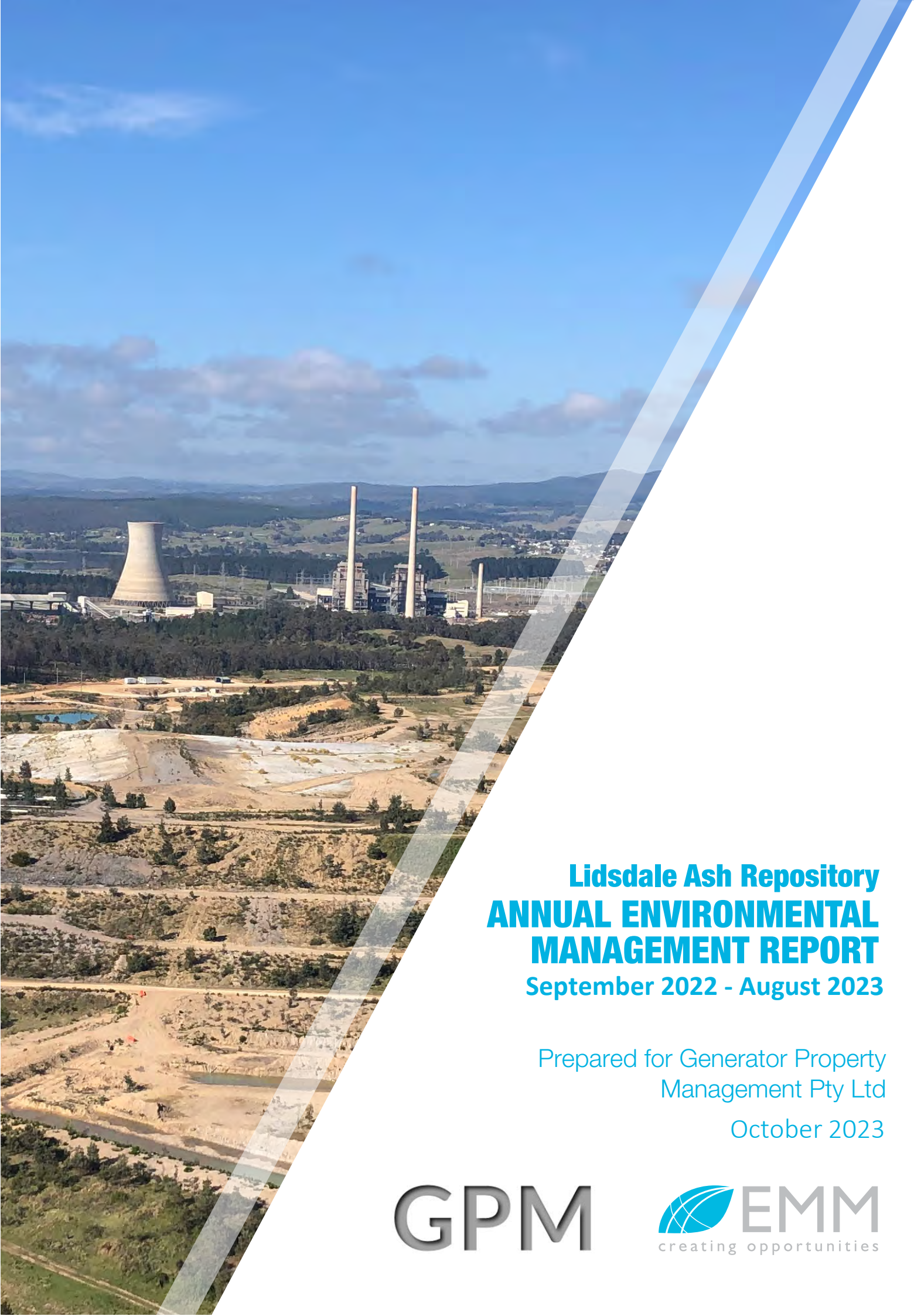

Lidsdale Ash Repository
ANNUAL ENVIRONMENTAL MANAGEMENT REPORT
September 2022 - August 2023

Prepared for Generator Property Management Pty Ltd

October 2023

GPM

EMM
creating opportunities

Kerosene Vale Ash Repositories

Annual Environmental Management Report

Generator Property Management Pty Ltd

E230527 RP#1

October 2023

Version	Date	Prepared by	Approved by	Comments
1.0	30 October 2023	M. Frankham	D.Bone	Final

Approved by

David Bone
Associate Director
30 October 2023

Level 3 175 Scott Street
Newcastle NSW 2300

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 1)
Name of holder of development consent/project approval	Consent lists Proponent as 'Energy Australia' GPM took ownership of the site in 2020
AEMR start date	1 September 2022
AEMR end date	31 August 2023

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 2022 to 31 August 2023 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 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

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

Name of authorised reporting officer	John Pola
Title of authorised reporting officer	Manager Safety & Environment
Signature of authorised reporting officer	
Date	3rd November 2023

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1 Summary of compliance

Generator Property Management Pty Limited (GPM) own and operate the Kerosene Vale Ash Repositories and surrounds, located at Skelly Road, Lidsdale NSW (the Project Area). 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 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.

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 recorded during the 2022-2023 reporting period (1 September 2022 to 31 August 2023). An extended review of compliance with the Conditions of the Approval (CoA) is presented in Appendix A which satisfies the requirement for a Compliance Tracking Program, in accordance with Condition 4.2 of Project Approval 07_0005.

Table 1.1 Statement of compliance during the 2022-2023 reporting period

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

No non-compliances were identified during the AEMR reporting period. Assessment of compliance was conducted using the compliance status key presented in Table 1.2.

Table 1.2 Compliance key status

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

Table 1.2 Compliance key status

Risk level	Colour code	Description
Compliant		The intent and all elements of the requirement of the regulatory approval have been complied with.

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

- 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 Environment Management Plan (OEMP) assessment criteria for depositional dust gauges located in Wallerawang and Lidsdale townships. One sample exceedance at DG31 in October 2022 was investigated. Analysis determined that the elevated dust results could not be definitively attributed to the Site operations.
- Surface water quality trends in Lidsdale Cut and the SSCAD are consistent with recent AEMR periods (i.e. 2018 to the current period). A gradual and minor decline in water quality in Sawyers Swamp Creek and Dump Creek over the current AEMR Period is considered to be due to drier conditions from the beginning of 2023 onwards. The results show that salinity increased from the mid-December 2022 low results indicating that this dilution trend provided by successive wet years (i.e. 2019-2022) was temporary and correlates with longer term wet and dry cycles.
- Groundwater quality trends during the AEMR Period were generally consistent with recent AEMR periods (i.e. 2018 to the current period) at D1, D2, D4, D5 and D6. Groundwater at monitoring bore D3 (located between SSCAD and the KVAR) is slightly degraded, relative to baseline water quality trends, however was generally consistent with water quality in recent AEMR periods (i.e. 2018 the current period).
- Asbestos waste was disposed of in the designated landfill area during the reporting period and in accordance with EPL 21185.
- No known heritage sites associated with the project approval were impacted during the reporting period and no new heritage sites were identified within the reporting period. No new heritage sites were identified during the reporting period.
- Weed management has been ongoing throughout the reporting period. Priority weeds, Pampas Grass and Blackberry, have been targeted and removal of pine trees has commenced to reduce fire safety risks.
- There were no community complaints received relating to the management of the Project Area.

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

- Continue to liaise with the EPA in regards to the Voluntary Management Proposal (VMP) to investigate and control contaminated materials at the site in the next AEMR reporting period.
- 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 being revised and finalised and is anticipated to be implemented during the 2023-2024 AEMR period.
- Ensure that the long term remediation of the site is planned and executed in consultation with the local community, including neighbours who adjoin the land holding.

- A Community Consultation Forum has now been established and will continue to operate in the 2023-2024 AEMR reporting period. It is intended that this group will meet quarterly with the GPM team and provide feedback on plans related to closure of the site for consideration prior to finalisation.

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 (Figure 2.1).

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 powerstation 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 decommissioning, demolition, rehabilitation and management of ongoing regulatory and contractual obligations.

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).

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 10.2).

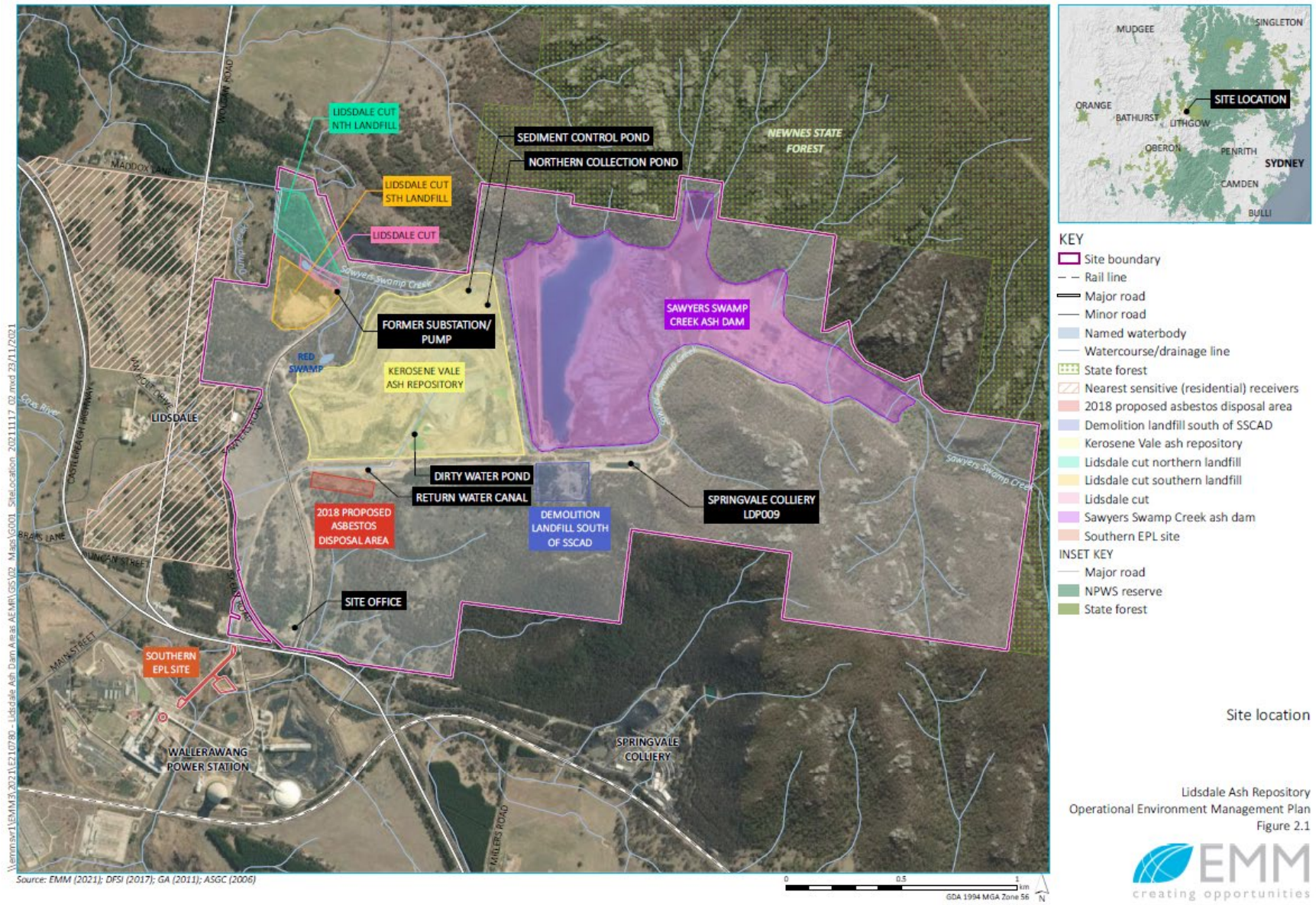


Figure 2.1 Site location and layout

2.3 Approval application during reporting period

The site operates under Project Approval 07_0005 (MOD1, 2018). GPM submitted a Modification Application to DPE (MOD2, 2023) in May 2023 to extend the import of capping materials by ten years. 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 Modification was determined and approved on 13 October 2023. Compliance against the Consolidated Consent (Mod 2) will be assessed in the 2023-2024 AEMR reporting period.

2.4 Purpose of the AEMR

This AEMR has been prepared to satisfy Schedule 2, Condition 7.3 of Project Approval 07_0005. This report covers the operations and environment and community performance of the site from 1 September 2022 to 31 August 2023 (the AEMR reporting period).

The AEMR has been prepared in accordance with the NSW Government's *Post-approval requirements for State significant mining developments Annual Review Guideline, October 2015* and is based on previous investigation data and the latest available information from environmental databases to inform the ongoing management and future remediation of the Project Area.

2.5 Actions required from previous AEMR

No correspondence was received from DPE regarding the 2021-2022 AEMR within the reporting period, therefore there were no outstanding actions to be addressed within the reporting period.

2.6 Project contacts

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

Mr Paul Glasson

Western Region Manager

M: 0418 708 113

E: paul.glasson@gpmco.com.au

Mr John Pola

Facility Environment & Safety Manager

M: 0429 205 290

E: john.pola@gpmco.com.au

3 Approvals

Care and maintenance activities throughout the AEMR reporting period were undertaken in accordance with the Project Approval, OEMP, CEMP and Environmental Protection Licence. The monitoring and management of the environmental aspects, including noise, ecology, air quality, waste, heritage and surface and groundwaters at the Kerosene Vale Ash Repository 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, licenses 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 September 2020, therefore Condition 1.4 is satisfied, and there is no expiry date for the consent.	Granted by the Minister for (former) Department of Planning (DoP), Section 75J of the EP&A Act.
	9 August 2018 (MOD 1)		Import of clean fill
	MOD 2 - Approval from DPE granted on 13 October 2023	October 2033 for condition 2.36A	Extension Time for import of capping material for 10 years
Environment Protection Licence (EPL) No. 21185	14 September 2020	14 September (annual anniversary date)	Granted by NSW Environment Protection Authority (EPA).
Modification to EPL 21185	27 January 2022	14 September (annual anniversary date)	Variation to Licence No. 21185 was approved on 27 January 2022, to allow for asbestos disposal at the site.
Modification to EPL 21185	18 July 2022	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.

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 includes the care and maintenance activities including ongoing regulatory and contractual obligations associated with the Kerosene Vale Ash Repository area.

The OEMP is in the process of being revised and finalised and is anticipated to be implemented during the 2023-2024 AEMR period once approved.

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 decommissioning, demolition, rehabilitation.

To ensure ongoing compliance when in care and maintenance, GPM manage a site contractor to undertake regular, ongoing maintenance activities. The contractor primarily maintains surface water management structures, dust suppression measures, vegetation management and any other care and maintenance works required.

There was no ash delivered or reused during the reporting period. The total ash footprint has remained the same from the previous reporting period. Additional rehabilitation activities were undertaken during the reporting period, more information and photos of these activities have been 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)	37.07	37.07	37.07
Area of repository capped (ha)	33.5	Nil	TBC following VMP process (works continuing)
Stabilisation works on KVAR (ha)	Not reported	17.4	TBC following VMP process (works continuing)
Temporary cover application (ha)	Not reported	13.58	TBC following VMP process (works continuing)

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:

- installation and extension of leachate collection pipes and transfer pipes around KVAR Stage 2
- stabilisation of exposed ash areas on the eastern face of KVAR Stage 2 over a 17.4 ha area to reduce erosion of ash materials
- temporary cover application to an area of approximately 13.58 ha

- commencement of trials of cover types (grass seeding, hydro seeding and hydromulching, mulch application) to gauge resilience to local conditions
- commencement of trials of irrigation of site water on temporary cover areas to gauge responses to site water
- extension of irrigation network to manage treated water from the site and reduce reliance on discharge to Cox's River via EPL discharge points
- modifications of the return water canal and discharge pumps
- upgrade to the water chemical dosing plants to remove/reduce metal contaminants in discharge water to meet EPL requirements
- installation of additional real time surface water flow and chemistry sensor in Cox's River, EPL discharge points and Sawyers Swamp Creek
- installation of seepage monitoring points around the site
- weed management of Pine trees, Sifton Bush, Blackberry, Pampas Grass and Thistle across the site
- repair of damage by wombats on KVAR/KVAD walls and other areas across the Project Area
- review and updating of existing operational plans for submission and approval of ongoing operations following completion of ash placement activities
- preparation of construction environmental management plans for major upcoming works (Sawyers Swamp Creek relocation, KVAR Stage 2 stability berm, Detailed site Investigation)
- removal of dead exotic vegetation as a result of the 2019 Gospers Mountain wildfire.
    - Pine plantations in the Stage 2 area were badly damaged as a result of the fires and are being removed with some logs salvaged for use on site as barriers and others chipped for use as mulch and erosion control.

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 37 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 is currently sourced from various locations in the Metropolitan an Central Tablelands regions and comprise of virgin excavated natural material (VENM) and excavated natural material (ENM).

Import of ENM and VENM for capping of the ash repositories was undertaken during the reporting period. Capping material was sourced from outside the Lithgow LGA and included Raglan and Vittoria in the Bathurst LGA, and Medlow Bath in the Blue Mountains LGA.

Due diligence testing of the structural properties of ENM/VENM is conducted monthly, and includes testing of particle size distribution, maximum dry density, emersion, permeability and Atterberg limits testing. The capping material is further tested for a suite of analytes (metals, pH, EC) and hydrocarbons to ensure they meet the NSW EPA Resource Recovery Order and exemptions for Excavated natural material (ENM) and/or the Waste Classification guidelines for Virgin excavated natural material (VENM).

Where materials are not considered to meet these requirements, they are rejected.

4.5 Asbestos disposal areas

4.5.1 Operational asbestos disposal area

The asbestos disposal area enables disposal of asbestos and asbestos contaminated materials arising from the demolition of WPS, permitted via EPL (21185). Asbestos waste continued to be received from the demolition of WPS during the reporting period and ceased in December 2022. The areas approved to receive these materials have been capped in accordance with the approved designs.

4.5.2 Historic disposal areas

The areas around the Lidsdale Cut which stretch to the property boundary to the west were identified during the AEMR reporting period as historical waste landfills containing fly ash, asbestos, metals and other waste materials. These previously unknown landfills were identified as a result of vegetation which died as a result of fire damage. These trees (Pinus sp.) were falling over in winds and from fauna digging burrows and from water erosion eating dislodging the material. Upon identification of the historical landfill, GPM re-capped and profiled the area, removed the pine forest, repaired fencelines and installed barrier to deter fauna, including wombats, from repopulating the area.

5 Environmental management performance

Environmental monitoring for the Kerosene Vale Ash Repository operations is designed to comply with the regulatory requirements specified in Chapter 3, and also to provide an ongoing analysis of the condition of the environment surrounding the Project Area.

Environmental monitoring is performed as part of the monitoring program at the monitoring locations shown in Figure 5.1. The results are used as indicators of the effectiveness of the environmental controls, and as guidelines for the management and maintenance of key environmental procedures.

Detailed procedures outlining the environmental monitoring, responsibilities of key stakeholders and the impacts to be mitigated can be found within the individual sub-plans of the OEMP, and include:

- Operational Noise and Vibration Management Sub-Plan
- Surface Water Quality Sub-Plan
- Groundwater Management Sub-Plan
- Air Quality Management Sub-Plan
- Landscape and Revegetation Sub-Plan
- Waste Management Sub-Plan.

A summary of the environmental management measures and associated performance is summarised below in Table 5.1. Surface and groundwater monitoring results and performance during the AEMR reporting period is summarised in Chapter 6 and Appendix D.

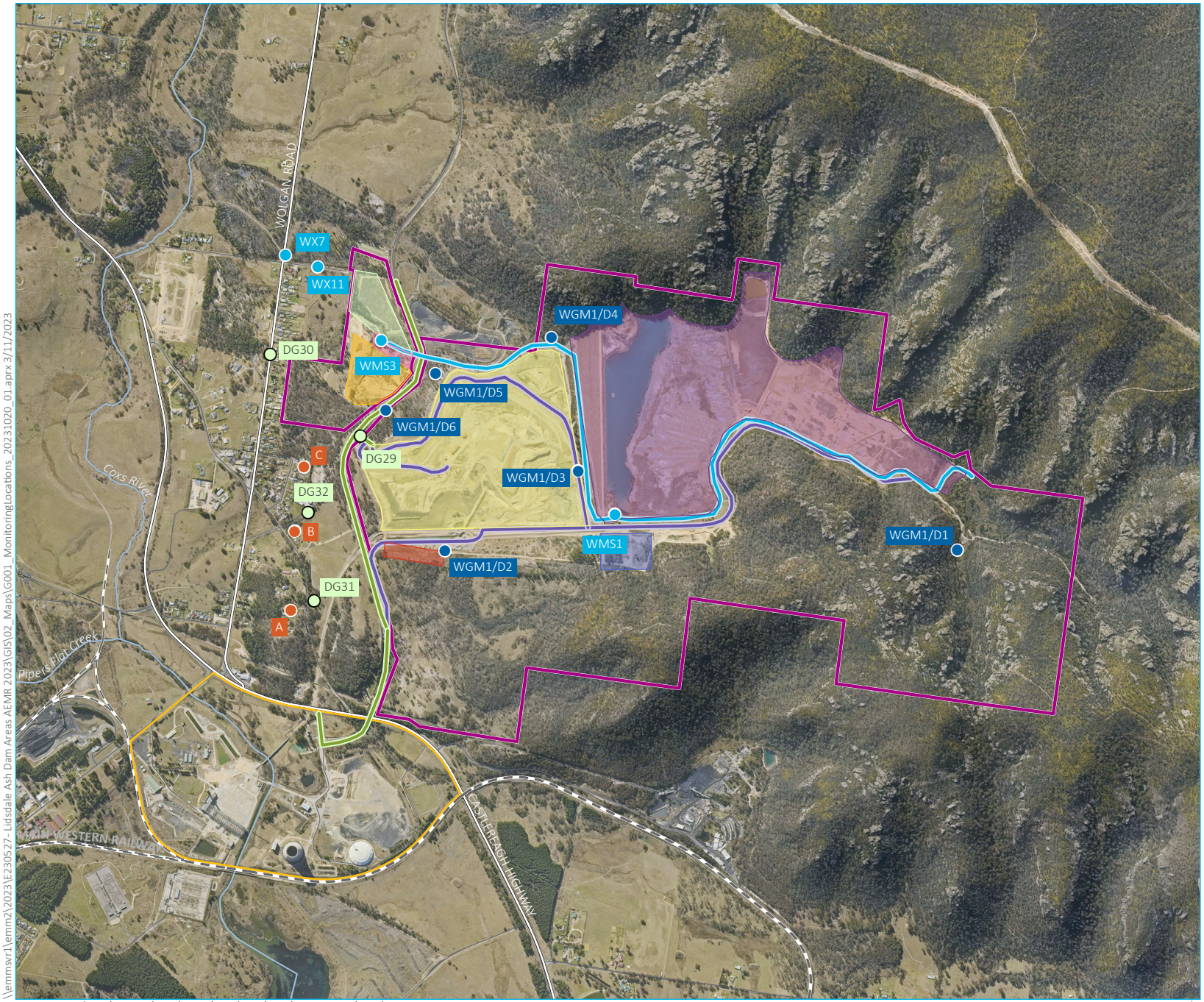
Performance against environmental monitoring and compliance requirements are provided by the site contractor (PRJH Mining) as a monthly Kerosene Vale Site Operations Monthly Report and through external consultant and internal reports, an example of these reports is shown in Appendix B.

