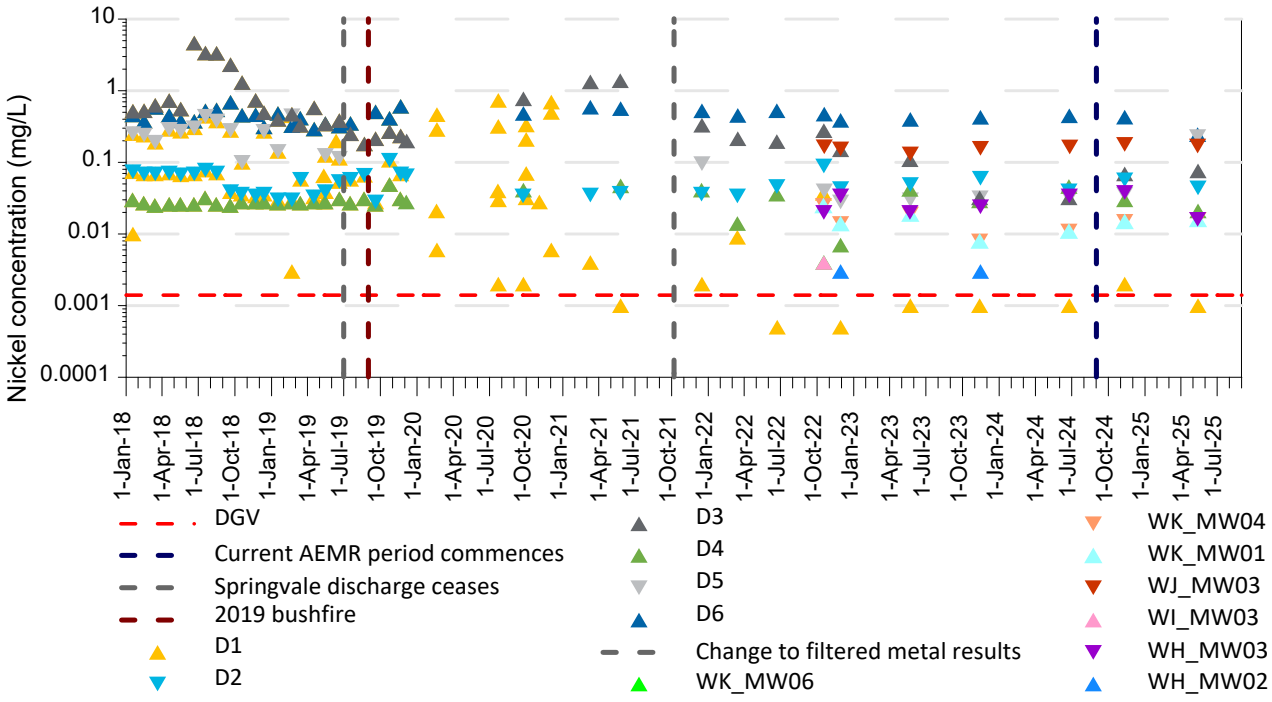
Groundwater quality - Copper



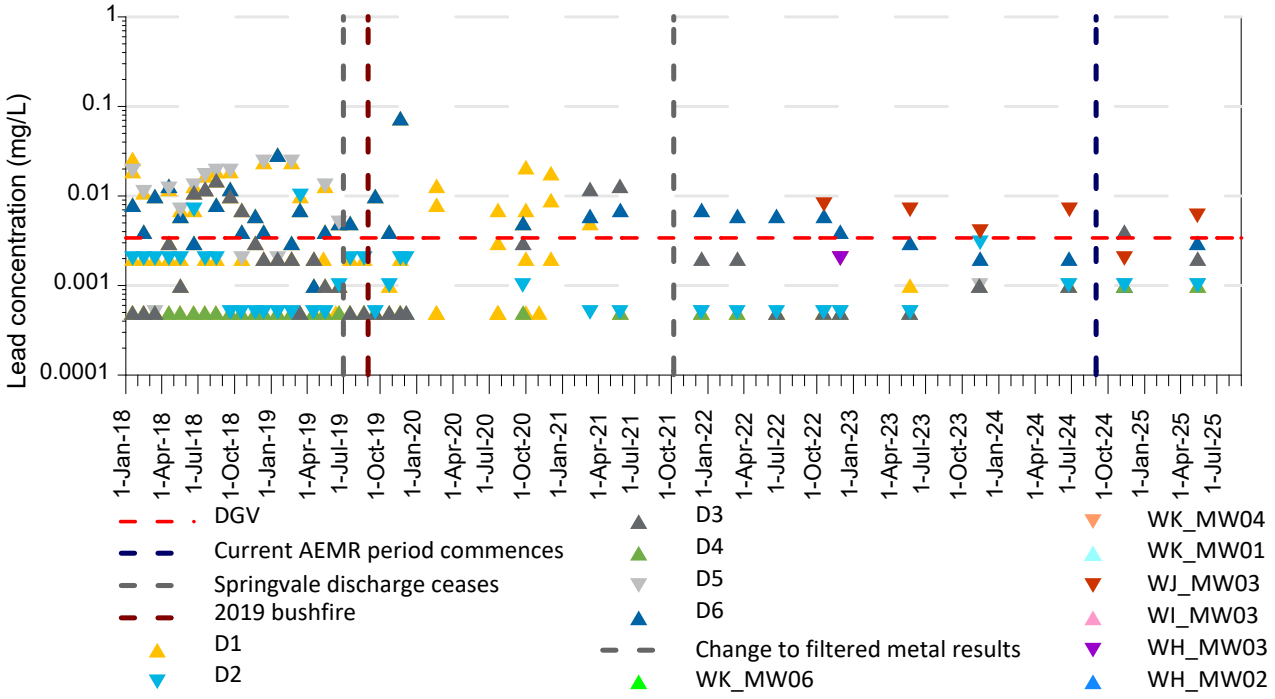

Groundwater quality - Manganese
Manganese (mg/L)
16
14
12
10
8
6
4
2
0
-2
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Current AEMR period commences
Change to filtered metal results
WK_MW06
WK_MW04
WK_MW01
WJ_MW03
WI_MW03
WH_MW03
WH_MW02