Table 5.1 Environmental performance during AEMR reporting period

Aspect	Approval criteria	Prediction	Kerosene Vale Ash Repository performance during reporting period	Trends/ management implications	Management actions
Noise	All residences $L_{Aeq(15minute)}$ Daytime 40 dB; Evening 40 dB.	LAeq $L_{Aeq(15minute)}$ Location A: 33 dB(A); Location B: 33 dB(A); Location C: 31 dB(A).	**Quarter 3 2022** Day $L_{Aeq(15minute)}$ All locations: Inaudible Evening $L_{Aeq(15minute)}$ All locations: Inaudible **Quarter 4 2022** Day $L_{Aeq(15minute)}$ Location A: Inaudible Location B: <20dB Location C: <25dB Evening $L_{Aeq(15minute)}$ All locations: Inaudible **Quarter 1 2023** Day $L_{Aeq(15minute)}$ All Locations: Inaudible Evening $L_{Aeq(15minute)}$ All Location: Inaudible **Quarter 2 2023** Day $L_{Aeq(15minute)}$ All locations: Inaudible Evening $L_{Aeq(15minute)}$ Location A: 37dB Location B: 33dB Location C: 34dB **Quarter 3 2023** Day $L_{Aeq(15minute)}$ Location A: <30dB Location B: <30dB Location C: <25dB Evening $L_{Aeq(15minute)}$ All locations: Inaudible	NA – no exceedance of criteria.	Nil additional management actions required.
Ecology	Minimal impacts on ecology of Swayers Swamp Creek following its realignment.	Potential impacts associated with realignment of Swayers Swamp Creek.	Swayers Swamp Creek was not realigned therefore no ecological monitoring is required.	NA – Sawyers Swamp Creek was not aligned.	Nil additional management actions required

Table 5.1 Environmental performance during AEMR reporting period

Aspect	Approval criteria	Prediction	Kerosene Vale Ash Repository performance during reporting period	Trends/ management implications	Management actions
Air quality	Maximum total deposited dust 4 g/m^2/month annual.	Annual average of 3.5 g/m^2/month deposited dust.	Annual average range 0.1 to 3.2 g/ m^2/month. No dust results available for January 2023 due to lab error. Investigation of one exceedance of 4.77 g/m^2/month deposited dust at DG31 was not able to be definitively attributed to Site operations.	Annual average dust levels show a slight decreasing trend.	Nil additional management actions required.
Waste	Waste disposal in accordance with EPL 21185.	Wastes disposed of accordingly.	Asbestos waste was disposed of in the designated area during the reporting period	Decrease in waste disposed of at the repository.	Nil additional management actions required.
Heritage	Minimal impact on heritage values of the area.	Heritage impacts considered to be minimal and are manageable with appropriate and well – established procedures.	No additional heritage sites were identified during the reporting period.	No additional heritage sites have been identified during the reporting period.	Nil additional management actions required.



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

Environmental Monitoring Locations

Kerosene Vale Ash Repositories
Annual Environmental Management Report
Figure 5.1

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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

There are no official meteorological measurements recorded within the Project Area. Weather monitoring is undertaken at the site however the data is real time only and is not recorded. Meteorological data from the Bureau of Meteorology (BoM) automatic weather station (AWS) at Marrangaroo (Defence) (station 063308), located approximately 6km south-east of the site has been used for this AEMR reporting period.

5.1.2 Overview of data for reporting period

A summary of meteorological data has been compiled from the BoM Marrangaroo AWS for the period between 1 September 2022 and 31 August 2023 and is presented in Table 5.2.

The BoM Marrangaroo AWS recorded a minimum temperature of -9.6°C in June, and a maximum temperature of 35.3°C in March.

The highest total monthly rainfall recorded over the period was in November 2022 with 142.8 mm and the lowest recorded monthly rainfall was in May 2023 with 3.8 mm. Total annual rainfall for the reviewed period was 848.4 mm.

Table 5.2 Statistics for temperature and rainfall – BoM Marrangaroo AWS – September 2022-August-2023

Month	Minimum temperature (°C)	Maximum temperature (°C)	Total rainfall (mm)	Cumulative Rainfall (mm)
Sep-22	-3.7	18.2	134.4	134.4
Oct-22	-1.5	21.8	120.2	254.6
Nov-22	-0.6	25.6	142.8	397.4
Dec-22	0.1	29.2	36.2	433.6
Jan-23	5.3	31.6	111.0	544.6
Feb-23	4.9	33.5	43.4	588.0
Mar-23	2.0	35.3	76.2	664.2
Apr-23	-0.5	21.2	75.2	739.4
May-23	-7.1	19.5	3.8	743.2
Jun-23	-9.6	19.2	33.4	776.6
Jul-23	-9.0	18.8	14.2	790.8
Aug-23	-5.2	20.0	57.6	848.4

An annual wind rose created from wind speed and direction data collected at the BoM Marrangaroo AWS from September 2022 to August 2023 is presented in Figure 5.2. The winds recorded were predominately from the easterly and westerly direction. Annual average wind speeds were 1.5 m/s, and the annual average frequency of calm conditions (windspeeds less than 0.5 m/s) were 27.3%.

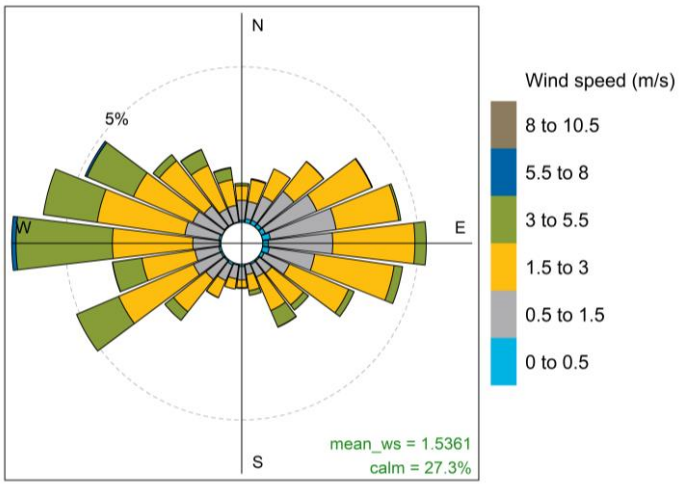

Figure 5.2 Annual wind speed and direction – BoM Marrangaroo AWS – September 2022 – August 2023

Monthly wind roses for the BoM Marrangaroo AWS from September 2022 to August 2023 are presented in Figure 5.3. Monthly average wind speeds ranged from 1.1 m/s to 1.8 m/s. The monthly average frequency of calm conditions ranged from14.3% to 42.5%. The predominant wind direction patterns recorded during the warmer months (i.e. January, February, March and December) were from the east and south-easterly direction. The dominance of the south-eastly winds reduced between autumn and winter, with an increase in winds from the west to north-west.

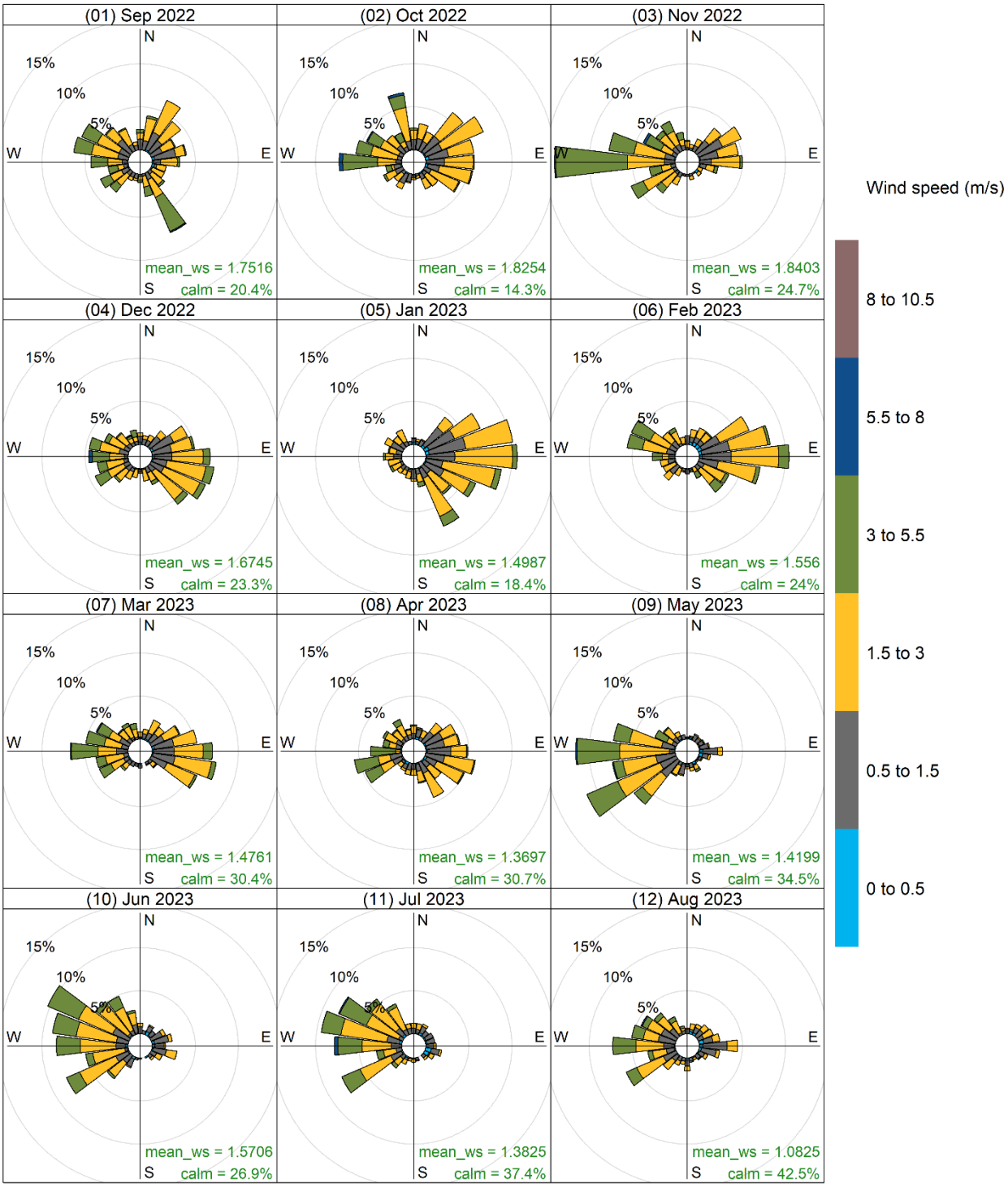

Figure 5.3 **Monthly wind speed and direction – BoM Marrangaroo AWS – September 2022-August 2023**

5.2 Noise monitoring

5.2.1 Environmental management

An Operational Noise and Vibration Management Sub-plan (ONVMSP) is included in the OEMP and has been developed in accordance with Condition 6.5 of PA 07_005. The ONVMSP 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 KVAR Stage 2.

The ONVMSP 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 5.3 and depicted in Figure 5.1.

Table 5.3 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 ONVMSP. 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 5.1). Due to the closure of the WPS, no fly ash trucks have been hauling to the ash placement area during the reporting period.

Noise monitoring was undertaken by EMM over the reporting period during the day and evening periods of 19 and 20 September 2022 (Quarter 3), 10 November 2022 (Quarter 4), 15 February 2023 (Quarter 1), 26 and 27 April 2023 (Quarter 2) and 2 August 2023 (Quarter 3).

A summary of the noise generating activities during each of the reporting periods is provided below in Table 5.4.

Table 5.4 Noise generating activities during the reporting period

Noise monitoring (day and evening)	Noise generating activities
Quarter 3 - 2022	The site was inaudible during all measurements for Quarter 3 2022. Road traffic was primarily responsible for generating measured noise levels. Noise from power station demolition and from animals was also noted.
Quarter 4 – 2022	Trucks travelling along the haul road into site were audible during the day measurement at Location B, generating a site only L_{Aeq} of less than 20 dB, and at Location C, generating a site only L_{Aeq} of less than 25 dB. Road traffic was primarily responsible for generating measured noise levels. Noise from power station demolition and from animals was also noted.
Quarter 1 – 2023	The site was inaudible during all measurements for Quarter 1 2023. Road traffic was primarily responsible for generating measured noise levels. Noise from power station demolition and from animals was also noted.
Quarter 2 – 2023	Trucks travelling along the haul road to site were audible during the day at Location A, generating a site only L_{Aeq} of 37 dB, Location B, generating a site only L_{Aeq} of 33 dB, and at Location C, generating a site only L_{Aeq} of 34 dB. Track noise was also noted. Noise from road traffic was primarily responsible for generating measured noise levels during the evening period. Noise from animals was also noted.
Quarter 3 - 2023	Trucks travelling along the haul road to site were audible during the day at Location A, generating a site only L_{Aeq} of less than 30 dB. Track noise was also noted. Trucks travelling along the haul road and construction continuum were audible during the day at Location B, generating a site only L_{Aeq} of less than 30 dB. An operational continuum was audible during the day at Location C, generating a site only L_{Aeq} of less than 25 dB.

Based on site observations and information reviewed, potential noise impacts from the operation and maintenance of the project are considered to have been effectively mitigated and managed. There were no noise complaints received during the reporting period. Monitoring reports are provided in Appendix C.

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 operational noise 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 while the site is in care and maintenance.

5.3 Ecological monitoring

A realignment of Sawyers Swamp Creek (SSC) along the northern side of the KVAR was planned to be undertaken during the reporting period to facilitate structural stabilisation works for the Stage 2 KVAR. The proposed alignment contained in the Stage 2 EIS was 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 Sawyers Swamp Creek". EMM notes that this realignment has not been undertaken as the proposed location is within a known filled mining void and finalisation of the KVAR buttress wall is still being developed. The contaminated site declaration and upcoming detailed site investigation has further complicated this work. Following detailed investigations and buttress designs the realignment of SSC will be developed in consultation with relevant agencies. This is considered to be an important part of the safe decommissioning, demolition, rehabilitation of the Project Area.

As there has been no realignment of Sawyers Swamp Creek, ecological monitoring required under Condition 3.7 of the Project Approval is not required.

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 and the emplacement of ash. These measures includes the use of extensive sprinkler system and water cart applications to control dust from operations at within the Project Area. In addition depositional monitoring for dust/airborne particulates is undertaken.

Dust management at Kerosene Vale Ash Repository 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.

During the reporting period GPM sealed the haul road to site, enabling receipt of materials under all weather conditions and reducing the potential for dust generation from haul trucks. A new truck wash facility was installed, which complements the road upgrade to further reduce the potential for dust migration offsite.

i Site 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.

A water cart is available onsite to undertake additional dust suppression as required. The water used during dust suppression is sourced from the SSCAD return system, no additional clean water is used in this application.

ii Dust deposition monitoring

Air quality was monitored at four depositional 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 for the Project Area has been reviewed for the reporting period. In January 2023 a laboratory error caused all depositional dust samples to be destroyed. The samples were delivered to the laboratory, where they were dried at 105C and then burned again at 850C without being weighed back. The laboratory has since completed toolbox talks to ensure the error does not occur in future. As such, no dust data is available for January 2023.

Dust gauge data obtained for the reporting period confirm emissions have complied with annual compliance criteria at all dust gauges.

One exceedance of insoluble matter was recorded at DG31 during the October 2022 dust monitoring period 30/09/2022-31/10/2022. The insoluble mater recorded during the October dust monitoring period was above the yearly average, with a recorded result of 4.77 g/m^2. The sample was sent for dust characterisation analysis and recorded 90% dirt. In accordance with the OEMP, section 6.6 Air quality sub-plan, a review is required to be conducted when the limit of 4g/m2/month is exceeded by 2 g/m2. Nevertheless, a review of the October exceedance was conducted which showed that the meteorological conditions were not particularly hot or dry during October. Wind direction during October was variable; winds were not prevailing from the direction of the Site in relation to DG31 (i.e. north-easterly). Further, the associated dust gauges; DG29, DG30 and DG32 did not return dust exceedances above the Annual Maximum Criteria. Analysis of the DG31 result determined that the cause of the exceedance could not be attributed to the Site and was potentially due to external tampering with the sample, noting that the sampling point is located proximate to neighbouring properties.

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.

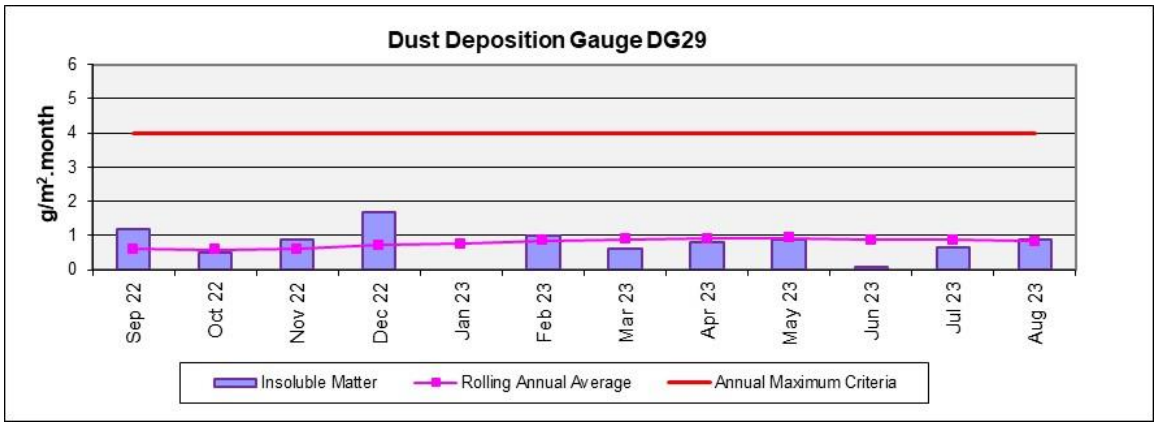

Figure 5.4 Depositional dust summary – Dust Gauge 29

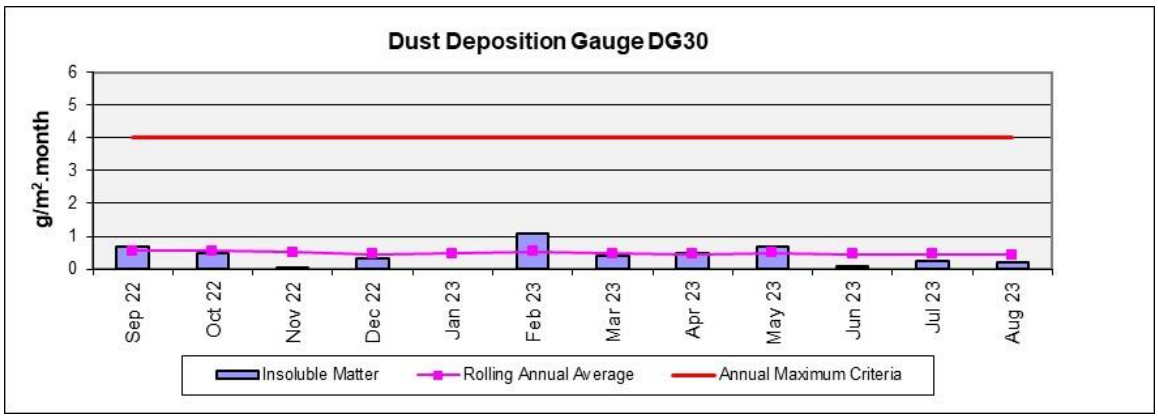

Figure 5.5 **Depositional dust summary – Dust Gauge 30**

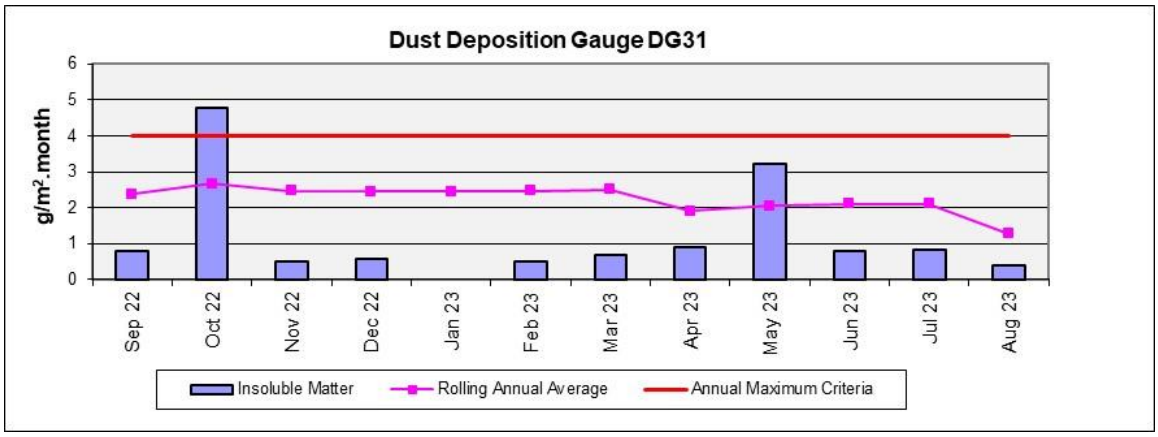

Figure 5.6 **Depositional dust summary – Dust Gauge 31**

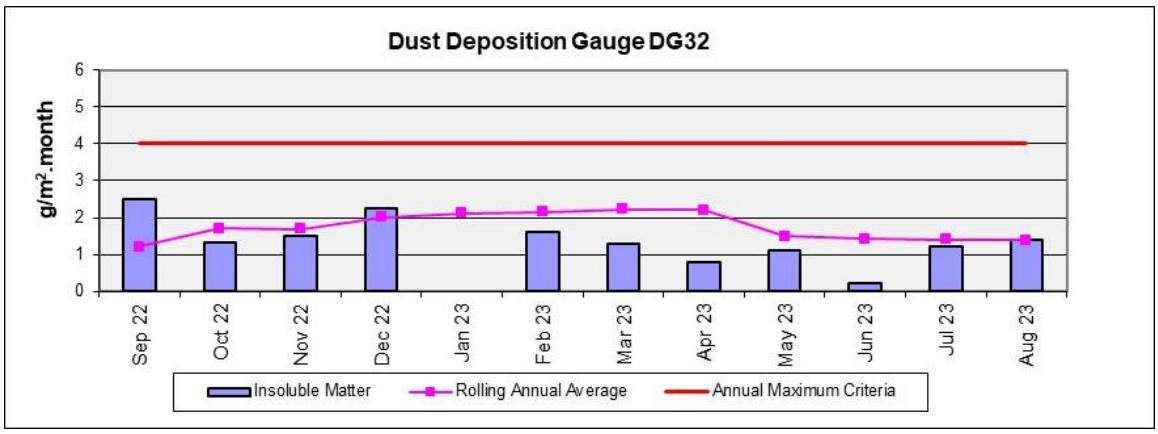

Figure 5.7 **Depositional dust summary – Dust Gauge 32**

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

During the next AEMR reporting period, GPM will investigate if methods are available to exclude the potential for tamping with dust gauge bottles, or vandalism (e.g. stealing or breaking), particularly gauges located near residential areas.

GPM will consider several improvements to the monitoring program, including:

- adding dust observations to the monthly environmental inspection reports
- the addition of written observations of the samples from the laboratory to the monthly depositional dust gauge report to improve the investigation of contaminated samples or elevated dust results.

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 as outlined in the OEMP. 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 current asbestos disposal pit (as per development consent DA 016/19).

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

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 regards to heritage sites, were made:

- Disturbance to the western 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 D.

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, C and D (Figure 6.1).

- **KVAR/KVAD water management area** is located to the west (downgradient) of SSCAD. KVAD is the Power Station's original ash dam which was established in an open cut mine void. The KVAR is a dry ash compacted stockpile situated on top of the capped KVAD.

A perched groundwater system exists within the KVAD (the perched KVAD groundwater system). The combined area now has a water management system. Surface water runoff and seepage from this area drains to several water storage areas. Captured water that is known to be contaminated is reticulated to Lidsdale Cut (located downgradient of KVAD) where it is pumped to SSCAD Pond. Stormwater that is not ash affected is managed in accordance with the methods described in Managing Urban Stormwater Soils and Construction: Volume 1 (Landcom 2004) and Volume 2E Mines and Quarries (DECC 2008).

- **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 10.2)

    - **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.

Figure 6.1 shows the abovementioned features and Figure 5.1 shows the OEMP surface and groundwater monitoring sites.

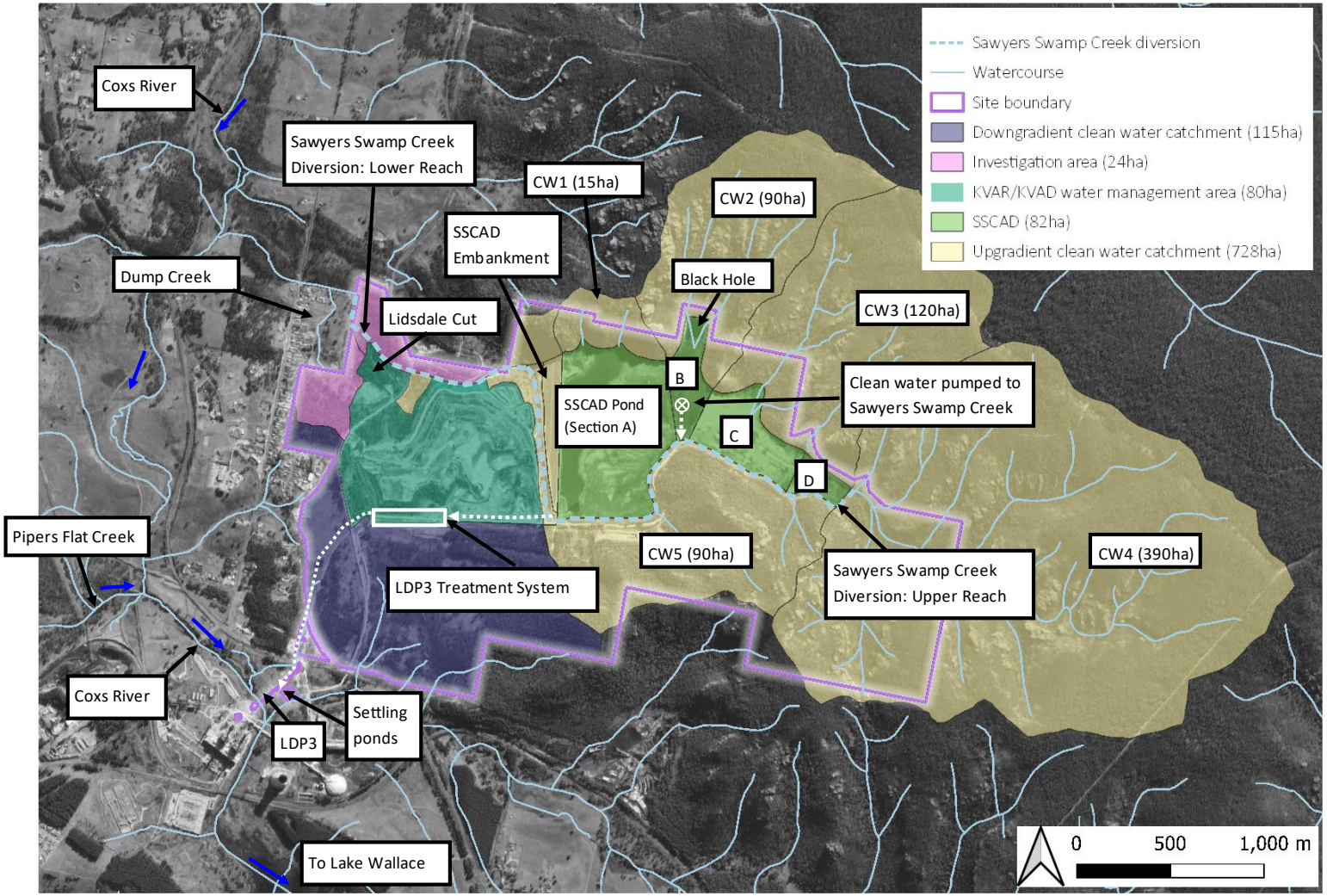

Figure 6.1 **Water management features**

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. In February 2022, GPM prepared a summary table from water management Action Plan (the Action Plan) that described water management improvements that were either underway or proposed. The plan included a description of each improvement, expected outcomes once implemented and estimated completion timeframes. 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 a water management related pollution reduction program that was under discussion at that time.

The EPL was varied on 18 July 2022. The varied EPL included several new conditions including Condition U2 which relates to water management. In August 2022 GPM submitted a Water Management Assessment to the EPA that addressed EPL Condition U2.1 and 2.2. This assessment included an updated Action Plan that described water management improvements that were either underway or proposed in August 2022. The assessment also included a commitment to provide an updated Action Plan with each Water Quality Monitoring Report that is required every six months to address EPL Condition R4. During the AEMR Period, updated Action Plans were included in Water Quality Monitoring Reports that were submitted to the EPA in March and September 2023.

Water management actions undertaken during the reporting period include:

- opportunities for irrigation and aeration are taken whenever conditions are suitable (wind, rain, humidity, temperature) to reduce the amount of water required to be discharged via licensed discharge points
- GPM has reinstated pipework and drainage of contaminated water seepage from the original KVAD, which can then be directed to the water treatment plant (via Lidsdale Cut collection sump) using a diesel standalone pump
- works have been undertaken to reinstate the civil drainage structures along the western edge of the dam wall toe and direct this flow to Lidsdale cut (for treatment in the Water Treatment Plant), improving the riparian vegetation quality and SSC water quality in that area of the site
- partitioning the Lidsdale Cut collection area to separate contaminated waters (leachate) from the uncontaminated surface runoff from capped areas and pump to the site water treatment facilities
- Expansion of instrumentation to facilitate the remote real time monitoring of water quality, dam levels and the operation of pumps remotely and semi automatically via a SCADA system located in the site office.

6.1.3 Water monitoring over the period

The AWQR addresses the surface and groundwater monitoring and reporting requirements established in the OEMP. Table 6.1 provides a summary of these requirements and notes where each requirement is addressed in the AWQR.

Table 6.1 OEMP – water monitoring and reporting requirements

	Description	OEMP reference	AWQR reference
Surface water			
Monitoring	Monthly water quality monitoring at four locations: • WMS3– Lidsdale cut • WX11 – Dump Creek • WMS1 – Sawyers Swamp Creek Ash Dam • WX7 – Sawyers Swamp Creek, downstream.	Chapter 5 (Environmental Monitoring)	Chapter 4
Analysis	Surface water quality monitoring data is to be assessed against: • Baseline water quality that is provided in Appendix B of the OEMP • Default guideline values (DGV) from ANZECC 2000.	Section 6.4 – Surface water quality sub-plan	Chapter 4
Reporting	The surface water quality monitoring data and associated analysis is to be reported in the AEMR.	Section 6.4 – Surface water quality sub-plan	Chapter4
Groundwater			
Monitoring	Monthly groundwater quality monitoring at six locations: • D1 – south-east of SSCAD • D2 - south of KVAR • D3 – between SSCAD and KVAR • D4 – north of KVAR • D5 – north-west of KVAD/KVAR • D6 – west of KVAD/KVAR.	Chapter 5 (Environmental Monitoring)	Chapter 5
Analysis	Groundwater quality monitoring data is to be assessed against: • Baseline water quality that is provided in Appendix C of the OEMP • DGVs from ANZECC 2000.	Section 6.5 – Groundwater quality sub-plan	Chapter 5
Reporting	The ground water quality monitoring data and associated analysis is to be reported in the AEMR.	Section 6.5 – Groundwater quality sub-plan	Chapter 5

6.2 Environmental performance

The review of surface water quality data documented in the AWQR concluded 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 contaminated water management system and hold water that is known to be ash affected.

- The water quality in Sawyers Swamp Creek and Dump Creek improved during the previous AEMR Period and relative to previous AEMR periods (i.e. 2018, 2019 and 2020 periods). This may be due to significant works implemented by GPM to improve the capture and containment of seepage in the KVAR/KVAD water management area that were implemented in the 2nd half of 2021 and/or the wet conditions that occurred over the period.

The gradual and minor decline in surface water quality noted over the current AEMR Period may be due to drier conditions from the beginning of 2023 onwards. The results show that salinity increased from the mid-December 2022 low indicating that this dilution trend provided by successive wet years (i.e. 2019-2022, refer Appendix D) was temporary (as expected) and correlates with longer term wet and dry cycles.

- The water quality in Sawyers Swamp Creek downstream of the Project Area (WX7) has characteristics consistent with clean water.

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

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

- groundwater at monitoring bore D3 (located between SSCAD and the KVAR) is slightly degraded, relative to baseline water quality trends.

In terms of other studies carried out over the AEMR Period, the Characterisation Report completed in September 2023 confirmed that some contaminants are migrating into the local and regional groundwater systems in the central and downgradient areas of the Project Area (i.e. beneath and immediately downgradient of the KVAR/KVAD area). The data suggests there is a regional groundwater flow generally towards the west with potential discharge to surface water features such as Sawyers Swamp Creek and Dump Creek. There is no evidence of offsite migration of contaminants in the regional groundwater system at this time.

6.3 Reportable incidents

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

6.4 Further improvements

GPM propose to continue to progressively improve the water management system through implementing the Action Plan commitments throughout the next AEMR 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 13.58 ha have 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

Current landscape and revegetation activities focus on care and maintenance of the Project Area.

Table 7.1 Rehabilitation status summary

Performance indicator	Completion criteria*	Current status (reporting period)
Visual impact	Measures to reduce the visual impact implemented as soon as practical.	Satisfactory – batters located closest to residents have been revegetated and weeds managed.
	Ash placement will concentrate on the Eastern face of the KVAR Stage 2 ash repository in order to shield the residents from future ash placement activities.	Not Applicable – ash placement no longer performed due to decommissioning of the WPS.
Capping	Ash to be capped to a depth of 0.75 m and contour ripped to preclude soil movement during rainfall or other erosion events.	Satisfactory – no soil loss or erosion identified in capped areas.
	Capping shall be conditioned to facilitate revegetation, which may include the use of cover crop grasses.	Satisfactory – import of capping material must meet ENV and VENM thresholds. Due diligence sampling is undertaken on capping material.
Revegetation	Develop a broad acre planting strategy on slopes at a 1 to 4 ratio.	Satisfactory – As per previous AEMR revegetated areas continue to grow. In areas where trees have impacted the capping integrity (closed asbestos area and KVAR), these plants have been removed and the areas reseeded with grass species to ensure stability and integrity of the capping.
	A developed revegetation procedure in place and implemented.	Satisfactory – As per previous AEMR, a Plan has been developed but requires updating to ensure species planted do not impact the integrity of capped areas.
	Grass cover revegetation to include perennial grasses.	Satisfactory – seed mix trials were undertaken during reporting period to gauge resilience to local conditions.

Table 7.1 Rehabilitation status summary

Performance indicator	Completion criteria*	Current status (reporting period)
	Planting of shrubs and trees undertaken using tube stock of local provenance tree species to be performed after establishment of perennial grasses.	Satisfactory – No additional planting has been undertaken due to the site declaration and upcoming DSI. Following these investigations remedial actions will be identified and the final landscape options will be updated to reflect the Health and Human Environmental Risk profile of the site.
	Plant establishment (trees and shrubs) to minimise soil loss and erosion.	Satisfactory – No soil loss or erosion identified in revegetated areas.
Irrigation	Irrigation undertaken at establishment and as required thereafter.	Satisfactory – Irrigation performed through the use of water cart sprays and sprinklers already installed on and around site.
Animal control	Threats to vegetation such as grazing by animals managed accordingly.	Satisfactory – No evidence of animal significant grazing on revegetated areas. Site fencing in good order. Wombat exclusion fencing has been successfully installed and maintained around the closed asbestos area.
Rehabilitation	All new batters rehabilitated as soon as practicable.	No new batters have been constructed within the Project Area. The existing KVAR berms have been regraded and reseeded as part of general maintenance activities.
	All areas of ash placement that have reached RL 940 m to be rehabilitated or in the process of rehabilitation as per revegetation plan.	GPM are currently maintaining existing rehabilitated areas with additional areas of the site being progressively rehabilitated during the 2022-2023 reporting period.

**Completion criteria taken from the OEMP Landscape and Revegetation Plan*

7.2.1 Remediation

Remediation activities onsite during the AEMR reporting period have included ensuring the ongoing stability of the ash repositories. Instability of the repositories has been caused by saturation of exposed ash areas, tree falls and animal burrows. GPM has engaged technical specialists to design reinforcement options and a final landform water drainage system to improve long term stability, and thereby facilitate final capping and rehabilitation of the site. The installation of this drainage, local reinforcement and the capping of exposed ash has been achieved during the year. Works are now underway and will continue into 2024 to establish a reinforcement berm against the stockpile in these areas which will ensure stability of the repository.

GPM intends to continue reinforcing berms around the entire extent of the KVAR/KVAD to ensure long term resistance to collapse in the next AEMR reporting period. 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.

7.2.2 Rehabilitation

Additional rehabilitation activities were undertaken during the 2022-23 reporting period, these included:

- KVAR stage 2 capping
- Lidsdale Cut landfill area capped
- closed asbestos landfill re-profiled, capped and rehabilitated
- installation of erosion and sediment controls.

7.2.3 Landscaping and revegetation

The growth of weeds has been an ongoing problem that GPM has continued to resolve through active weed management throughout the reporting period. The SSCAD had large areas of Pampas Grass in such magnitude it represented a risk to the important highland swamp threatened ecological communities areas elsewhere on the GPM landholding and in the wider district. The wooded areas of the Project Area had significant infestations of blackberry that had not been managed for many years and were harbouring other pest species such as rabbits.

Throughout the reporting period GPM has conducted weed removal and re-seeding of grasses along the Castlereagh Highway frontage to manage weeds, erosion and improve visual impacts to sensitive receivers, and passing traffic. These areas are irrigated from onsite settlement ponds during dry periods.

Weed treatment throughout the reporting period has targeted Pampass grass, Blackberry, Sifton Bush, Sorrel, Tussock, Pattersons curse, and thistle. Herbicides used for removal of weed species include Grazon, Glyphosate, Concussion and Ravage. Weed spraying is undertaken by a licensed contractor and only during low wind conditions to reduce the potential for impacts from spray drift. Mechanical removal of vegetation is also undertaken where access permits.

Progress has been made on removing pine forests historically planted by the Electricity Commission of NSW. These forests were beyond the maturation date with tree falls presenting safety risks and the potential to self-propagate, impacting infrastructure and competing with native vegetation. Impacts to infrastructure include the stability of the KVAD and KVAR walls. Dead and dying vegetation has allowed water into the ash stockpile in some locations increasing stability and potentially leachate generation.

In the next AEMR reporting period GPM propose 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.

Trees impacted by bushfires have also been removed during the reporting period.

Photograph 7.1 Pampas infestation pre-spraying

Photograph 7.2 Pampas infestation post-spraying and mechanical removal

7.2.4 Final landform

No final rehabilitation has occurred due to ongoing contamination investigations 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

8.1 Community engagement

The requirement for a new community consultative 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. 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 have registered to be included on the committee. The committee has met once during the reporting period.

8.1.1 Vegetation management

GPM have continued to undertake extensive vegetation management works around the site and Project Area boundaries to reduce the fire risk to near-by residences and site infrastructure. Work was undertaken in consultation with local residents and stakeholders and in accordance with the RFS requirements.

8.2 Community complaints

No complaints were received in the reporting period.

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 contact 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 & Safety 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:

- 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.

8.3 Website information

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

- Environment Assessment
- Project Approval 07_0005
- Operation Environmental Management Plan
- Annual Environmental Management Reports
- Environment Protection Licence 21185
- Pollution Incident Response Management Plan.

9 Independent audit

Since taking over the site, GPM have engaged a number of independent consultants and contractors to understand the history and current status to inform the safe closure of the site including decommissioning, demolition, rehabilitation.

As part of each AEMR, a Compliance Assessment against the CoA is conducted. The 2022-2023 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 Independent studies

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

- engagement of a NSW EPA accredited site auditor to provide independent reviews of investigation, remediation, and validation work undertaken by GPM's consultants
- monthly compliance review and site inspection
- Water Quality Discharge Assessment
- Water Management Assessment (including Site Action Plan), submitted to the EPA in August 2022
- six-monthly Water Quality Monitoring Reports
- surface water characterisation report, submitted to the EPA on 30 September 2023
- initial Groundwater Characterisation Report, submitted to the EPA on 30 September 2023
- Pollution Reduction Study - – Development of a Coal Ash Repository Water Sampling Program (currently underway)
- Preliminary Site Investigation (PSI)
- Kerosene Vale Ash Repository Stability Assessment
- independent assessment and recommendations to improve historic asbestos areas
- update of the site weed management program
- ecological biodiversity site survey
- assistance with the Department of Agriculture's reinstatement of copper wing butterfly habitat study
- routine dam safety audits
- independent fortnightly work practice site safety audits.

In addition to the above studies and investigations, GPM complete internal monthly EPL compliance reports and as part of the review an update to the OEMP and Compliance Tracking Program is proposed.

10 OEMP update and future studies

GPM are currently finalising the updates to the OEMP which includes a revised water monitoring and analysis approach. It is anticipated that the updated OEMP will be submitted to DPE for review and once approved, implemented during the 2023-2024 AEMR period.

GPM continues proactive discussions with regulators as to the best management and regulatory approach for the site.

10.1 Modification to PA 07_0005

A Modification to Project Approval 07_0005 was submitted to DPE in May 2023 to extend the import of capping materials by ten years. This extension of time accounts for the significant volumes of suitable capping material required to fully rehabilitate the site, and the inherent supply limitations of suitable excavated material from large infrastructure projects within a reasonable haulage distance to the site. The Modification was determined and approved on 13 October 2023. Compliance against the Consolidated Consent (Mod 2) will be assessed in the 2023-2024 AEMR reporting period.

10.2 Contamination declaration

During the 2021-2022 reporting period a preliminary site investigation (PSI) was completed. Recommendations were made in the PSI that contamination investigations should be undertaken to further evaluate all identified medium to high risks which have not been adequately characterised based on the data gap analysis conducted.