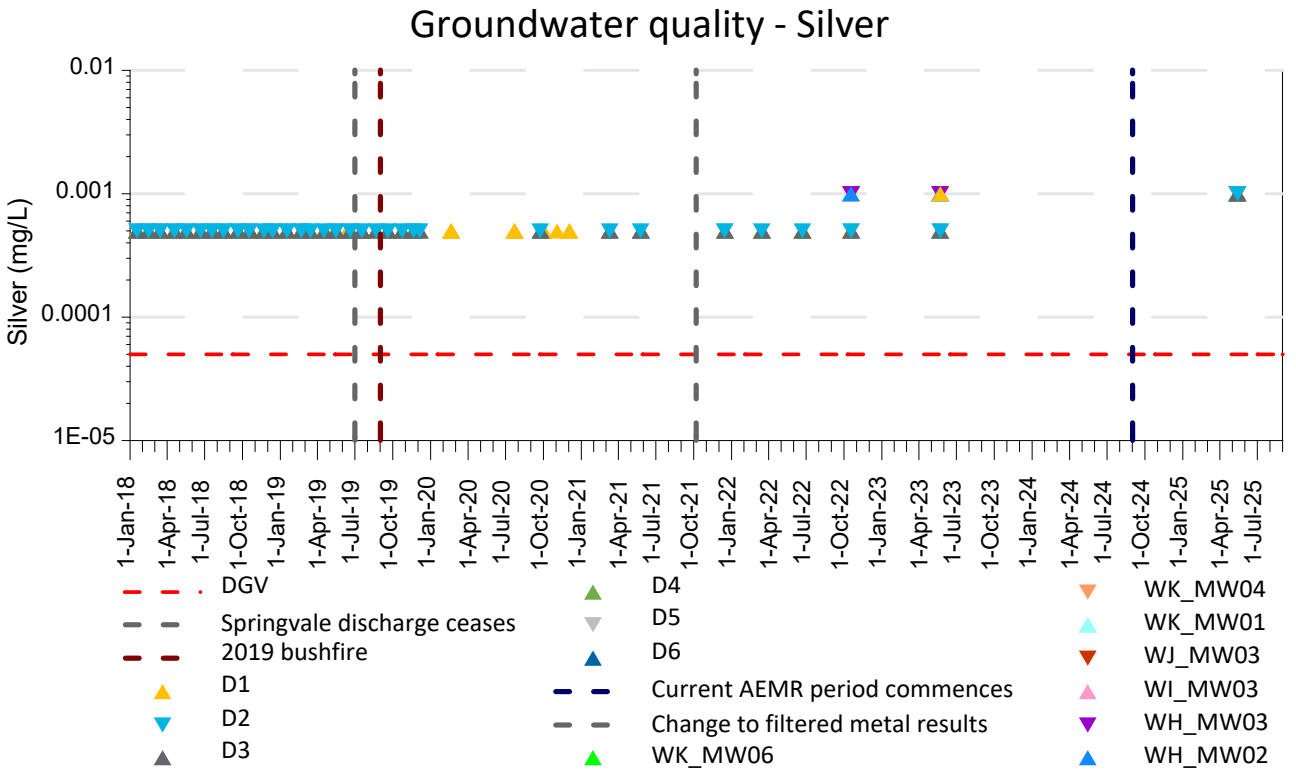

Groundwater quality - Mercury
Mercury (mg/L)
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Change to filtered metal results
WK_MW06
WK_MW04
WK_MW01
WJ_MW03
WI_MW03
WH_MW03
WH_MW02

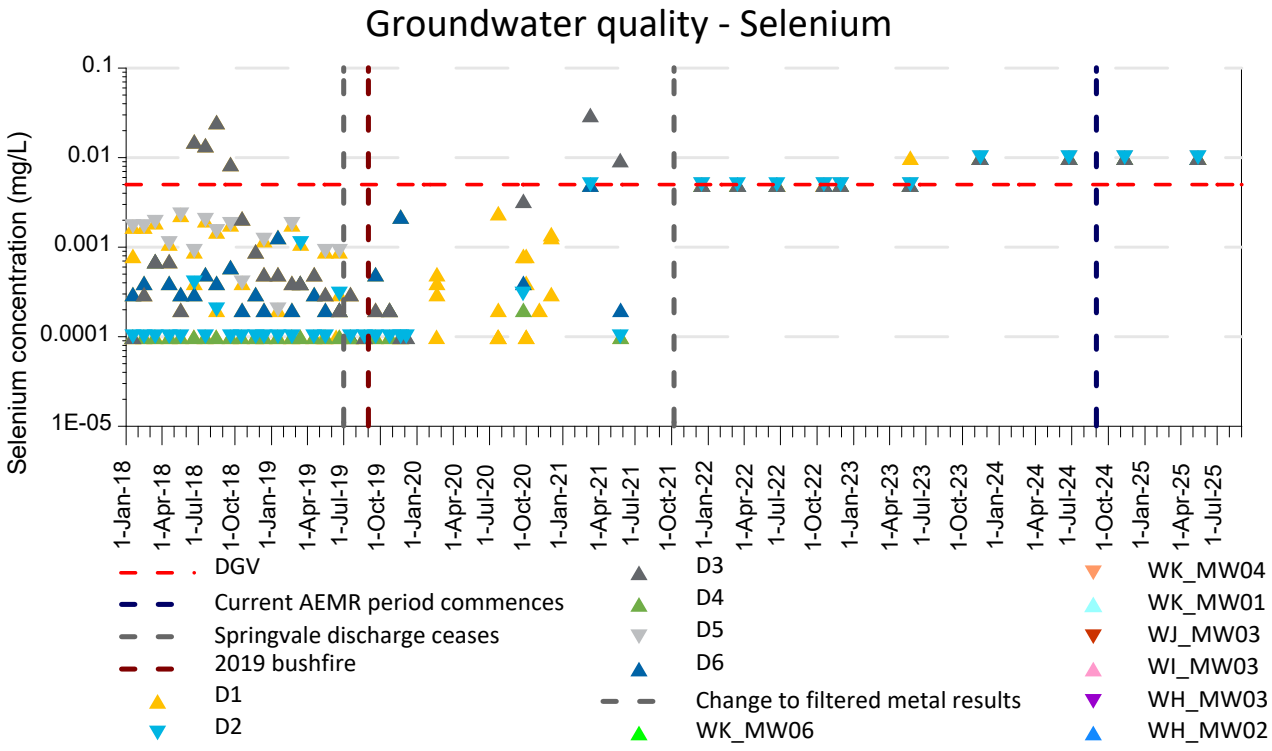
Groundwater quality - Nickel

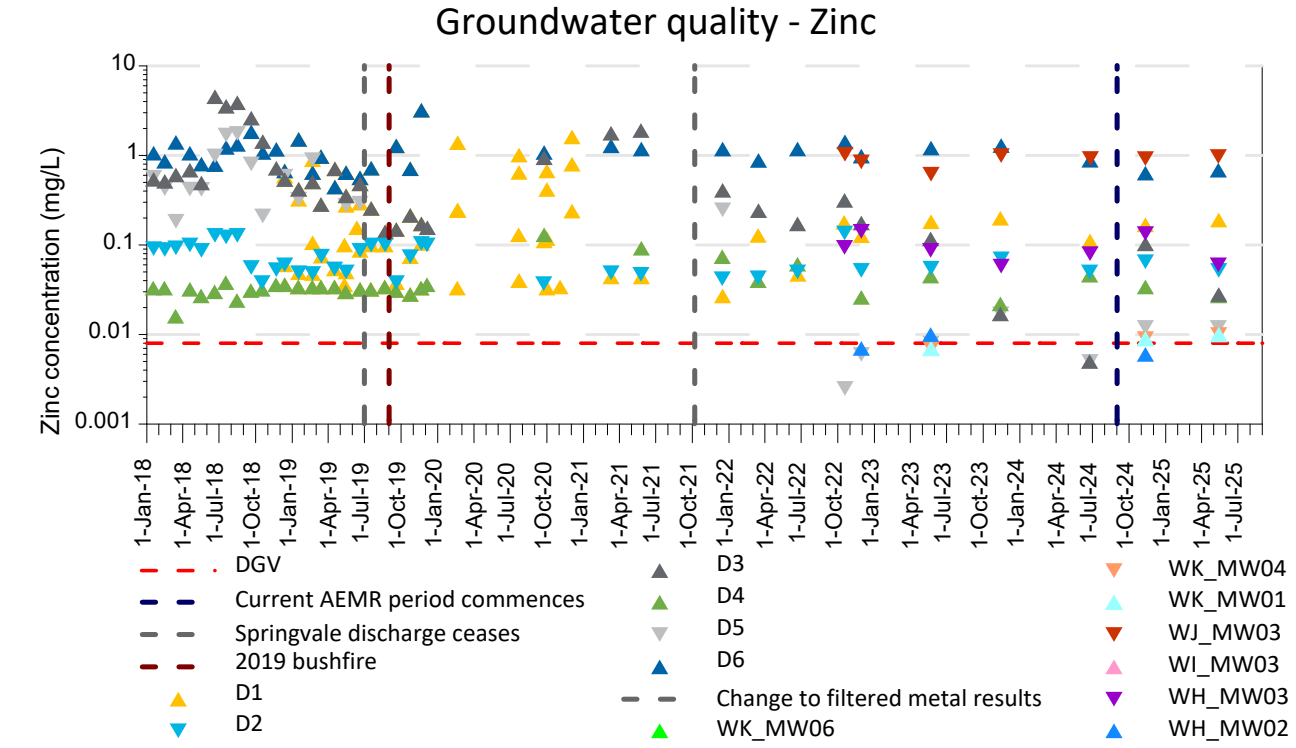


Groundwater quality - Lead



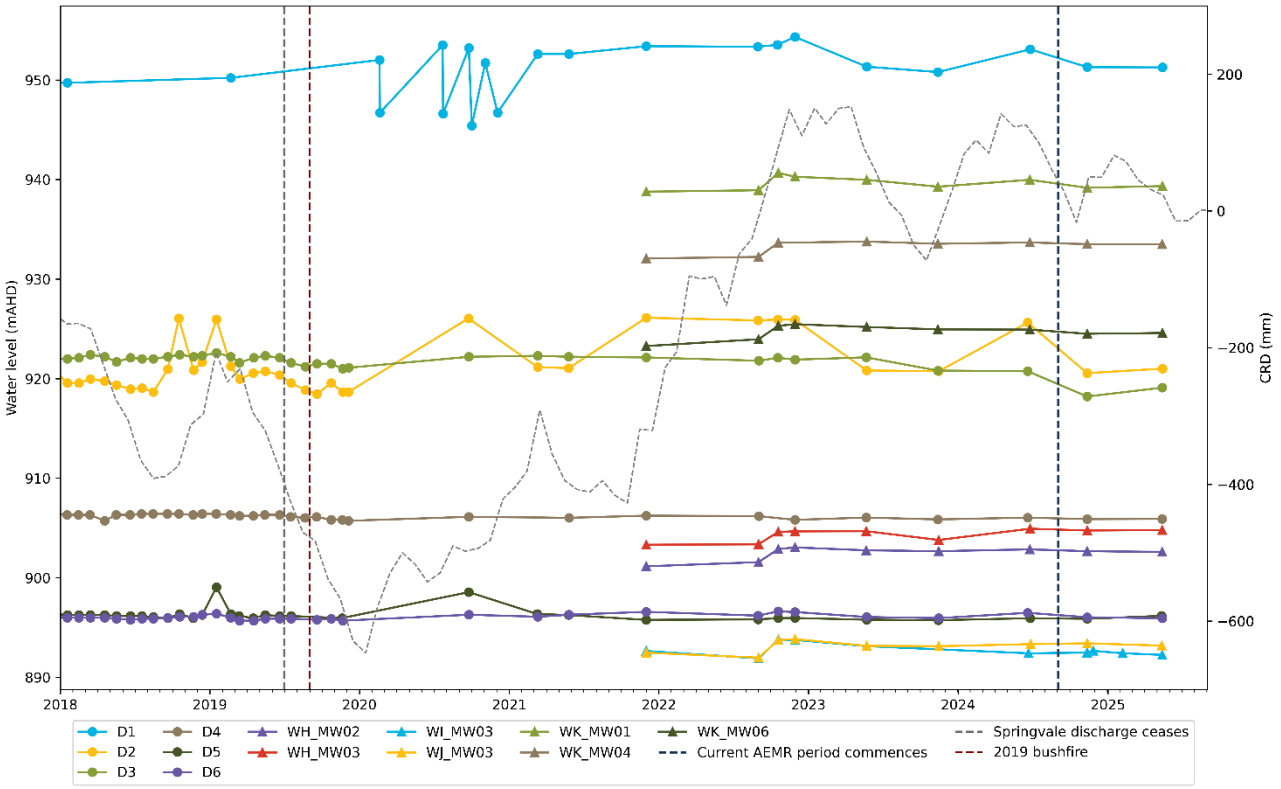

Groundwater quality - Silver
Silver (mg/L)
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Current AEMR period commences
Change to filtered metal results
WK_MW06
WK_MW04
WK_MW01
WJ_MW03
WI_MW03
WH_MW03
WH_MW02


Groundwater quality - Selenium
Selenium concentration (mg/L)
0.1
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Change to filtered metal results
WK_MW06
WK_MW04
WK_MW01
WJ_MW03
WI_MW03
WH_MW03
WH_MW02