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, 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 are anticipated:

- The Detailed Site Investigation (DSI) will be undertaken with the objective of identifying the nature and extent of contamination. The DSI report will include relevant data from the Initial Groundwater Characterisation Report (EMM 2023c) and the Surface Water Characterisation Report.
- A Human Health and Ecological Risk Assessment will be prepared (if required) to identify specific soil and groundwater acceptance criteria for the site and for the remediation works.
- 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 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 proponent shall carry out the project generally in accordance with the:

a) the EA; and

b) the conditions of this approval.

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.

Compliance Assessment Finding – Compliant

Condition of Approval 1.2

In the event of an inconsistency between:

a) the conditions of this approval and any document listed from condition 1.1a), the conditions of this approval shall prevail to the extent of the inconsistency; and

b) any of the documents listed from the condition 1.1a), the most recent document shall prevail to the extent of the inconsistency.

Compliance Assessment Observations and Comments

Noted. No inconsistencies were observed between the documents listed above during implementation of the Kerosene Vale Ash Repository or during the course of the review of operations in preparing this AEMR.

Compliance Assessment Finding – Compliant

Condition of Approval 1.3

The proponent shall comply with the reasonable requirements of the Secretary arising from the Department's assessment of:

a) any reports, plans or correspondence that are submitted in accordance with this approval; and

b) the implementation of any actions or measures contained in these reports, plans or correspondence.

Compliance Assessment Observations and Comments

No correspondence was received from DPE regarding the 2021-2022 AEMR.

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 Proponent 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 Proponent to obtain, renew or comply with such licences, permits or approvals.

Compliance Assessment Observations and Comments

The project complies with the requirements of Generator Property Management Pty Limited EPL 21185 (See 3.1), dated 18 July 2022. 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 Proponent 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 Proponent 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

Prior to GPM ownership of the site, EnergyAustralia NSW commissioned the report Fly Ash: Strategy Development for Aggregates and Other Bulk Use Applications (DMC, 2010). The reports were submitted to DPI (now DPIE) in September 2011.

EnergyAustralia NSW did not achieve the goal of 40% ash reuse 31st December 2013, with a total of only 0.32% ash reuse occurring from Wallerawang Power Station by the end of 2013. In March 2014, when it was announced that Wallerawang Power Station was being put out of service, the total ash reuse from Wallerawang has remained at 0.32%.

Compliance Assessment Finding – Not applicable

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 Proponent shall undertake revised staging of ash placement activities as described in the document referred to in condition 1.1a) of this approval

Compliance Assessment Observations and Comments

Ash will not be placed over the coal resource in the project area as a result of the decommissioning of Wallerawang Power Station.

Compliance Assessment Finding – Not applicable

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 applicable

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 Proponent 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 applicable

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 applicable

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 applicable

Construction Noise

Condition of Approval 2.7

The construction noise objective for the proponent 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 Proponent 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 applicable

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 Proponent 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 Proponent 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 – Compliant

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 Proponent (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 Proponent is to take all reasonable and feasible measures to repair the breakdown in the shortest time possible.

Compliance assessment Observations and comments

PRJH Mining are the prime contractor for civil works across the site and have advised that no operational activities have taken place outside of these hours. These works only relate to activities at the 'repository' as the WPS has been largely demolished and has not been part of the GPM controlled activities since 2020.

Compliance Assessment Finding – Not Applicable

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 Proponent 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 Proponent shall implement all reasonable and feasible mitigation measures in accordance with the requirements of the Secretary.

2.12 - *The Proponent 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 Proponent 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 Proponent 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 Applicable

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 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.

Compliance Assessment Observations and comments

Measured noise levels during the 2022-23 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 2.16

The Proponent 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 2022-23 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 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.

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 applicable

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 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.

Compliance Assessment Observations and Comments

The requirement for a noise investigation report was not triggered. Measured noise levels during the 2022-23 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 Applicable

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 2022-23 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 Applicable

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 AEMR 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 Applicable

Sawyers Swamp Creek Realignment

Condition of Approval 2.26

The Proponent 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 Proponent 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

No Rehabilitation Plan for the SSC was submitted to DPE for approval, and no work on SSC realignment has been undertaken, therefore this condition was not triggered. GPM intends to submit an SSC Realignment Rehabilitation Plan in the 2023-2024 AEMR Reporting Period.

Compliance Assessment Finding – Not Applicable

Condition of Approval 2.27, 2.28 and 2.29

Compliance Assessment Observations and Comments

No Rehabilitation Plan for the SSC was submitted to DPE for approval, and no work on SSC realignment has been undertaken, therefore Conditions of Approval 2.27,2.28 and 2.29 were not triggered.

Compliance Assessment Finding – Not Applicable

Surface water quality

Condition of Approval 2.30

The Proponent shall take all reasonable and feasible measures to prevent discharge of sediments and pollutants from the construction andoperation 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 providedby an Environmental Protection Licence.

Compliance Assessment Observations and Comments

The KVAR water management system is located to the west (downgradient) of SSCAD. It comprises the KVAD and KVAR and associated drainage. Surface water runoff and seepage from this area drains to several water storages. Captured water that is known to be contaminated is reticulated to Lidsdale Cut (located downgradient of KVAD) where it is pumped to the water treatment facilities. The water is reticulated around the Kerosene Vale Ash Repository site for dust suppression and rehabilitation irrigation. Minimal discharges from site have occurred during the period due to dry conditions. All discharges have been undertaken in accordance with EPL 21185 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.

Monthly Client Service Reports may be viewed upon request. An example report is provided in the AEMR as Appendix B.

Compliance Assessment Finding - Compliant

Air Quality

Condition of Approval 2.33

The Proponent 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 Proponent shall identify and implement all practicable dust mitigation measures, including cessation of relevant works, as appropriate,such that emissions of visible dust cease.

Compliance Assessment Observations and Comments

Dust management within the Site is included in the responsibility of all operations. 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 Proponent 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 2022-23 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 Proponent 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

PRJH Work Procedures Manual contains procedures that apply to all personnel and equipment operating at Kerosene Vale Ash Repository, including the use of mobile lighting towers for any site works, and details the responsibilities, application and procedures for using outdoor lighting within the project area.

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.

The lights used at the Kerosene Vale Ash Repository site are the HILITE 4000. The specification sheets for these lights form part of the Work Procedures Manual for lighting and show compliance with requirements of this standard..

Compliance Assessment Finding - Compliant

Construction Traffic and Transport Impacts

Condition of Approval 2.36

The Proponent 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 Traffic Management Plan was submitted to and approved as part of the Construction Environment Management Plan. A Transport Management plan has been developed for the haulage of capping material (consent conditions 2.36A, & 6.5 f) with review and input from TfNSW and Council. The Transport Management Plan will be incorporated into the updated OEMP.

Compliance Assessment Finding - Compliant

Capping Material Transport Impacts

Condition of approval 2.36A

The Proponent 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 2 years following its commencement.

Compliance, Assessment and Observation

A Modification to Project Approval 07_0005 was submitted to DPE in May 2023 to extend the import of capping materials by ten years (MOD2). This extension of time accounts for the significant volumes of suitable capping material required to fully rehabilitate the site, and the inherent supply limitations of suitable excavated material from large infrastructure projects within a reasonable haulage distance to the Site. MOD2 was approved by DPE on 13 October 2023.

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 Proponent 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 RMS.

Compliance, Assessment and Observation

A Transport Management Plan has been developed with review and input from TfNSW and Council. The Transport Management Plan will be included in the updated OEMP. Signage is erected on the approaches to the Castlereagh Highway.

Compliance Assessment Finding – Compliant

Heritage Impacts

Condition of Approval 2.37

The Proponent 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.

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 AEMR reporting period.

Compliance Assessment Finding - Not applicable

Waste Management

Condition of Approval 2.39

All waste materials shall be assessed, classified, managed and disposed of in accordance with Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes (EPA, 1999).

Compliance Assessment Observations and Comments

PRJH Mining provides a monthly report which includes all issues of routine site maintenance as part of a monthly work program. Site waste 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 AEMR reporting period.

Compliance Assessment Finding - Compliant

Condition of Approval 2.41

The Proponent 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 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 1.1b) 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 Proponent 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

A CEMP was prepared for the construction works associated with the development of KVAR Stage 2B in preparation for ash placement, including a Construction Noise Management Plan and Noise Monitoring Program. This was submitted to DPI in August 2011 and approved on 16 December 2011.

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 Applicable

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 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 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, theProponent 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

Environmental Monitoring

Ongoing Operational Noise Monitoring

Condition of Approval 3.3

The Proponent 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 New South Wales Industrial Noise Policy (EPA,2000) 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 (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.

The Proponent 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 Proponent 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

An Operational Noise Monitoring Program in the form of the Operational Noise sub-plan was developed as part of the OEMP (EANSW, 2018) and provided to EnergyAustralia NSW to determine the minimum monitoring requirements for noise following receipt of approval from the DPI. GPM Continue to implement the required noise monitoring assessments. No non-compliances were identified during the reporting period.

Compliance Assessment Finding - Compliant

Groundwater Monitoring

Condition of Approval 3.4

The Proponent 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 in the form of the Groundwater Quality sub-plan was developed as part of the OEMP (EANSW, 2018) and provided to EnergyAustralia NSW to determine the minimum monitoring requirements for groundwater following receipt of approval from the DPI (now DPE). GPM continue to implement the required groundwater monitoring assessments.

Groundwater quality, depth, flow results and trends for the AEMR reporting period are reported in Section 7 and Appendix D.

Environmental Monitoring

Compliance Assessment Finding - Compliant

Surface Water Quality Monitoring

Condition of Approval 3.5

The *Proponent 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 in the form of the Surface Water Quality sub-plan was developed as part of the OEMP (EANSW, 2018) and provided to EnergyAustralia NSW to determine the minimum monitoring requirements for surface water following receipt of approval from the DPI. GPM continue to implement the required surface water monitoring program. During the AEMR Period GPM issued a water management assessment to the NSW Environment Protection Authority (EPA). This assessment included an Action Plan that described water management system improvements that are underway and proposed. The plan included a description of each improvement, expected outcomes once implemented and estimated completion timeframes. 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 a water management related pollution reduction program that was under discussion at that time.

Compliance Assessment Finding - Compliant

Swayers Swamp Creek Realignment Monitoring

Condition of approval 3.6 and 3.7

3.6 - *The Proponent 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 Proponent 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.

Environmental Monitoring

Compliance Assessment Observations and Comments

No action was taken to realign the Sawyers Swamp Creek during the AEMR reporting period, and no Rehabilitation Plan for SSC was submitted to DPE, therefore Conditions of Approval 3.6 and 3.7 were not triggered.

Compliance Assessment Finding – Not applicable

Air Quality Monitoring

Condition of Approval 3.8

*The Proponent shall prepare an **Air Quality Monitoring Program**, in consultation with, and to the satisfaction of, the EPA. The Program shallinclude 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 in the form of the air quality sub-plan was developed as part of the OEMP (EANSW, 2018) and provided to Delta to determine the minimum monitoring requirements for air quality following receipt of approval from the DPE. GPM continue to implement the required air quality monitoring program.

Depositional dust results for the period were below the annual assessment criteria at all gauges during the AEMR reporting period. These results indicate that Kerosene Vale Ash Repository is managed effectively for ash dust and as such is in compliance with CoAs 2.33 and 3.8.

Compliance Assessment Finding - Compliant

Compliance Monitoring and Tracking

Condition of Approval 4.1

Prior to each of the events listed below, the Proponent 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 applicable

Condition of Approval 4.2

The Proponent 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 Statement of 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

Environmental incidents that may occur at the Kerosene Vale Ash Repository site are reported in accordance with the Operation Environmental Management Plan (EANSW, 2018) and are captured within GPM's Incident Register.

PRJH Mining (site contractor) prepare and submit monthly reports to GPM which detail the number of site inspections, pre-start meetings, site water management activities and number of incidents for the month. These reports are in line with the conditions of approval, the OEMP and the EPL.

Annual compliance reporting requirements are covered by the preparation of the AEMR (Appendix A).

Compliance Assessment Finding – Compliant

Conditions of Approval 4.3 and 4.4

Conditions of Approval 4.3 – Nothing in this approval restricts the Proponent from utilising any existing compliance tracking programs administered by the Proponent to satisfy the requirements of condition 4.2. In doing so, the Proponent 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 Proponent 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 Proponent shall establish and maintain a website for the provision of electronic information associated with the project. The Proponent 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 Proponent 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 Assessment
- Project Approval 07_0005
- Environment Protection Licence (EPL21185)
- Operation Environmental Management Plan
- Annual Environmental Management Reports
- Environment Protection Licence 21185
- Pollution Incident Response Management Plan

Compliance Assessment Finding - Compliant

Complaints and Enquiries Procedure

Condition of Approval 5.3

Prior to the commencement of the project, the Proponent shall ensure that the following are available for community complaints and enquiries 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 Proponent 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 Proponent in relation to the complainant; and

g) if no action was taken by the Proponent 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 Proponent shall nominate for the approval of the Secretary a suitably qualified and experienced Environmental Representative(s) independentof the design, construction and operation personnel. The Proponent 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 Proponent upon the achievements of these plans/programs;

b) have responsibility for considering and advising the Proponent 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 Proponent 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 Proponent 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 preparation and will be implemented for upcoming 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 applicable

Operational Environmental Management

Conditions of Approval 6.4 and 6.5

Conditions 6.4 and 6.5 relate to the detailed requirements of the Operational Environmental Management Plan (OEMP).

Compliance Assessment Observations and Comments

The OEMP was prepared by Parsons Brinckerhoff, with approval granted in April 2009 and operations at KVAR Stage 2 commenced in September 2009. The OEMP was reviewed by EnergyAustralia NSW during the 2017-18 reporting period to ensure that it reflects the current care and maintenance activities. The reviewed OEMP 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 the approved OEMP to ensure it still reflects the current care and maintenance activities with the intent to submit a revised OEMP in the 2023-2024 AEMR reporting period.

Compliance Assessment Finding - Compliant

Condition of Approval 6.5A

The Proponent 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 reviewing the approved OEMP to ensure it still reflects the current care and maintenance activities with the intent to submit a revised OEMP in the 2023-2024 AEMR reporting period. The review will include the development of the 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 Proponent 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

Since taking over the Site, GPM have engaged a number of independent consultants and contractors to understand the Site history and current status to inform the safe closure of the Site including decommissioning, demolition, rehabilitation. Refer to Section 10 of the AEMR for more details on independent studies commissioned during the AEMR reporting period.

In addition to independent studies and investigations, PRJH Mining (site contractor) conduct routine site inspections. These inspections are provided to GPM in the form of monthly reports.

GPM are currently reviewing the site OEMP to ensure it reflects current care and maintenance activities. 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 Proponent shall notify the Secretary of any environmental incident within 12 hours of becoming aware of the incident. The Proponent 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 Proponent shall meet the requirements of the Secretary to address the cause or impact of any environmental incident, as it 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 incidents during the 2022-2023 AEMR reporting period.

Compliance Assessment Finding - Compliant

Annual Performance Reporting

Condition of Approval 7.3

The Proponent 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 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 Proponent 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 Proponent 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 Proponent 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.

Compliance Assessment Finding - Compliant

Appendix B

Kerosene Vale Site Operations Monthly Report – PRJH Mining

EMM
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PJ King Services Pty Ltd t/as PRJH Mining

Lidsdale Site Operations

EOM Summary Report
NOVEMBER 2022

Index

1. EXECUTIVE SUMMARY

November 2022 was our 12th month as the Lidsdale Site Operations Maintenance Contractor.

Safety and Compliance Auditing continue to provide positive feedback on our standards of work, compliance, and willingness to manage hazards on site. A summary of our Leading and Lagging Safety & Environmental KPI's are contained in section 2 of this report.

Labour and equipment hours were increased during November as we had good weather all month allowing us to fully utilise our equipment and people. Weed Spraying continued during the month with more details contained in section 5 of this report. Our ratio of Labour Hours to Equipment SMU continues to decrease as the work we are performing requires less Manual Labour.

The 1.8m wide 'Finishing Cutting Deck' for the Green Climber is due for delivery in December. This can be used on areas where there is not a requirement to have the heavier 'Flail Bar' attachment that is associated with heavy brush and regrowth. On areas where we have already mowed twice with the Green Climber, the thicker regrowth has thinned out, plus we have identified and where possible removed obstacles such as, steel rubbish, tree stumps & rocks.

Capping of the exposed ash in the KVAR continued using material being transported to site by Traffic NSW.

We continued with the installation of the KVAR Cut-Off Trench to attempt to capture any contaminated water on the floor of KVAR. The next step is to excavate into the bottom of the Ash and install drainage pipes that will feed the Cut-Off Trench by dewatering the bottom of the KVAR.

The Maintenance and Compliance Summary Spreadsheet continues to be updated Weekly now, then placed on the site Notice Board so the fitter and Auditors can see what services have been completed on the equipment, and when the next service is due.

Compliance items are also listed on this summary spreadsheet so they can be kept an eye on to make sure all dates are within the required range.

The Rectified Hazards Register and November-22 Risk Identifier Reports are attached at the back of this monthly report.

We continue to use the 'Plant Assessor' service which enables each machine to have a thorough ITS (Introduction to Site) completed, then a formal Plant Risk Assessment to ensure compliance to all NSW Rules & Regulations.

In addition to our Pump and Site Maintenance Duties a full list of extra tasks completed in the month is listed in Section 5 of this report.

Future projects planning to be undertaken on site are listed in Section 6.

2. SAFETY, LABOUR, ENVIRONMENTAL & KPI INFORMATION

Below is a summary of our key safety statistics for the project.

TABLE. 2.1 – Safety Statistics

Safety Item – Lag Indicators	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Total 6mths
Medically Treated Injuries	0	0	0	0	0	0		**0**
Near Miss Incidents	0	0	1	1	1	0		**3**
Lost Time Injuries	0	0	0	0	0	0		**0**
Breach of Safety Systems/Plans	0	0	0	0	0	0		**0**

Safety Item – Leading Indicators	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Total 6mths
Task Observations	7	3	3	5	3	3		**24**
Weekly Inspections	0	1	2	3	0	0		**6**
Monthly Audits	0	0	0	0	0	0		**0**
Toolbox Talks	2	1	4	1	3	2		**13**
Risk Assessments	8	3	1	1	3	0		**16**
Hazard Reports	5	2	1	3	1	0		**12**
Take 5's	164	133	162	150	148	159		**916**

Our Site Admin and part time Fitter assists us with reporting, servicing, defects, and compliance on site. The 'Equipment Planned Maintenance and Compliance Register' is updated each week and placed on the site Notice Board for everyone's information.

The 'Risk Identifier Report' which summaries each of the items identified during the Take 5 process is included at the back of this Monthly Report.

TABLE. 2.2 – Labour Hours

Company	Prev 7mths	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Project Total
PRJH Mining	12,492	1,975	2,198	2,446	2,161	2,138		**23,409**
Marangaroo Timbers	430	82	63	60	60	80		**775**
Other - Admin/Weeds/Fitter	351	14	24	34	130	109		**661**
PROJECT TOTALS	**13,272**	**2,070**	**2,285**	**2,540**	**2,351**	**2,327**	**0**	**24,844**

Novembers labour hours was in line with being a four-week period.

TABLE. 2.3 – Labour to Equipment SMU Ratio

Company	Prev 7mths	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Project Total
PRJH Mining Labour	n/a	1,975	2,198	2,446	2,161	2,138	0	**10,917**
Equipment SMU	n/a	1,012	1,201	1,375	1,268	1,289	0	**6,144**
Labour to SMU Ratio		**1.95**	**1.83**	**1.78**	**1.70**	**1.66**	**#DIV/0!**	**1.78**

As the work we are performing requires less Manual Labour, our Ratio of Labour to Equipment SMU is decreasing.

TABLE. 2.4 – Other KPI's

ITEM – Environmental KPI's	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Total 6mths
Environmental Incidents	None	None	None	None	None	None		**0**
Visible Dust Raising	None	None	None	None	None	None		**0**
Breach of EPL or Other Approvals	None	None	None	None	None	None		**0**
ITEM – Reporting KPI's								
Completion of Reports on Time	Yes	Yes	Yes	Yes	Yes	Late		**0**
Quality of Reports (Error Free)	Yes	Yes	Yes	Yes	Yes	Yes		**0**
Timely Provision of Information	Yes	Yes	Yes	Yes	Yes	Late		**0**
ITEM – Site Support KPI's	**Jun-22**	**Jul-22**	**Aug-22**	**Sep-22**	**Oct-22**	**Nov-22**	**Dec-22**	**Total 6mths**
No Delays to Project/Works due to Contractor	Yes	Yes	Yes	Yes	Yes	Yes		**0**
Equipment Delivered to Site on Time	Yes	Yes	Yes	Yes	Yes	Yes		**0**
Works Completed to Satisfaction of Third Parties	Yes	Yes	Yes	Yes	Yes	Yes		**0**
Safe Work Procedures	Yes	Yes	Yes	Yes	Yes	Yes		**0**

TABLE. 2.5 – Equipment Downtime

Equipment	Fault & Downtime	Outcome
Green Climber	Roller Bearing carrying the weight of the Rotating Flail Bars Failed. Lost only a few days in October, but expect November to be at least a week.	Replacement Bearings purchased and installed. As the machine only has 400hrs on it from new we are investing if we can modify the kind of bearings used so that a longer life is achieved.
299D Skidsteer	Final Drive appeared to have failed but after 1.5days it was going again.	After removing and inspecting it was discovered that just an internal hose needed to be replaced which was done then machine put back into service.
Backhoe	Puncture in one of the rear tyres. Was repaired within 2 days.	New tyre purchased and installed.

TABLE. 2.6 – Incidents

Date	Incident	Outcome
31.08.22	Watercart slumped on side of road near the CIP.	Water released from truck then pulled forward out of slumped side of road. New Barriers Installed to prevent traffic driving near side of embankment, plus road converted to a One Way Access.
14.09.22	Drill Rig become Bogged on KVAR above Red Swamp	When drill was driving down a newly constructed temporary ramp, the front left wheel sank in soft ground which the operator then stopped the drill and called for assistance. The drill was jacked up and mat placed under wheel so it could continue driving down the ramp.
9.10.22	Pump 6. Was caught below the water level after Heavy Rain	Pump moved to higher ground, fuel drained and injectors cleaned, then restarted and running as per normal.

Included at the back of this Monthly Report is the table of Hazard Reports raised and rectified on the project up until the end of November-22.

3. EQUIPMENT & FUEL STATISTICS

A full list of equipment and hours utilised on site can be observed below.

TABLE. 3.1 – Equipment Monthly Hours

Item	Prev 7mths Ave	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Project Total
Water Carts	57.8	26.0	86.0	135.5	78.0	77.0		**793**
Backhoe	106.5	118.4	88.0	158.0	118.0	111.0		**1,312**
Rigid Truck	108.1	90.2	65.0	38.0	0.0	0.0		**923**
Pumps	n/a	n/a	n/a	n/a	n/a	n/a		**0**
Generator	n/a	n/a	n/a	n/a	n/a	n/a		**0**
Site Light Vehicles	n/a	n/a	n/a	n/a	n/a	n/a		**0**
Extra Rigid Truck	38.1	36.5	8.0	0.0	0.0	1.0		**274**
Cat 730 Artic Truck	n/a	n/a	101.0	165.0	155.0	154.5		**576**
Bell Artic Truck	n/a	n/a	n/a	n/a	n/a	10.0		**10**
7tn Excavator	144.4	124.0	125.0	29.0	0.0	0.0		**1,145**
25/30tn Exc - Cat 300	119.2	0.0	65.0	58.0	61.0	61.0		**1,050**
25/30tn Exc – Hyundai	215.0	101.0	149.0	176.0	175.0	177.0		**993**
8tn Exc – Hyundai	n/a	99.0	178.0	202.0	186.0	194.0		**859**
5.5tn Excavator	121.6	126.0	89.0	65.0	148.0	153.0		**733**
Green Climber	94.1	87.0	42.5	98.5	108.0	93.0		**664**
12H Grader	33.3	28.5	9.0	8.0	0.0	0.0		**179**
Barford 9tn Trk (Days)	4.7	n/a	n/a	n/a	n/a	n/a		**28**
Bobcat / SkidSteer	61.0	132.0	128.0	133.0	129.0	160.0		**926**
Roller	5.3	10.0	0.0	0.0	0.0	0.0		**21**
980H Loader	73.2	32.0	62.0	108.0	108.0	97.0		**773**
1.7tn Exc (Days)	9.0	1.0	5.0	1	2	0.0		**45**
Other	0	0.0	0.0	0.0	0.0	0.0		**0**
PROJECT TOTALS	**1,191**	**1,012**	**1,201**	**1,375**	**1,268**	**1,289**	**0**	**11,302**

TABLE. 3.2 – Equipment Monthly Fuel

Item	Prev 7mths Ave	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Project Total
Water Carts	656	0	702	882	422	533		**6,964**
Backhoe	533	737	295	841	638	554		**6,261**
Rigid Truck	495	324	245	159	105	0		**3,801**
Pumps	2,471	1,427	1,143	1,328	1,953	2,350		**24,878**
Generator	781	0	61	155	107	47		**5,642**
Site Light Vehicles	336	632	420	879	507	562		**5,015**
Extra Rigid Truck	196	242	262	0	0	0		**1,484**
Cat 730 Artic Truck	n/a	n/a	811	1,925	1,529	1,848		**6,113**
Bell Artic Truck	n/a	n/a	n/a	n/a	n/a	205.0		**205**
7tn Excavator	652	1,036	655	194	0	0		**5,799**
25/30tn Exc - Cat 300	1,078	120	1,408	946	755	871		**11,377**
25/30tn Exc – Hyundai	3,159	1,423	1,562	2,049	1,601	2,264		**12,058**
8tn Exc – Hyundai	n/a	599	1,124	1,368	1,169	1,224		**5,484**
5.5tn Excavator	546	719	359	224	520	550		**3,055**
Green Climber	318	377	162	404	394	349		**2,480**
12H Grader	206	110	0	0	0	200		**1,134**
Barford 9tn Truck	56	0	0	0	0	0		**337**
Bobcat / SkidSteer	266	664	797	989	861	976		**5,350**
Roller	0	30	0	0	0	0		**30**
980H Loader	1,055	500	552	2,826	1,669	1,688		**12,509**
1.7tn Exc	88	0	44	15	16	13		**438**
Other	0	0	0	0	0	0		**0**
PROJECT TOTALS	**8,772**	**8,940**	**10,602**	**15,184**	**12,246**	**14,234**	**0**	**120,414**

At the end of the September Quarter a Fuel Reconciliation was submitted. The cost per Litre has increased significantly since the commencement of the project which required a reimbursement, plus we used over the budgeted 30,000litres for the period.

4. WATER USED & PUMPED

The Water Truck we used on site during November has a capacity of 14,000ltrs per load.

Based on the hours utilised during the month the approximate number of loads used for Dust suppression is 90 for a volume of 1,260,000ltrs.

5. WEED SPRAYING & GRASS SEEDING

November had four weeks or eight full days on the Weed Spraying Scope of Works using our suitable Light Vehicle with Tank and Retractable Hose arrangement.

Following is a picture with markings showing the Areas where chemicals were sprayed to control the weeds with details as follows.

4/11/22 – 850ltrs Grazon, Blackberries, Broadleaf, St John's Wort,

5/11/22 – 750ltrs Grazon, Blackberries, Broadleaf, St John's Wort,

9/11/22 – 800ltrs Grazon, Blackberries, Broadleaf, St John's Wort,

10/11/22 – 800ltrs Grazon, Blackberries, Broadleaf, St John's Wort,

18/11/22 – 400ltrs Grazon, 300ltrs Glyphosate at 2 Ponds,

19/11/22 – 600ltrs Grazon,

23/11/22 – 800ltrs Grazon,

24/11/22 – 850ltrs Grazon,

6. WORK UNDERTAKEN & COMPLETED

In addition to the General Duties on site of Pumping, Dust Suppression and Site Maintenance we also completed the following:

- Load & Haul Import Material from KVAR to Cap Ash Dump
- Spread Imported Material over Ash in KVAR
- Fill in Voids in the Ash in KVAR
- Marangaroo Timbers ongoing Tree Cutting, Mulching & Stump Grinding
- Cutting/Mowing Vegetation
- Continue Installing KVAR Cut Off Trench
- Seeding and preparing Batters for Seeding
- Weed Spraying
- Stockpile Management of Material Deliveries

7. OUTLOOK & FUTURE PROJECTS

Extra Tasks/Projects we are looking to Commence/Continue/Complete during December include:

- Continue Capping the exposed Ash in the KVAR
- Ongoing Tree Removal and preparation for Capping of the old Asbestos Dump and Lidsdale Town Dump Areas
- Regrading Batters so Green Climber can be used instead of brush cutters on Vegetation Control
- Install Rolled Turf as a trial onto the finished batters
- Installation of the Cut-Off Trench in KVAR
- Continue the Construction the first Clean Water Collection Pond on the North Side of SCAD Cell C/D
- General fill material delivery management for capping

8. PICTURES

Loading our Dividing Walls in KVAR

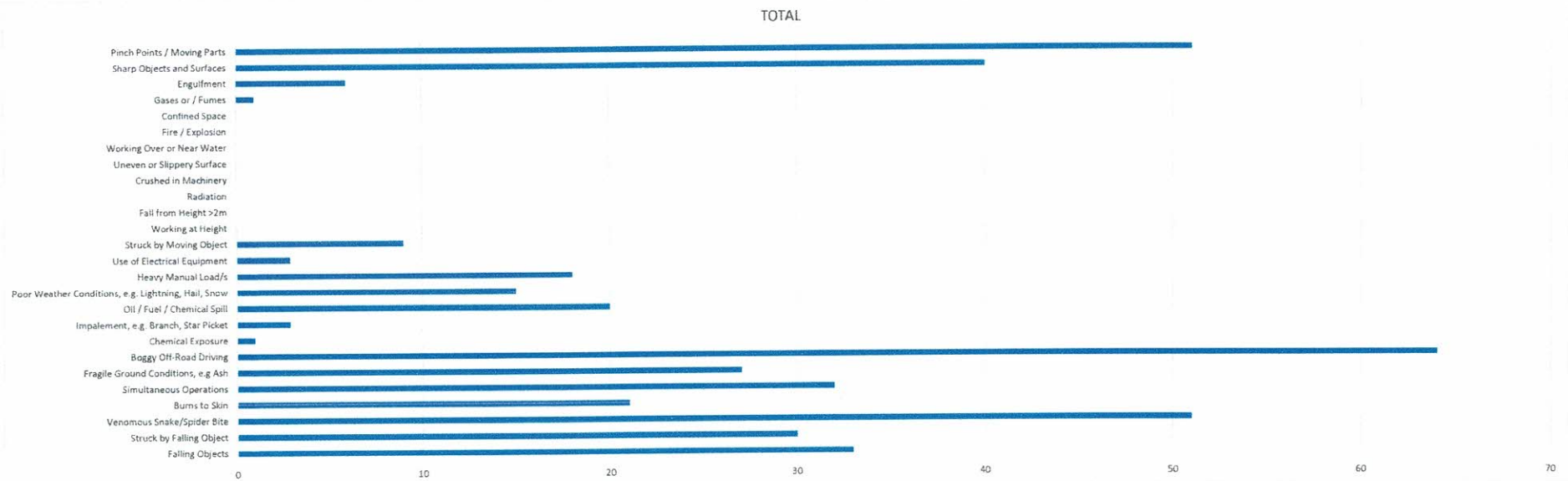
Completed KVAR Capping and Batters Regraded

New Site Telehandler and Medium Rigid Truck

935 - LID - Part 2 of 2

Kerosene Vale - Lidsdale Site Operations - Take 5/SLAMS's Hazards Identified - November 2022

No.	ITEM	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	23rd	24th	25th	26th	27th	28th	29th	30th	31st	TOTAL
1	Falling Objects	1	1	2	2	1	1	2	1	1	2	4	1	1	1	2	3	3	3	1	1	1	1	1	1	1			2	3	3		47
2	Struck by Falling Object	1		2	2	1	1	2	1	1	3	4	1	1	1	2	2	3	3	1	1		2	3	1	1			3	2	3		48
3	Venomous Snake/Spider Bite	1	2	4	3	1	1	4	4	4	5	5	1	1	2	4	3	5	4	1	1	3	2	4	3	3			4	3	6		84
4	Burns to Skin	1		3	2	1	1	2	2	1	3	2	1	1	1	1	1	2	2	1	1	1	1	2	1	1			2	1	1		39
5	Simultaneous Operations	2	2	2	3	1	1	3	4	3	3	4	1		2	2	1	3	3	1	1	1	1	2	2	1			3	3	3		58
6	Fragile Ground Conditions, e.g Ash	4	3	4	3		1	5	6	7	4	5			2	3	4	5	6			5	3	4	4	4			4	7	7		100
7	Boggy Off-Road Driving	4	3	3	3		1	3	6	5	4	3			2	3	3	4	3			2	2	4	1	2			4	2	5		72
8	Chemical Exposure								2	1	1	1			1			1	1	1										1	1		11
9	Impalement, e.g. Branch, Star Picket			1					1									1	1														4
10	Oil / Fuel / Chemical Spill	1		1	1	1	1	1	1	1	1	1	1	1			1	2	1	1	1								1				19
11	Poor Weather Conditions, e.g. Lightning, Hail, Snow		1									1		1				1	1														5
12	Heavy Manual Load/s			1	1	1	1	1	1		2	1	1	1			1	1	1	1	1	1		1					1				19
13	Use of Electrical Equipment																	1	1			1								1			4
14	Struck by Moving Object	2	1	3	1	1	1	2	2	2	3	3	1	1		2	2	3	3	1	1	3	1	3	1				2		4		49
15	Working at Height	1	1		1			1		1	1	1				1	1	2	2			1	1	1	1	3				1			21
16	Fall from Height >2m			1														1	1					1									4
17	Radiation																	1	1														2
18	Crushed in Machinery	1	2	4	2	1	1	3	1	3	2	2	1	1	1	3	2	4	3	1	1	2	1	1	3	2			2	1			51
19	Uneven or Slippery Surface	2	3	4	2	1	2	3	2	5	5	4	1	1	1	3	4	3	4	1	1	3	1	3	3	2			4	5	5		78
20	Working Over or Near Water	1	1	1	1	1	2	2	2	3	2	2	1	1		1	2	1	2	1	1	1		1	1				3	2	2		38
21	Fire / Explosion	1	1	1		1	1		1				1	1				1	1	1	1	2	1		2	1							18
22	Confined Space																	1	1														2
23	Gases or / Fumes																	1	1														2
24	Engulfment	1		1				3	1	2	1	2			1	1	1	2	3			2		1	2	2			1		3		30
25	Sharp Objects and Surfaces			1	1	1	1	1		1	2	2	1	1		1	1	2	2	1	1			1	1				1	1	1		25
26	Pinch Points / Moving Parts	1	1	3	1	1	1	3	3	2	3	4	1	1	1	3	2	3	3	1	1	3	1	3	3	2			2	3	3		59
	TOTALS	25	22	42	29	14	18	41	41	43	47	51	14	14	16	32	34	57	57	15	14	32	18	36	30	25	0	0	39	36	47	0	889



PRJH MINING PTY LTD

HAZARD & CORRECTIVE ACTION REGISTER

KEROSENE VALE ASH REPOSITORIES

Incident Number	Incident Type		Date	Issue Identified	Recommended Corrective or Preventative action	By Whom	Priority *High-Medium-Low	Due Date	COMPLETED ON (Insert Date)	Set the no. of weeks to close out the action	OVERDUE (DAYS)
	*Safety (S)	*Environment (E)									
1		√	12.08.22	Contaminated material released from old Springvale pipe line	Ensure area is bunded or sump inplace before disconnecting diseased pipe line	Barry O	Medium	12.08.22	12.08.22		
2	√		15.08.22	Loss of traction on ramp to water fill when wet	Clean mud off ramp and resheet ramp	Barry O	Medium	15.08.22	18.08.22		
3	√		19.08.22	Light vehicles on truck circuit not making positive communication	All light vehicles to make positive communicarion with HV's when entering live circuits, extra signage to be used	Conall O	Medium	19.08.22	20.08.22		
4	√		26.08.22	Manual handling to refill water cart	Set up water fill stand pipe@ CIP (Drive through)	Pumpers	Low	26.08.22	30.08.22		
5		√	28.08.22	Water from wetlands causing dusty conditions on roads after drying	Don't use water from wetlands to water road						
6	√		2.09.22	Uncompacted raod edge at return water chanel	Place concrete block to keep vehicles away from edge	Saoirse	High	2.09.22	2.09.22		
7	√		9.09.22	Trees falling on road on way to black hole	Marangaroo Timbers to cut any trees overhanging road	Peter	Medium	13.09.22	13.09.22		
8	√		14.09.22	Open edge along haul road	Widen road where possible and place concrete blocks as barrier	Ross	High	26.9.22	22.09.22		
9	√		26.09.22	Narrow access around CIP	Make road one way and toolbox crew		Low				
10		√	10.10.22	Speeding on site	Toolbox crew and let any contractors aware of site speed limits	Tony	Medium	10.10.22	20.10.22		
11	√		17.10.22	New employees on site who have not worked on ash	Training, daily catch up (Toolbox)	Barry O	High	17.10.22	Ongoing		
12	√		28.10.22	Uneven surface @ shutoff valve for waterfill	Sheet uneven surface with gravel to make safe	Saoirse	Medium	28.10.22	29.10.22		
13	√		1.11.22	Entrance to seepage pit needs tidy up to make safe	Dig out tree stumps, fill hole with crusher dust. Tidy up poly pipes from pit	Barry O	Medium	1.11.22	2.11.22		
14	√		4.11.22	Exit from wheelwash needs guard railing to prevent vehucles driving over concrete plenth	Place guard rails alond sides of exit	Barry O	Medium	1.12.22			
15	√		15.11.22	Uneven surface at water fill	Fill with gravel and level off	Barry O	Medium	16.11.22	16.11.22		
16		√	26.11.22	Very dusty due to trucks dumping top of KVAR	Ensure water truck is manned up all day while trucks are running	Barry O	High	27.11.22	27.11.22		

Appendix C
Noise report

EMM
creating opportunities

AEMR Noise Report

1 September 2022 to 31 August 2023

Prepared for Generator Property Management Pty Ltd

October 2023

AEMR Noise Report

1 September 2022 to 31 August 2023

Generator Property Management Pty Ltd

E230527 RP1

October 2023

Version	Date	Prepared by	Reviewed by	Comments
1	04/10/2023	Will Moore	Robert Kirwan	Draft
2	25/10/2023	Will Moore	Jesse Tribby	Final

Approved by

Jesse Tribby
Associate, Acoustics
25 October 2023

Level 3 175 Scott Street
Newcastle NSW 2300

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Tables

Figures

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Generator Property Management Pty Ltd (GPM) to provide an Annual Environmental Management Report (AEMR) for 2022/2023. This report summarises the attended noise monitoring of operational activities at Kerosene Vale Ash Repository (KVAR, the site) as required in section 7.3 of development consent MP07_0005 (MOD1, August 1 2018). Reporting period for this AEMR is 1 September 2022 to 31 August 2023.

During the 2022/2023 reporting period, attended noise monitoring was conducted on a quarterly basis in accordance with MP07_0005, Environment Protection Licence (EPL) No. 21185 and the Operational Environmental Management Plan (OEMP). More detail regarding monitoring locations and timing of monitoring is provided in Section 1.2 of this report.

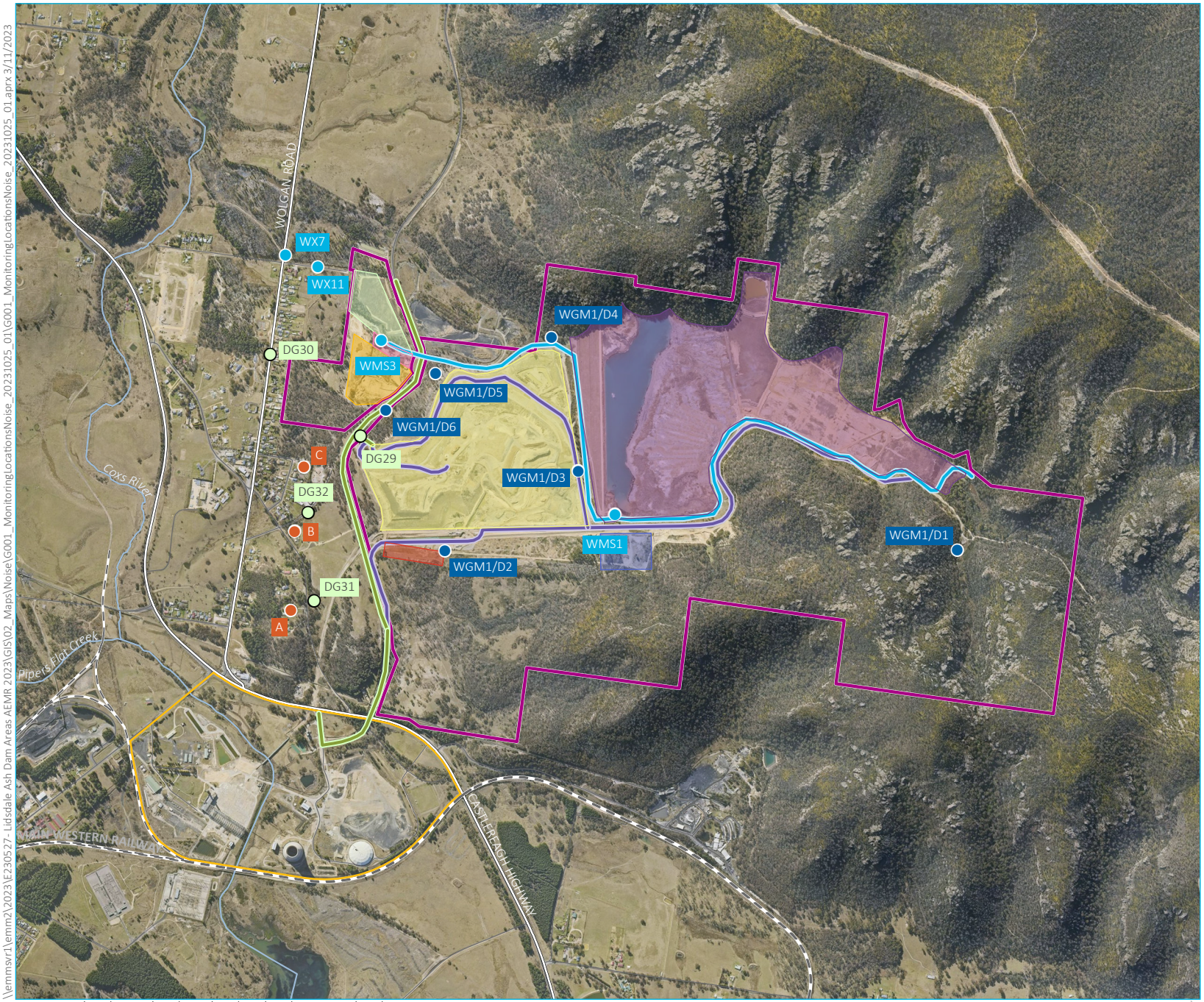
1.2 Monitoring locations and timing

There were three attended noise monitoring locations between 1 September 2022 and 31 August 2023 as detailed in Table 1.1 and shown on Figure 1.1. Monitoring during this period was undertaken quarterly, specifically during the months September 2022, November 2022, February 2023, April 2023, and August 2023.