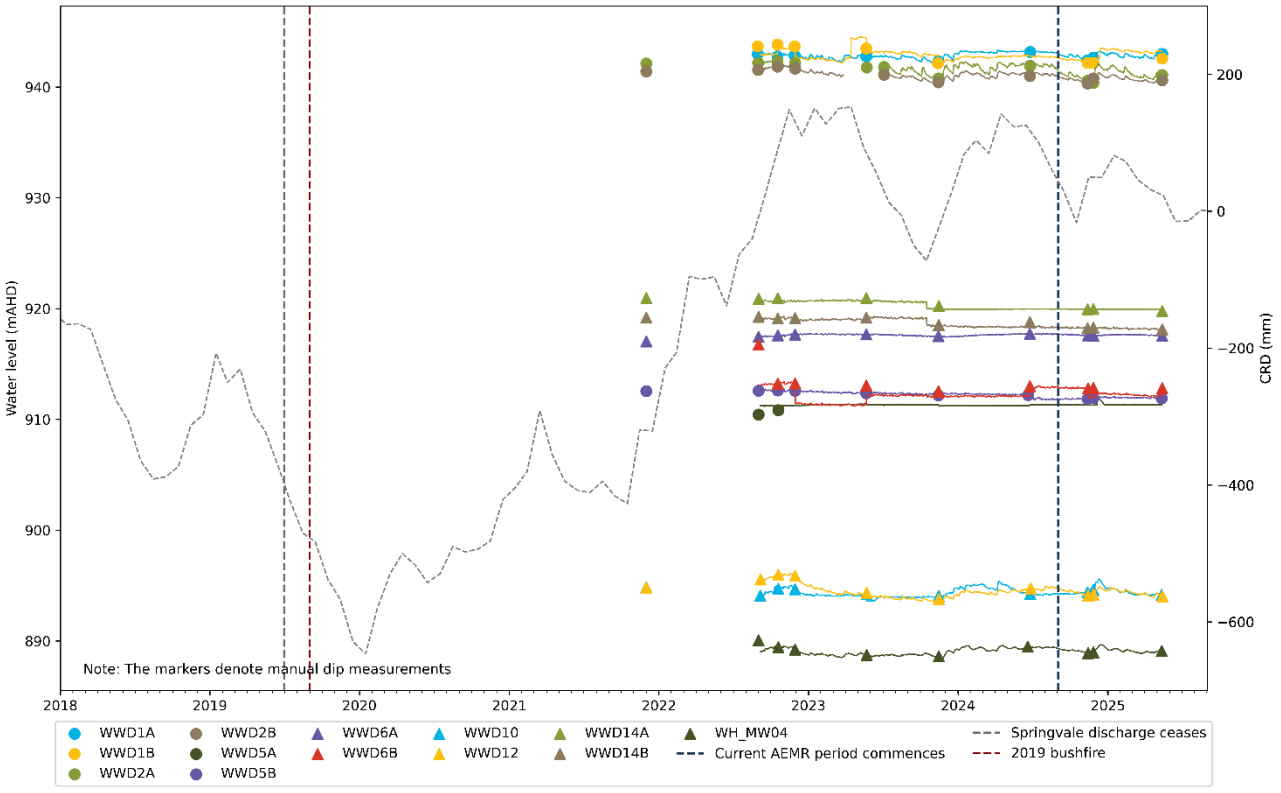

Groundwater quality - Zinc
Zinc concentration (mg/L)
10
1
0.1
0.01
0.001
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
1-Oct-23
1-Jan-24
1-Apr-24
1-Jul-24
1-Oct-24
1-Jan-25
1-Apr-25
1-Jul-25
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Change to filtered metal results
WK_MW06
WK_MW04
WK_MW01
WJ_MW03
WI_MW03
WH_MW03
WH_MW02

B.3 Hydrographs

B.3.1 Manual water level measurements



B.3.2 Level logger measurements

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