It should be noted that Figure 1.1 shows the actual monitoring positions, not 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



\\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

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

Environmental Monitoring Locations

Kerosene Vale Ash Repositories
Figure 1.1

EMM
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1.3 Terminology and abbreviations

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

Table 1.2 Terminology and abbreviations

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.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
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.

2 Noise limits

2.1 Development consent

The current development consent for the Site is MP07_0005 (MOD 1, August 2018). Section 2 of the consent details the specific conditions relating to operational noise generated by the Site.

2.2 Environment protection licence

GPM holds Environment Protection Licence (EPL) No. 21185 issued by the Environment Protection Authority (EPA) dated 18 July 2022. Section L5 sets out the noise limits applicable to the Site.

2.3 Noise management plan

The Site 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.

2.4 Noise limits

2.4.1 Operational noise limits

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

Table 2.1 Operational noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$
Location A	40	40
Location B	40	40
Location C	40	40

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 conducted in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements.

3.2 Attended noise monitoring

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 the Site contribution (if any) to measured levels. At each monitoring location, the Site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

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

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

If exact noise levels from the 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 the Site 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.

4 Results

4.1 Quarter 3 – September 2022

4.2 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.4.

Table 4.1 Total measured noise levels, dB – Quarter 3 2022 [1]

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
A	20/09/2022 08:23	67	57	55	55	37	34	30
A	19/09/2022 18:00	74	60	46	49	40	38	35
B	20/09/2022 08:43	80	65	49	55	42	39	37
B	19/09/2022 18:19	63	54	47	45	42	38	34
C	20/09/2022 09:06	66	49	47	45	45	43	39
C	19/09/2022 18:38	73	57	47	56	39	35	33

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

Atmospheric condition data measured by the noise consultant during each measurement using a hand-held weather meter is shown in Table 4.5. 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 2022

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
A	20/09/2022 08:23	7	<0.5	-	0
A	19/09/2022 18:00	8	<0.5	270	0
B	20/09/2022 08:43	11	<0.5	-	0
B	19/09/2022 18:19	8	<0.5	-	0
C	20/09/2022 09:06	12	<0.5	60	0
C	19/09/2022 18:38	6	<0.5	-	0

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

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

Table 4.3 Site noise levels and limits – Quarter 3 2022

Location	Start date and time	Wind speed m/s	Limits apply? [1]	Site limit, $L_{Aeq,15minute}$ dB	Site level, $L_{Aeq,15minute}$ dB [2]	Exceedance, dB [3]
A	20/09/2022 08:23	1.9	Yes	40	IA	Nil
A	19/09/2022 18:00	1.7	Yes	40	IA	Nil
B	20/09/2022 08:43	1.9	Yes	40	IA	Nil
B	19/09/2022 18:19	1.1	Yes	40	IA	Nil
C	20/09/2022 09:06	1.9	Yes	40	IA	Nil
C	19/09/2022 18:38	0.0	Yes	40	IA	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.

The Site was inaudible during all measurements for Quarter 3 2022. Road traffic was primarily responsible for generating measured noise levels. Noise from power station demolition and from animals was also noted.

4.4 Quarter 4 – November 2022

4.5 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.4.

Table 4.4 Total measured noise levels, dB – Quarter 4 2022 [1]

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
A	10/11/2022 15:58	67	51	40	40	35	32	30
A	10/11/2022 18:44	64	54	44	43	36	33	30
B	10/11/2022 15:35	53	46	40	37	35	32	30
B	10/11/2022 18:22	66	55	47	45	39	32	28
C	10/11/2022 15:11	67	59	45	46	36	32	29
C	10/11/2022 18:00	70	57	42	44	36	33	28

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

Atmospheric condition data measured by the noise consultant during each measurement using a hand-held weather meter is shown in Table 4.5. 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 4.5 Measured atmospheric conditions – Quarter 4 2022

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
A	10/11/2022 15:58	22	1.5	180	3
A	10/11/2022 18:44	18	0.7	210	3
B	10/11/2022 15:35	23	0.5	230	4
B	10/11/2022 18:22	19	1.4	270	4
C	10/11/2022 15:11	22	0.5	230	4
C	10/11/2022 18:00	20	1.0	330	5

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

4.6 Site only noise levels

4.6.1 Modifying factors

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

4.6.2 Site noise levels

Table 4.6 provides site noise levels in the absence of other sources, where possible, and includes weather data from the Marrangaroo AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.6 Site noise levels and limits – Quarter 4 2022

Location	Start date and time	Wind speed m/s	Limits apply? [1]	Site limit, $L_{Aeq,15minute}$ dB	Site level, $L_{Aeq,15minute}$ dB [2]	Exceedance, dB [3]
A	10/11/2022 15:58	0.6	Yes	40	IA	Nil
A	10/11/2022 18:44	1.1	Yes	40	IA	Nil
B	10/11/2022 15:35	1.7	Yes	40	<20	Nil
B	10/11/2022 18:22	1.9	Yes	40	IA	Nil
C	10/11/2022 15:11	1.9	Yes	40	<25	Nil
C	10/11/2022 18:00	1.7	Yes	40	IA	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.

Trucks travelling along the haul road into Site were audible during the day measurement at Location B, generating a site only L_{Aeq} of less than 20 dB, and at Location C, generating a site only L_{Aeq} of less than 25 dB.

Road traffic was primarily responsible for generating measured noise levels. Noise from power station demolition and from animals was also noted.

4.7 Quarter 1 – February 2023

4.8 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.7.

Table 4.7 Total measured noise levels, dB – Quarter 1 2023 [1]

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
A	15/02/2023 15:23	62	48	39	38	35	33	31
A	15/02/2023 19:13	65	53	41	42	37	35	33
B	15/02/2023 15:00	60	51	44	41	36	33	31
B	15/02/2023 18:51	54	45	39	37	35	32	29
C	15/02/2023 14:38	51	45	38	36	35	31	28
C	15/02/2023 18:29	66	51	40	40	36	33	30

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

Atmospheric condition data measured by the noise consultant during each measurement using a hand-held weather meter is shown in Table 4.8. 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 4.8 Measured atmospheric conditions – Quarter 1 2023

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
A	15/02/2023 15:23	26	0.9	220	3
A	15/02/2023 19:13	21	1.5	190	3
B	15/02/2023 15:00	31	1.8	90	4
B	15/02/2023 18:51	23	1.1	300	4
C	15/02/2023 14:38	29	1.3	120	4
C	15/02/2023 18:29	25	0.8	130	3

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

4.9 Site only noise levels

4.9.1 Modifying factors

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

4.9.2 Site noise levels

Table 4.9 provides site noise levels in the absence of other sources, where possible, and includes weather data from the Marangaroo AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.9 Site noise levels and limits – Quarter 1 2023

Location	Start date and time	Wind speed m/s	Limits apply? [1]	Site limit, $L_{Aeq,15minute}$ dB	Site level, $L_{Aeq,15minute}$ dB [2]	Exceedance, dB [3]
A	15/02/2023 15:23	1.7	Yes	40	IA	Nil
A	15/02/2023 19:13	1.7	Yes	40	IA	Nil
B	15/02/2023 15:00	2.5	Yes	40	IA	Nil
B	15/02/2023 18:51	2.5	Yes	40	IA	Nil
C	15/02/2023 14:38	1.9	Yes	40	IA	Nil
C	15/02/2023 18:29	2.5	Yes	40	IA	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.

The Site was inaudible during all measurements for Quarter 1 2023. Road traffic was primarily responsible for generating measured noise levels. Noise from power station demolition and from animals was also noted.

4.10 Quarter 2 – April 2023

4.11 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.10.

Table 4.10 Total measured noise levels, dB – Quarter 2 2023 [1]

Location	Start date and time	L_{amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{amin}
A	26/04/2023 21:44	47	40	36	35	34	32	31
A	27/04/2023 11:55	52	49	45	41	38	35	32
B	26/04/2023 21:24	52	48	37	36	34	33	30
B	27/04/2023 11:30	58	53	47	43	38	33	30
C	26/04/2023 21:06	49	37	32	29	27	25	23
C	27/04/2023 11:04	53	46	41	37	34	30	27

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

Atmospheric condition data measured by the noise consultant during each measurement using a hand-held weather meter is shown in Table 4.11. 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 4.11 Measured atmospheric conditions – Quarter 2 2023

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
A	26/04/2023 21:44	12	0.7	360	6
A	27/04/2023 11:55	22	0.8	360	1
B	26/04/2023 21:24	11	<0.5	-	4
B	27/04/2023 11:30	19	0.6	315	1
C	26/04/2023 21:06	10	<0.5	-	5
C	27/04/2023 11:04	18	0.7	300	0

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

4.12 Site only noise levels

4.12.1 Modifying factors

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

4.12.2 Site noise levels

Table 4.12 provides site noise levels in the absence of other sources, where possible, and includes weather data from the Marangaroo AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.12 Site noise levels and limits – Quarter 2 2023

Location	Start date and time	Wind speed m/s	Limits apply? [1]	Site limit, $L_{Aeq,15minute}$ dB	Site level, $L_{Aeq,15minute}$ dB [2]	Exceedance, dB [3]
A	26/04/2023 21:44	1.1	Yes	40	IA	Nil
A	27/04/2023 11:55	1.7	Yes	40	37	Nil
B	26/04/2023 21:24	1.1	Yes	40	IA	Nil
B	27/04/2023 11:30	1.9	Yes	40	33	Nil
C	26/04/2023 21:06	1.1	Yes	40	IA	Nil
C	27/04/2023 11:04	1.7	Yes	40	34	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.

Trucks travelling along the haul road to Site were audible during the day at Location A, generating a site only L_{Aeq} of 37 dB, Location B, generating a site only L_{Aeq} of 33 dB, and at Location C, generating a site only L_{Aeq} of 34 dB. Track noise was also noted.

Noise from road traffic was primarily responsible for generating measured noise levels during the evening period. Noise from animals was also noted.

4.13 Quarter 3 – August 2023

4.14 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.13.

Table 4.13 Total measured noise levels, dB – Quarter 3 2023[1]

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
A	2/08/2023 14:00	61	50	40	39	35	33	29
A	2/08/2023 19:25	45	41	38	36	35	34	32
B	2/08/2023 13:37	84	72	49	58	38	33	30
B	2/08/2023 19:04	52	49	45	41	39	36	33
C	2/08/2023 13:16	76	63	51	51	38	33	29
C	2/08/2023 18:44	56	47	38	36	32	30	27

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

Atmospheric condition data measured by the noise consultant during each measurement using a hand-held weather meter is shown in Table 4.14. 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 4.14 Measured atmospheric conditions – Quarter 3 2023

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
A	2/08/2023 14:00	13	1.7	40	4
A	2/08/2023 19:25	6	0.0	-	0
B	2/08/2023 13:37	18	2.0	90	4
B	2/08/2023 19:04	5	0.0	-	0
C	2/08/2023 13:16	17	0.7	260	4
C	2/08/2023 18:44	11	0.0	-	0

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

4.15 Site only noise levels

4.15.1 Modifying factors

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

4.15.2 Site noise levels

Table 4.15 provides site noise levels in the absence of other sources, where possible, and includes weather data from the Marangaroo AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.15 Site noise levels and limits – Quarter 3 2023

Location	Start date and time	Wind speed m/s	Limits apply? [1]	Site limit, $L_{Aeq,15minute}$ dB	Site level, $L_{Aeq,15minute}$ dB [2]	Exceedance, dB [3]
A	2/08/2023 14:00	3.1	No	40	<30	N/A
A	2/08/2023 19:25	0.6	Yes	40	IA	Nil
B	2/08/2023 13:37	2.5	Yes	40	<30	Nil
B	2/08/2023 19:04	1.1	Yes	40	IA	Nil
C	2/08/2023 13:16	2.5	Yes	40	<25	Nil
C	2/08/2023 18:44	1.7	Yes	40	IA	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.

Trucks travelling along the haul road to Site were audible during the day at Location A, generating a site only L_{Aeq} of less than 30 dB. Track noise was also noted. Trucks travelling along the haul road and operational continuum were audible during the day at Location B, generating a site only L_{Aeq} of less than 30 dB. An operational continuum was audible during the day at Location C, generating a site only L_{Aeq} of less than 25 dB.

Noise from road traffic was primarily responsible for generating measured noise levels during the evening period. Noise from animals was also noted.

5 Summary of compliance

EMM was engaged by Generator Property Management Pty Ltd to provide an annual Noise Compliance Assessment Report for 2022/2023 to support the AEMR. This report summarises the attended noise monitoring of operational activities and operations at the Site located near Lidsdale, NSW during the reporting period 1 September 2022 to 31 August 2023.

The purpose of quarterly attended monitoring is to quantify and describe the acoustic environment around the Site, compare results with relevant limits, and assess whether the monitoring points are still representative of noise compliance at sensitive receivers.

Compliance

The Site complied with all development consent 07_0005 limits and EPL 21185 limits at all monitoring locations during attended noise monitoring undertaken between September 2022 and August 2023.

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Appendix D

Annual water quality review

EMM
creating opportunities

Annual Water Quality Review

Kerosene Vale Ash Dam Areas

Prepared for Generator Property Management Pty Ltd

October 2023

Annual Water Quality Review

Kerosene Vale Ash Dam Areas

Generator Property Management Pty Ltd

E230527 RP#1a

October 2023

Version	Date	Prepared by	Reviewed by	Comments
V1	26/10/2023	Jack Mellor & Harrison Callen	Chris Kuczera & Michelle Frankham	Final

Approved by

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26/10/2023
Level 3 175 Scott Street
Newcastle NSW 2300

Executive Summary

ES1 Report context

This Annual Water Quality Review (AWQR) has been developed to support the overarching annual environmental management report (AEMR) for the Kerosene Ash Dam Areas (the Site). The AEMR considers the period from 1 September 2022 – 31 August 2023 (the AEMR Period). The AWQR addresses the surface and groundwater monitoring and reporting requirements set out in the Wallerawang Ash Repository: Operation Environment Management Plan (OEMP) prepared by Energy Australia in 2018.

This AWQR reviews both surface and groundwater quality monitoring data that was collected over the AEMR Period at four surface water and six ground water monitoring locations that are established in the OEMP.

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 (ie 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 is a 1st order watercourse located to the west (down gradient) of the ash dams. It flows to the north and joins Sawyers Swamp Creek near the Site boundary. Outside of wet weather the creek generally has standing water but no visible flow. 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 is generally consistent with clean water.

In August 2022 GPM issued a Water Management Assessment 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, updated Action Plans were included in Water Quality Monitoring Reports that were submitted to the EPA in March and September 2023.

ES3 Groundwater review summary

The review of groundwater quality data concluded that that:

- groundwater quality trends during the AEMR Period were generally consistent with recent AEMR periods (ie 2018 to the current period)
- groundwater quality at monitoring bore D3 (located between SSCAD and the KVAD/KVAR) may be degraded, relative to water quality trends at upgradient bores, and
- groundwater quality at monitoring bore D6 (located downgradient of KVAD/KVAR) is consistent with ash affected water.

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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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 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)
- The associated heavy vehicle access route
- KVAR and SSCAD private access routes

The primary ash repository areas are the KVAR, KVAD and SSCAD. In 2014, the closure and demolition of the Power Station was approved. Currently the Site is operated on a care and maintenance arrangement consistent with NSW Planning Approval 07_0005 (MOD1) 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 balance of 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, EPA advised (on 27 June 2022), that the contamination is significant enough to warrant regulation under the CLM Act. Given this determination, regulation is being finalised to declare the land as significantly contaminated land under section 11 of the CLM Act. In 2023, GPM has submitted a Voluntary Management Plan (VMP) to the EPA that establishes a proposed investigation and remediation approach.

Figure 1.1 shows the Site layout, noting the abovementioned features.

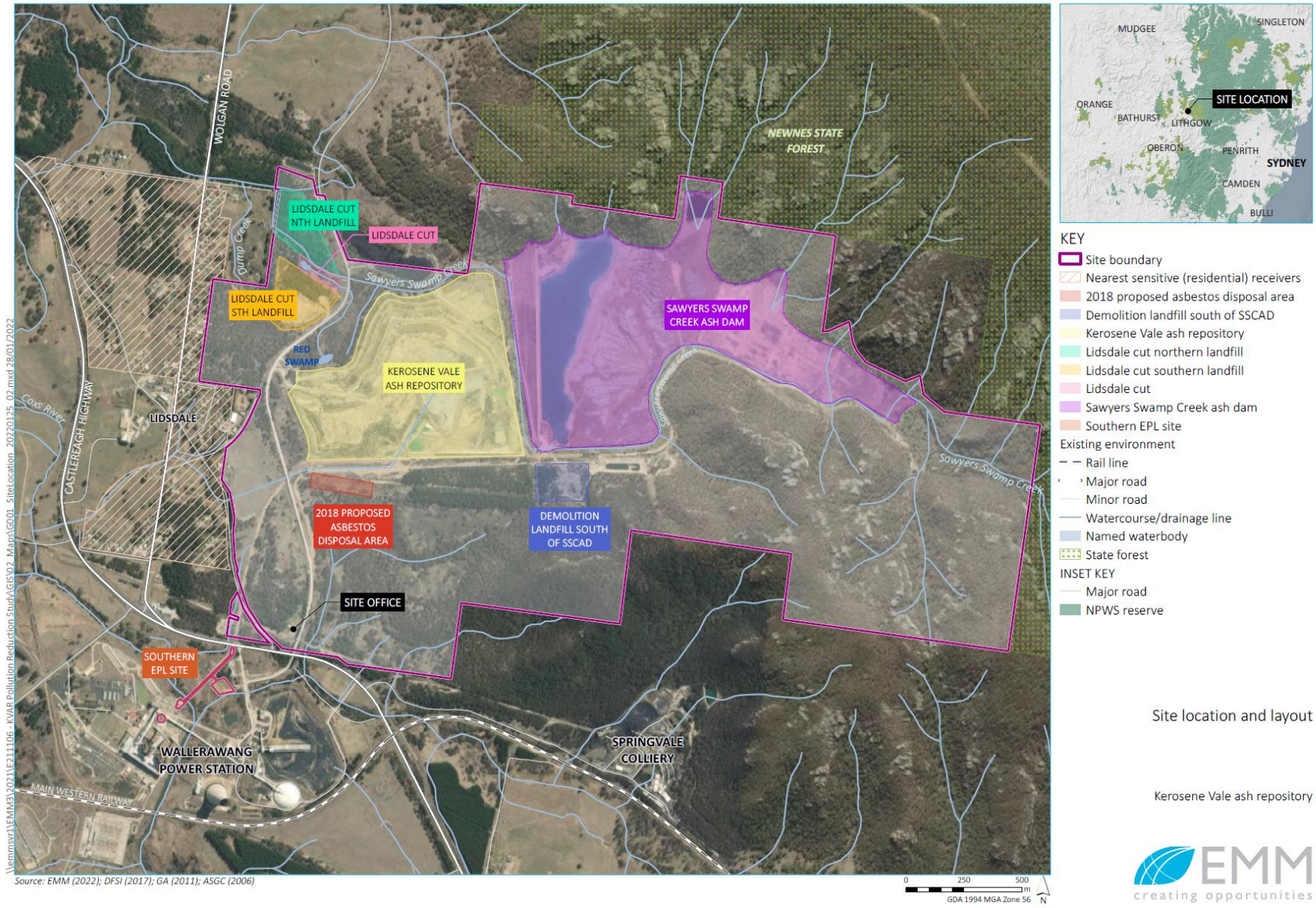

Figure 1.1 Site layout

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 2022 – 31 August 2023 (the AEMR Period). The AWQR addresses the surface and groundwater monitoring and reporting requirements set out in the Wallerawang Ash Repository: Operation Environment Management Plan (OEMP) prepared by Energy Australia in 2018. 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 water quality monitoring at four locations: • WX7 – Sawyers Swamp Creek, downstream • WX11 – Dump Creek • SW40 – Lidsdale Cut • Sawyers Swamp Creek Ash Dam	Chapter 5 (Environmental Monitoring)	Chapter 4
Analysis	Surface water quality monitoring data is to be assessed against: • Baseline water quality that is provided in Appendix B of the OEMP • Default guideline values (DGV) from ANZECC 2000	Section 6.4 – Surface water quality sub-plan	Chapter 4
Reporting	The surface water quality monitoring data and associated analysis is to be reported in the AEMR.	Section 6.4 – Surface water quality sub-plan	Chapter 4
Groundwater			
Monitoring	Monthly groundwater quality monitoring at six locations: • D1 – east of SSCAD • D2 – south of KVAR • D3 – between SSCAD and KVAR • D4 – north of KVAR • D5 and D6 – west of KVAR	Chapter 5 (Environmental Monitoring)	Chapter 5
Analysis	Groundwater quality monitoring data is to be assessed against: • Baseline water quality that is provided in Appendix C of the OEMP • DGVs from ANZECC 2000	Section 6.5 – Groundwater quality sub-plan	Chapter 5

Table 1.1 OEMP – water monitoring and reporting requirements

	Description	OEMP reference	Report reference
Reporting	The groundwater quality monitoring data and associated analysis is to be reported in the AEMR.	Section 6.5 – Groundwater quality 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 18 July 2022 to include (among other things):

- revised surface and groundwater monitoring requirements (EPL Condition M)
- a requirement to prepare a Water Quality Monitoring Report every six months (EPL Condition R4)
- a requirement to prepare a groundwater characterisation study by 30 September 2023 (EPL Condition U1)
- a requirement to prepare a Water Management Assessment and implement the proposed actions (EPL Condition U2), and
- a requirement to undertake a comprehensive water sampling program and prepare a water characterisation report (EPL Condition E1).

The following sections describe reports that have been submitted to the EPA to address the above conditions.

1.3.1 Water management assessment

A Water Management Assessment addressing EPL Conditions U2.1 and 2.2 was submitted to the EPA in August 2022 (EMM 2022). This assessment included an Action Plan that described water management improvements that were either underway or proposed in August 2022. Section 3.2 describes actions that were implemented during the AEMR period.

1.3.2 Water quality monitoring reports

EPL Condition R4 requires that GPM submit a Water Quality Monitoring Report every six months to the EPA (unless otherwise agreed by the EPA). Two reports were prepared in 2023 to address the initial 12-month period after the EPL variation on 18 July 2022. 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 water characterisation report

A Surface Water Characterisation Report (EMM 2023a) that presents and analyses the surface water monitoring data collected in accordance with the requirements of EPL Condition E1.1 was submitted to the EPA on 30 September 2023. This report combined with the Initial Groundwater Characterisation Report (EMM 2023b) collectively addresses EPL Conditions U1 and E1.

1.3.4 Initial groundwater characterisation report

An Initial Groundwater Characterisation Report (EMM 2023b) documents the results from the groundwater monitoring data collected in accordance with the requirements of EPL Condition E1.1 and includes recommendations for further monitoring. The report was submitted to the EPA on 30 September 2023 along with the Surface Water Characterisation Report (EMM 2023a).

1.4 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, 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 following sequence of events are anticipated:

- The Detailed Site Investigation (DSI) will be undertaken with the objective of identifying the nature and extent of contamination. The DSI report will include relevant data from the Initial Groundwater Characterisation Report (EMM 2023b) and the Surface Water Characterisation Report (EMM 2023a).
- A Human Health and Ecological Risk Assessment will be prepared (if required) to identify site specific soil and groundwater acceptance criteria for the Site and for the remediation works.
- 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 she/he has no objection to the ROA and RAP will be obtained and the EPA's approval of the RAP will be obtained.

1.5 OEMP update

GPM are in the process of finalising updates to the OEMP which will include a revised water monitoring and analysis approach, which, where possible, will align with the EPL requirements. It is anticipated that the updated OEMP will be implemented during the 2023-2024 AEMR Period.

2 Water management system overview

Surface water within the Site is described using 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 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, C and D (refer Figure 2.1).

  - **KVAR/KVAD water management area** is located to the west (downgradient) of SSCAD. KVAD is the Power Station's original ash dam which was established in an open cut mine void. The KVAR is a dry ash compacted stockpile situated on top of the capped KVAD. A perched groundwater system exists within the KVAD (the perched KVAD groundwater system). The combined area now has a water management system. Surface water runoff and seepage from this area drains to several water storage areas. Captured water that is known to be contaminated is reticulated to Lidsdale Cut (located downgradient of KVAD) where it is pumped to SSCAD Pond. Stormwater that is not ash affected is managed in accordance with the methods described in Managing Urban Stormwater Soils and Construction: Volume 1 (Landcom 2004) and Volume 2E Mines and Quarries (DECC 2008).

  - **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 Site.

- 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 1.4).

- **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.

Figure 2.1 shows the locations of the above-mentioned water management areas and water management system features.

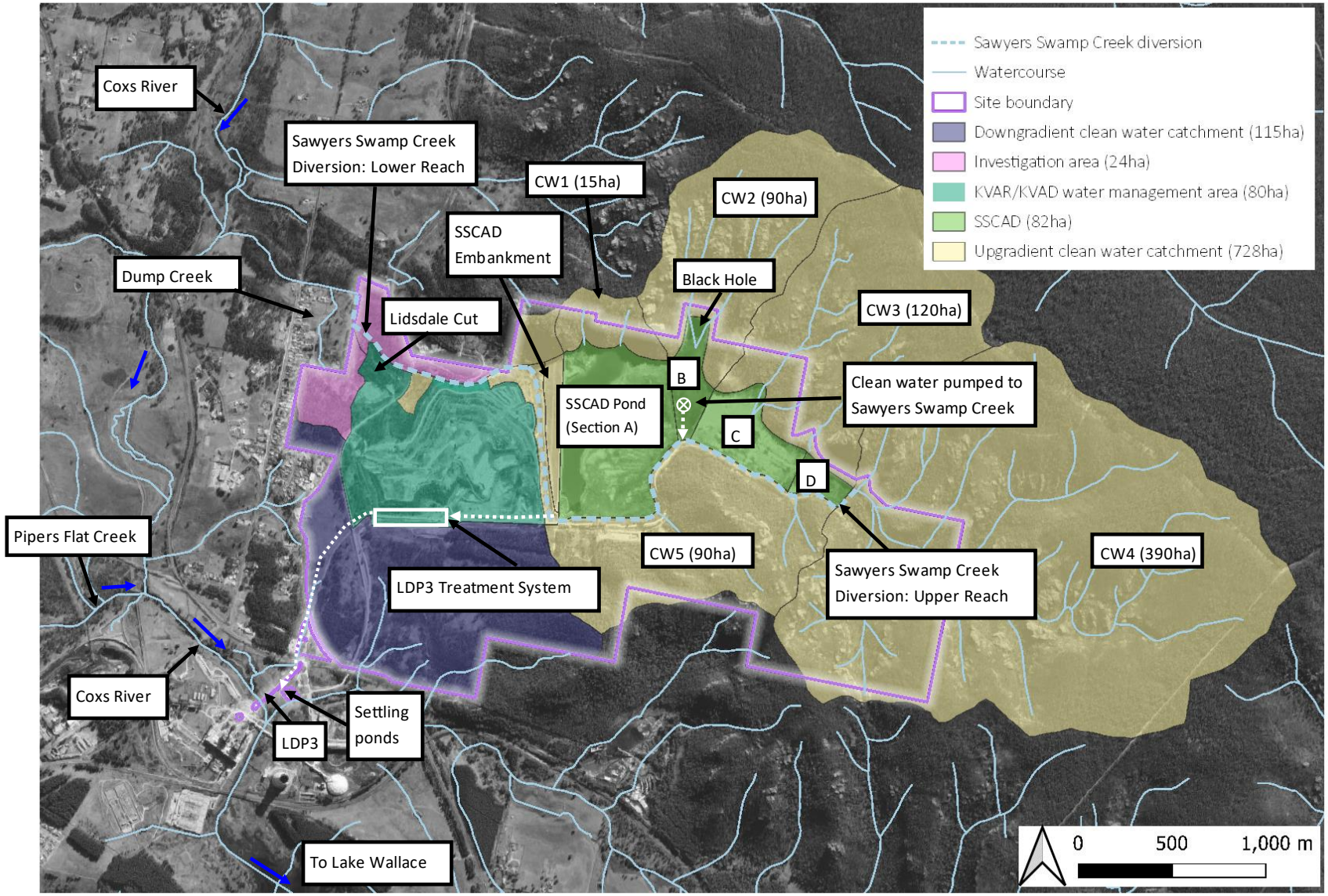

Figure 2.1 **Water management areas**

3 AEMR Period

This chapter describes the weather and key water management actions undertaken by GPM over the AEMR Period (1 September 2022 to 31 August 2023).

3.1 Weather conditions

Weather during the first three months of the AEMR period was characterised as being persistently wet with below average evaporation. These conditions were part of an extended wet period that commenced in February 2020 and continued through to November 2022 (the recent wet period) and was attributed to three consecutive La Niña's that were active over the summers of 2020-2022 (BoM 2023). The last of the three La Niña's officially ended in March 2023.

A total of 809.6 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.

As shown in Figure 3.1, rainfall during the initial three months of the monitoring period (September to November 2022) exceeded or was similar to the 90th percentile monthly rainfall. These conditions are described in this report as being persistently wet. The persistent wet conditions ceased in December 2022 with rainfall exceeding the monthly median in only three out of nine months between December 2022 to August 2023, resulting in generally dry conditions during summer (2022/23), autumn (2023) and winter (2023).

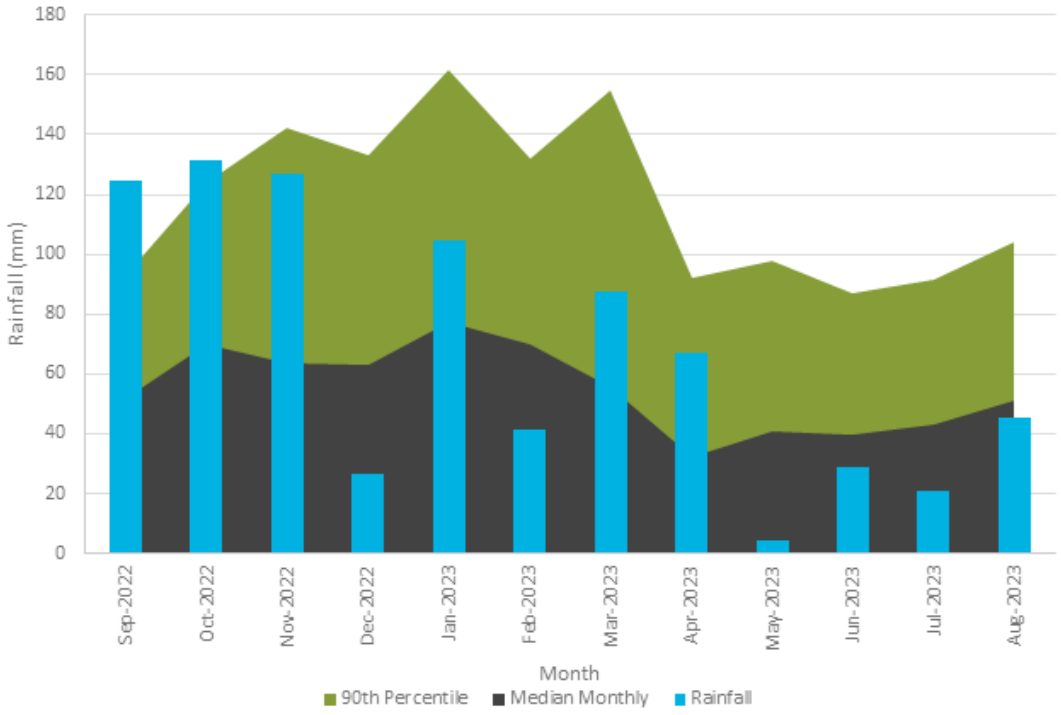

Figure 3.1 Monthly rainfall over the AEMR Period

3.2 Water management actions

GPM commenced ownership and responsibility for the site in September 2020. The inherited site had significant water management challenges including:

- SSCAD was about to overflow

- the system that was used to treat water removed from SSCAD was inoperable, and
- poor separation of clean water, stormwater and contaminated water at many locations.

The challenges were compounded by:

- significant wet weather that occurred during the recent wet period (February 2020 to November 2022) resulted in high inflow volumes to the water management system, reduced opportunities to manage water via irrigation and evaporation and restricted construction access to parts of the Site
- geotechnical stability concerns at the KVAR / KVAD which have required urgent actions, and
- the COVID-19 pandemic and associated supply chain issues which significantly increased procurement timeframes and reduced contractor availability.

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, and
- improve clean water 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, updated Action Plans were included in Water Quality Monitoring Reports that were submitted to the EPA in March and September 2023. These plans provided an update on the progress of the improvement works, including anticipated implementation timeframes.

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 four 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 (referred to as SW40 and as WX5 in historic reports. It is noted that WX5 is a current EPL monitoring location in Sawyers Swamp Creek)	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 (referred to as S2 in historic reports)	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).	Monthly monitoring	See Table 4.2
WMS1 – Sawyers Swamp Creek Ash Dam	This monitoring location is in the SSCAD Pond (see Figure 4.1).	Monthly monitoring	See Table 4.2
WX7 – Sawyers Swamp Creek	WX7 is located on Sawyers Swamp Creek approximately 500 m downstream of the Site.	Monthly monitoring	See Table 4.2

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
Anions	Chloride, fluoride, sulfate
Cations	Sodium, potassium, calcium, magnesium
Metals[2]	Aluminium, arsenic, silver, barium, boron, cadmium, chromium, copper, iron (filtered), mercury, manganese, molybdenum, nickel, lead, selenium, 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

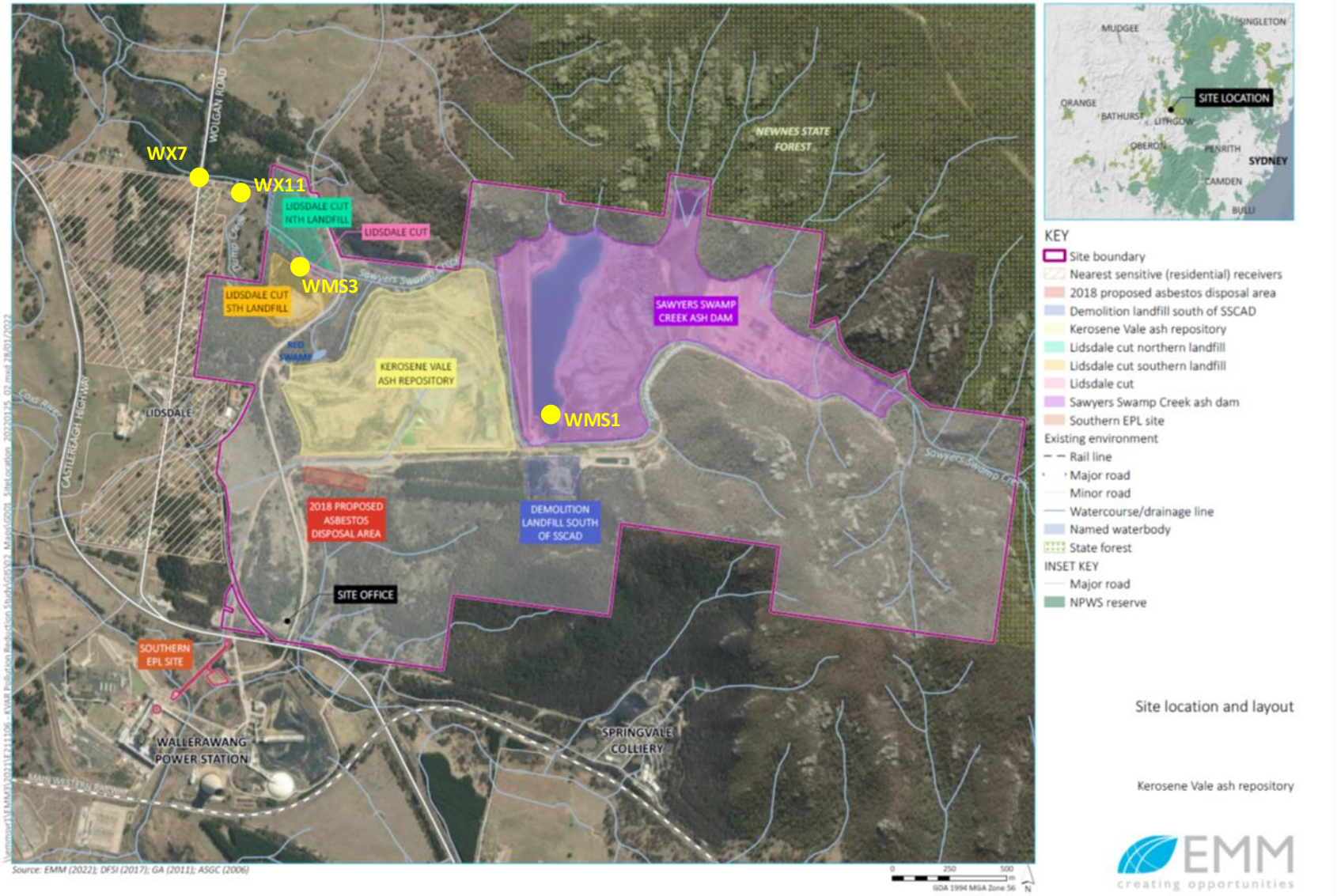

Figure 4.1 **Surface water monitoring locations**

4.1.2 Assessment criteria

The surface water quality sub-plan (OEMP Section 6.4) specifies that surface water monitoring results are to be compared to:

- Baseline water quality data that is provided in the OEMP (Table B in Appendix B). The baseline data is from sampling undertaken between July 2004 and January 2006 at the four OEMP surface water monitoring locations. Immediately prior to this period wet ash placement in SSCAD had ceased. Dry ash was being placed in Stage 1 of KVAR over the period.

- The ANZECC (2000) freshwater aquatic ecosystem guidelines. This is interpreted to be DGVs for a slightly-to-moderately disturbed upland river system. The relevant DGVs from the ANZG (2018) guidelines have been adopted for this review.

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

	Units	DGV (ANZG 2018)	Baseline range (OEMP, Table B in Appendix B)			
			Sawyers Swamp Creek (WX7)	Dump Creek (WX11)	Lidsdale cut (WMS3)	SSCAD (WMS1)
Physico-chemical parameters						
pH	-	6.5–8.0	6.1 – 6.6	4.0 – 5.9	5.1 – 6.5	4.0 – 5.6
EC	µS/cm	350	614 – 1,426	407 – 620	207 – 919	1,966 – 2,453
Total dissolved solids	mg/L	-	440 – 1060	300 – 430	180 – 620	1640 – 1950
DO	mg/L	-	NM	NM	NM	NM
Turbidity	NTU	25	NM	NM	NM	NM
Total nitrogen	mg/L	0.25	NM	NM	NM	NM
Total phosphorus	mg/L	0.02	NM	NM	NM	NM
Anions						
Chloride	mg/L		18 – 35	19 – 22	6 – 28	23 – 29
Fluoride	mg/L		0.7 – 1.1	0.3 – 0.8	0.3 – 3.2	5.5 – 10.0
sulfate	mg/L		250 – 710	150 – 300	57 – 490	1100 – 1800
Cations						
Sodium	mg/L	-	62 – 150	42 – 58	13 – 71	290 – 370
Potassium	mg/L	-	14 – 30	13 – 16	9 – 50	71 – 93
Calcium	mg/L	-	29 – 82	13 – 19	15 – 52	110 – 140
Magnesium	mg/L	-	17 – 48	12 – 20	4 – 25	15 – 18
Metals[1]						
Aluminium	mg/L	0.055	NM	NM	NM	NM

Table 4.3 Surface water assessment criteria

	Units	DGV (ANZG 2018)	Baseline range (OEMP, Table B in Appendix B)			
			Sawyers Swamp Creek (WX7)	Dump Creek (WX11)	Lidsdale cut (WMS3)	SSCAD (WMS1)
Arsenic	mg/L	0.013	0.025	0.025	0.025	0.025
Silver	mg/L	0.00005	0.005	0.005	0.005	0.005
Barium	mg/L	-	0.02 – 0.03	0.02 – 0.02	0.03 – 0.08	0.08 – 0.09
Boron	mg/L	0.94	1.10 – 3.40	0.63 – 1.20	0.24 – 1.60	4.80 – 7.30
Cadmium	mg/L	0.0002	0.001	0.001	0.001	0.0010 – 0.0070
Chromium	mg/L	0.001	0.005	0.005	0.005	0.005 – 0.010
Copper	mg/L	0.0014	0.005	0.005	0.005	0.005 – 0.040
Iron (filtered)	mg/L	-	0.03 – 0.16	0.06 – 0.83	0.03 – 4.00	0.03 – 0.69
Mercury	mg/L	0.00006	0.0001	0.0001	0.0001	0.0001
Manganese	mg/L	1.9	0.3 – 1.0	1.0 – 2.0	0.4 – 3.4	1.1 – 1.4
Molybdenum	mg/L	0.034	NM	NM	NM	NM
Nickel	mg/L	0.011	NM	NM	NM	NM
Lead	mg/L	0.0034	0.005	0.005	0.005	0.005
Selenium	mg/L	0.005	0.003	0.003	0.003	0.053 – 0.110
Zinc	mg/L	0.008	0.040 – 0.180	0.140 – 0.340	0.030 – 0.130	0.220 – 0.400

Notes: NM denotes not monitored or not provided in the baseline data set.

1. Refers to total concentrations unless stated

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 January 2018 to the end of the AEMR Period and can be used to establish water quality trends (ie increasing or decreasing concentrations). The charts note the timing of the following events that may have influenced water quality at some locations:

- Springvale Colliery discharged water into the upper portion of the Sawyers Swamp Creek Diversion (upstream of the SSCAD embankment) between 2013 and July 2019.
- A bushfire impacted the Site in late 2019.
- To align with standard practice, from October 2021 all water quality samples collected to analyse metal concentrations were filtered using a 0.45 µm filter to establish the filtered or dissolved concentrations. Prior to October 2021, analysis of most metals was undertaken using unfiltered samples to establish the total concentration. For some metals, there can be a significant difference between the total and filtered

concentrations. Accordingly, this change in monitoring method should be considered when comparing recent metal concentrations (ie from October 2021) to either the baseline data (which is based on total concentrations) or results from samples collected prior to October 2021. The analysis method (ie filtered or total) is noted in results tables and figures where relevant.

4.2.1 Lidsdale Cut – WMS3

Lidsdale Cut is one of the storages in the KVAD/KVAR water management system (see Figure 4.1). It receives collected seepage from the KVAD and runoff from the western portion of the KVAD/KVAR water management area. Captured water is dewatered via pumping to SSCAD Pond. 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.

16 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.

The water quality levels / concentrations generally exceeded both the DGV and baseline range, but 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 Pond is appropriate.

Table 4.4 Lidsdale Cut WMS3 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	5.1 – 6.5	16	**2.8**	**3.4**	7.1
EC	µS/cm	350	207 – 919	16	**478**	**1437**	**2941**
Total dissolved solids	mg/L	-	180 – 620	16	350	1100	1900
DO	mg/L	-	NM	16	3.1	6.3	12.1
Turbidity	NTU	25	NM	16	3.0	6.5	**70.0**
Total nitrogen	mg/L	0.25	NM	16	**0.4**	**1.3**	**1.7**
Total phosphorus	mg/L	0.02	NM	16	<0.05	**0.03**	**0.03**
Anions							
Chloride	mg/L		6 – 28	16	12.0	27.0	33.0
Fluoride	mg/L		0.3 – 3.2	16	<0.1	3.9	4.9
Sulfate	mg/L		57 – 490	16	220	1035	1900
Cations							
Sodium	mg/L	-	13 – 71	16	36	110	140
Potassium	mg/L	-	9 – 50	16	20.0	59.0	88.0
Calcium	mg/L	-	15 – 52	16	26.0	79.5	120.0

Table 4.4 Lidsdale Cut WMS3 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Magnesium	mg/L	-	4 – 25	16	12.0	37.0	57.0
Metals[1]							
Aluminium	mg/L	0.055	NM	16	**3.600**	**14.500**	**32.000**
Arsenic	mg/L	0.013	0.025	16	<0.001	0.002	0.008
Silver	mg/L	0.00005	0.005	16	<0.001	**0.0005**	**0.0005**
Barium	mg/L	-	0.03 – 0.08	16	0.013	0.027	0.070
Boron	mg/L	0.94	0.24 – 1.60	16	**0.95**	**3.25**	**5.10**
Cadmium	mg/L	0.0002	0.0010	16	**0.0018**	**0.0035**	**0.0069**
Chromium	mg/L	0.001	0.005	16	<0.001	0.001	**0.002**
Copper	mg/L	0.0014	0.005	16	**0.0030**	**0.0040**	**0.0050**
Iron	mg/L	-	0.03 – 4.00	16	0.15	7.90	17.00
Mercury	mg/L	0.00006	0.0001	16	<0.00005	0.000025	0.000025
Manganese	mg/L	1.9	0.4 – 3.4	16	1.6	**5.5**	**7.8**
Molybdenum	mg/L	0.034	NM	16	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	16	**0.150**	**0.405**	**0.570**
Lead	mg/L	0.0034	0.0050	16	**0.0040**	**0.0135**	**0.0200**
Selenium	mg/L	0.005	0.003 – 0.003	16	<0.001	0.001	0.001
Zinc	mg/L	0.008	0.030 – 0.130	16	**0.400**	**1.050**	**3.300**

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 relates to the total metal concentrations.

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. It receives potentially contaminated water that is collected in the KVAR/KVAD and SSCAD embankment drainage systems, direct rainfall and some runoff from clean water catchments. Water accumulation in the SSCAD Pond is managed via irrigation to exposed ash areas and at times via controlled discharges into the Coxs River at LDP3, following treatment.

16 samples were collected from SSCAD Pond, which was renamed as site WMS1 on 16 August 2022 near the beginning of the AEMR Period. 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 16 samples have consistent water quality, which is characterised as having a pH ranging between 4.0 and 5.6 and elevated salinity and metal concentrations. The pH and salinity are typically lower than the baseline range, which relates to the period shortly after wet ash placement in SSCAD had ceased. Aluminium, silver, boron, cadmium, copper,

manganese, nickel and zinc concentrations all exceed the respective DGVs at the median value. However, the reported metal concentrations have not changed significantly from previous AEMR periods.

Some water from SSCAD Pond was dewatered to LDP3 over the period. It is noted that water was treated prior to discharge. 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	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	4.0 – 5.6	16	**4.0**	**4.6**	**5.6**
EC	µS/cm	350	1,966 – 2,453	16	70	**728**	**1094**
Total dissolved solids	mg/L	-	1,640 – 1,950	16	440.0	635.0	810.0
DO	mg/L	-	NM	16	3.9	7.9	9.8
Turbidity	NTU	25	NM	16	1.6	7.0	**309.0**
Total nitrogen	mg/L	0.25	NM	16	<0.1	0.1	0.1
Total phosphorus	mg/L	0.02	NM	16	<0.05	**0.03**	**0.03**
Anions							
Chloride	mg/L		23 – 29	16	11.0	14.5	18.0
Fluoride	mg/L		5.5 – 10.0	16	1.7	2.4	2.8
Sulfate	mg/L		1100 – 1800	16	210	505	740
Cations							
Sodium	mg/L	-	290 – 370	16	52	64	150
Potassium	mg/L	-	71 – 93	16	23.0	31.5	65.0
Calcium	mg/L	-	110 – 140	16	33.0	47.5	97.0
Magnesium	mg/L	-	15 – 18	16	13.0	16.0	30.0
Metals[1]							
Aluminium	mg/L	0.055	NM	16	**5.900**	**8.600**	**11.000**
Arsenic	mg/L	0.013	0.025	16	<0.001	0.002	0.004
Silver	mg/L	0.00005	0.005	16	<0.001	**0.0005**	**0.0005**
Barium	mg/L	-	0.08 – 0.09	16	0.030	0.039	0.045
Boron	mg/L	0.94	4.80 – 7.30	16	**0.97**	**1.95**	**2.90**
Cadmium	mg/L	0.0002	0.0010 – 0.0070	16	**0.0022**	**0.0032**	**0.0037**
Chromium	mg/L	0.001	0.005 – 0.010	16	<0.001	0.001	0.001
Copper	mg/L	0.0014	0.005 – 0.040	16	**0.0040**	**0.0060**	**0.0090**

Table 4.5 SSCAD Pond WMS1– results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Iron	mg/L	-	0.03 – 0.69	16	0.05	0.25	0.47
Mercury	mg/L	0.00006	0.0001	16	<0.00005	0.000025	0.000025
Manganese	mg/L	1.9	1.1 – 1.4	16	1.7	**2.3**	**3.0**
Molybdenum	mg/L	0.034	NM	16	<0.001	0.004	0.011
Nickel	mg/L	0.011	NM	16	**0.100**	**0.140**	**0.190**
Lead	mg/L	0.0034	0.0050	16	<0.001	0.0010	0.0020
Selenium	mg/L	0.005	0.053 – 0.110	16	<0.001	0.001	0.001
Zinc	mg/L	0.008	0.220 – 0.400	16	**0.200**	**0.360**	**0.470**

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 relates to the total metal concentrations.

4.2.3 Dump Creek – WX11

Dump Creek is a 1st order watercourse located to the west (down gradient) of the KVAR/KVAD water management area. It flows to the north and joins Sawyers Swamp Creek upstream of WX7 (see Figure 1.1). Outside of wet weather the creek generally has standing water but no visible flow.

32 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 exceeded both the DGV and typical levels/concentrations in Sawyers Swamp Creek at WX7 (see Section 4.2.4) indicating that some ash affected water is seeping 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 clean and that seep(s) of ash affected water may impact water quality during dry conditions when the streamflow is minimal.

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	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	4.0 – 5.9	32	**3.5**	**6.2**	7.7
EC	µS/cm	350	407 – 620	32	153	**592**	**1644**
Total dissolved solids	mg/L	-	300 – 430	32	99	360	1500
DO	mg/L	-	NM	32	1.3	3.4	9.2
Turbidity	NTU	25	NM	32	4.2	22.5	**224.0**

Table 4.6 Dump Creek WX11 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Total nitrogen	mg/L	0.25	NM	32	**0.4**	**1.5**	**36.0**
Total phosphorus	mg/L	0.02	NM	32	<0.05	**0.10**	**8.30**
Anions							
Chloride	mg/L	-	19 – 22	32	6.0	30.0	77.0
Fluoride	mg/L	-	0.3 – 0.8	32	0.1	0.3	2.2
Sulfate	mg/L	-	150 – 300	32	34	205	1100
Cations							
Sodium	mg/L	-	42 – 58	32	11	37	65
Potassium	mg/L	-	13 – 16	32	4.0	10.5	33.0
Calcium	mg/L	-	13 – 19	32	8.6	26.0	140.0
Magnesium	mg/L	-	12 – 20	32	5.0	15.5	53.0
Metals							
Aluminium	mg/L	0.055	NM	32	<0.01	**0.135**	**17.000**
Arsenic	mg/L	0.013	0.025	32	<0.001	0.001	0.003
Silver	mg/L	0.00005	0.005	32	<0.001	**0.0005**	**0.0005**
Barium	mg/L	-	0.02	32	0.009	0.020	0.091
Boron	mg/L	0.94	0.63 – 1.20	32	0.08	0.38	0.86
Cadmium	mg/L	0.0002	0.0010	32	<0.0001	0.0001	**0.0160**
Chromium	mg/L	0.001	0.005	32	<0.001	0.001	**0.002**
Copper	mg/L	0.0014	0.005	32	<0.001	**0.0025**	**0.0510**
Iron	mg/L	-	0.06 – 0.83	32	0.05	7.90	66.00
Mercury	mg/L	0.00006	0.0001	32	<0.00005	0.000025	0.000025
Manganese	mg/L	1.9	1.0 – 2.0	32	<0.005	1.8	**9.7**
Molybdenum	mg/L	0.034	NM	32	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	32	**0.012**	**0.074**	**4.500**
Lead	mg/L	0.0034	0.0050	32	<0.001	0.0005	**0.0060**
Selenium	mg/L	0.005	0.003	32	<0.001	0.001	0.001
Zinc	mg/L	0.008	0.140 – 0.340	32	0.003	**0.083**	**18.000**

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 relates to the total metal concentrations.

4.2.4 Sawyers Swamp Creek – WX7

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. This means that the ambient water quality will 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.

34 samples were collected from WX7 over the AEMR Period. Table 4.7 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 Sawyers Swamp Creek has a pH that ranges between 5.7 to 7.8, low salinity levels and metal concentrations that are generally below DGVs and the baseline range. These characteristics are consistent with clean water.

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 historic 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. Dump Creek is one known source however there is potential for groundwater sources from both the Site and non-GPM owned land that adjoins the Site. Incidental discharges will be assessed as part of the VMP process.

Table 4.7 Sawyers Swamp Creek WX7 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	6.1 – 6.6	34	**5.7**	6.6	7.8
EC	µS/cm	350	614 – 1,426	34	84	192	**623**
Total dissolved solids	mg/L	-	440 – 1060	34	30	125	200

Table 4.7 Sawyers Swamp Creek WX7 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
DO	mg/L	-	NM	34	3.8	7.4	11.3
Turbidity	NTU	25	NM	34	1.6	23.0	**306.0**
Total nitrogen	mg/L	0.25	NM	34	<0.1	0.2	**0.4**
Total phosphorus	mg/L	0.02	NM	34	<0.05	**0.03**	**0.09**
Anions							
Chloride	mg/L	-	18 – 35	34	6.0	10.5	22.0
Fluoride	mg/L	-	0.7 – 1.1	34	<0.1	0.1	0.2
Sulfate	mg/L	-	250 – 710	34	14	45	130
Cations							
Sodium	mg/L	-	62 – 150	34	8	15	28
Potassium	mg/L	-	14 – 30	34	2.0	3.0	5.2
Calcium	mg/L	-	29 – 82	34	1.0	5.6	11.0
Magnesium	mg/L	-	17 – 48	34	1.0	4.0	8.0
Metals							
Aluminium	mg/L	0.055	NM	34	<0.01	0.020	**0.260**
Arsenic	mg/L	0.013	0.025	34	<0.001	0.001	0.001
Silver	mg/L	0.00005	0.005	34	<0.001	**0.0005**	**0.0005**
Barium	mg/L	-	0.02 – 0.03	34	0.022	0.043	0.056
Boron	mg/L	0.94	1.10 – 3.40	34	0.05	0.10	0.10
Cadmium	mg/L	0.0002	0.0010	34	<0.0001	0.0001	0.0002
Chromium	mg/L	0.001	0.005	34	<0.001	0.001	0.001
Copper	mg/L	0.0014	0.005	34	<0.001	0.0005	0.0005
Iron	mg/L	-	0.03 – 0.16	34	0.01	0.23	0.95
Mercury	mg/L	0.00006	0.0001	34	<0.00005	0.000025	0.000025
Manganese	mg/L	1.9	0.3 – 1.0	34	<0.005	0.4	0.9
Molybdenum	mg/L	0.034	NM	34	<0.001	0.001	0.002
Nickel	mg/L	0.011	NM	34	0.002	0.008	**0.017**
Lead	mg/L	0.0034	0.005	34	<0.001	0.0005	0.0005
Selenium	mg/L	0.005	0.003	34	<0.001	0.001	0.001
Zinc	mg/L	0.008	0.040 – 0.180	34	0.002	**0.017**	**0.054**

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 relates to the total metal concentrations.

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 (ie 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.

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

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, KVAD and KVAR. The degree of connectivity between each of the emplacement areas is not known but conceptually each emplacement area has a mounded perched aquifer system within it, and groundwater seeps occur around the downgradient edges and through the floors of each of the emplacement area. 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 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 KVAD/KVAR 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 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 six groundwater monitoring locations. 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	Description	Screened lithology and groundwater system	Monitoring frequency	Monitoring analytes
D1	Groundwater monitoring bore located to the south-east of SSCAD.	Clayey sand—local groundwater	Monthly monitoring	See Table 4.2
D2	Groundwater monitoring bore located to the south of KVAR.	Siltstone/sandstone—regional groundwater	Monthly monitoring	See Table 4.2
D3	Groundwater monitoring bore located between SSCAD and KVAD/KVAR.	Siltstone/sandstone/coal—regional groundwater	Monthly monitoring	See Table 4.2
D4	Groundwater monitoring bore located to the north of KVAD/KVAR and immediately to the west of the northern side of the SSCAD embankment.	Weathered sandstone —local groundwater	Monthly monitoring	See Table 4.2
D5	Groundwater monitoring bore located to the north-west of KVAD/KVAR.	Sandstone/coal—regional groundwater	Monthly monitoring	See Table 4.2
D6	Groundwater monitoring bore located to the west of KVAD/KVAR.	Sandstone/mudstone/coal—regional groundwater	Monthly monitoring	See Table 4.2

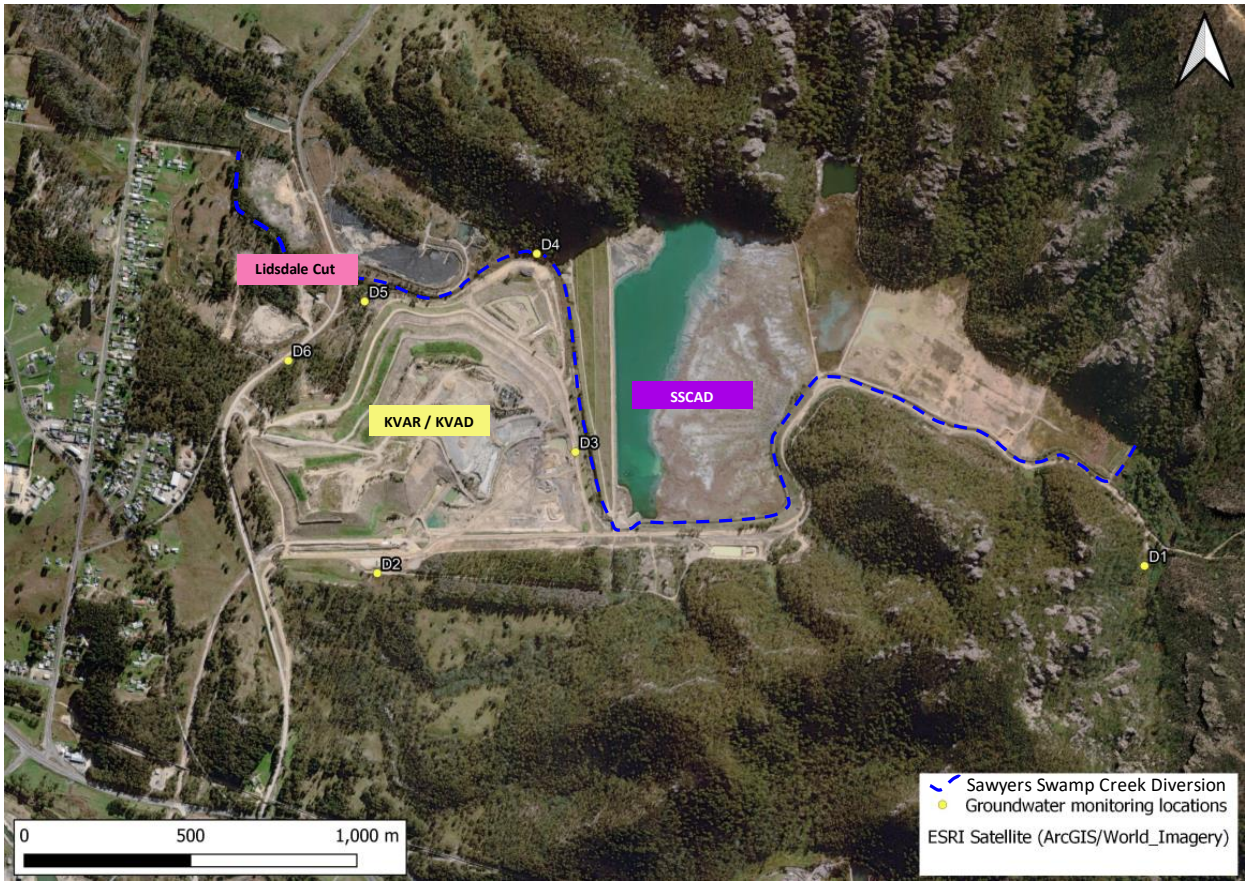

Figure 5.1 Groundwater monitoring locations

5.2.2 Monitoring approach

Table 5.2 provides the groundwater analytes that are established in the OEMP (Table A in Appendix B).

Table 5.2 Groundwater monitoring analytes – OEMP

Category	Analytes[1]
Physico-chemical	pH, electrical conductivity (EC), alkalinity, total dissolved solids
Anions	Chloride, fluoride, sulfate
Cations	Sodium, potassium, calcium, magnesium
Metals[2]	Aluminium, arsenic, silver, barium, boron, cadmium, chromium, copper, iron (filtered), mercury, manganese, molybdenum, nickel, lead, selenium, 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

5.2.3 Assessment criteria

The groundwater quality sub-plan (OEMP Section 6.5) specifies that groundwater monitoring results are to be compared to:

- Baseline water quality data that is provided in the OEMP (Table C in Appendix B). The baseline data is from sampling undertaken between November 2001 and April 2007 at the six OEMP groundwater monitoring

locations. During this period wet ash placement in SSCAD occurred up to 2003 and dry ash was placed in Stage 1 of KVAR from 2003 to the end of the period.

- The ANZECC (2000) Irrigation and Ecosystem Protection guidelines. This is interpreted to be DGVs for a slightly-to-moderately disturbed upland river system. The relevant DGVs from the ANZG (2018) guidelines have been adopted for this review.

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 (OEMP, Table C in Appendix B)					
			D1	D2	D3	D4	D5	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		0.0 – 0.1	0.0 – 0.1	0.1 – 0.2	0.0 – 0.1	0.2 – 0.4	0.0 – 0.2
Sulfate	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 – 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]								

Table 5.3 Groundwater assessment criteria

	Units	DGV	Baseline range (OEMP, Table C in Appendix B)					
			D1	D2	D3	D4	D5	D6
Aluminium	mg/L	0.055	NM	NM	NM	NM	NM	NM
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	0.0000 – 0.0002	0.0000 – 0.0002	0.0000 – 0.0002	0.0000 – 0.0002	0.0001 – 0.0002	0.0001 – 0.0002
Manganese	mg/L	1.9	0.0 – 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. Refers to total concentrations unless stated

5.3 Results

Groundwater monitoring results for the AEMR Period are presented and discussed in this section. The results for each monitoring location are presented in table from and compared to the assessment criteria established in Section 5.2.

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 trends (ie increasing or decreasing concentrations). The charts note the timing of the following events that may have influenced water quality at some locations:

- Springvale Colliery discharged water into the upper portion of the Sawyers Swamp Creek Diversion between 2013 and July 2019 (see Figure 2.1).
- A bushfire impacted the Site in late 2019.
- To align with standard practice, from October 2021 all water quality samples collected to analyse metal concentrations were filtered using a 0.45 µm filter to establish the filtered or dissolved concentrations. Prior to October 2021, analysis of most metals was undertaken using unfiltered samples to establish the total concentration. For some metals, there can be a significant difference between the total and filtered concentrations. Accordingly, this change in monitoring method should be considered when comparing recent metal concentrations (ie from October 2021) to either the baseline data (which is based on total concentrations) or results from samples collected prior to October 2021. The analysis method (ie filtered or total) is noted in results tables and figures.

The water quality results for each groundwater monitoring location are presented and discussed in the following sections.

5.3.1 Groundwater monitoring location D1

Groundwater monitoring bore 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 2023b).

Three 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 4.0 to 4.8 and low salinity, which indicates surface water influences. Median concentrations of aluminium, copper, silver and zinc exceeded DGVs, but were generally within the baseline range. This indicates that the groundwater is naturally high in these metals.

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 (ie 2018 to the current period).

Table 5.4 Groundwater monitoring location D1 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	5.5 – 6.0	3	**4.0**	**4.4**	**4.8**
EC	µS/cm	350	90 – 170	3	59	191	210
Total dissolved solids	mg/L	-	60 – 302	3	124	196	635
Anions							
Chloride	mg/L		12 – 37	3	20	22	22
Fluoride	mg/L		0.0 – 0.1	3	<0.1	0.050	0.050
Sulfate	mg/L		3 – 8	3	11	11	12
Cations							
Sodium	mg/L	-	8 – 19	3	12	13	14
Potassium	mg/L	-	2 – 10	3	3	4	8
Calcium	mg/L	-	2 – 9	3	2	2	3
Magnesium	mg/L	-	1 – 5	3	2	2	2
Metals[1]							
Aluminium	mg/L	0.055	NM	2	**0.090**	**0.100**	**0.110**
Arsenic	mg/L	0.013	0.001 – 0.001	3	<0.001	0.001	0.001
Silver	mg/L	0.00005	0.00025 – 0.00100	2	<0.001	**0.00050**	**0.00050**
Barium	mg/L	-	0.04 – 0.06	2	0.041	0.04850	0.05600
Boron	mg/L	0.94	0.02 – 0.05	3	<0.05	0.03	0.03
Cadmium	mg/L	0.0002	0.0001 – 0.0010	3	<0.0001	0.0001	0.0001
Chromium	mg/L	0.001	0.010 – 0.010	3	<0.001	0.001	0.001
Copper	mg/L	0.0014	0.002 – 0.055	3	**0.005**	**0.0070**	**0.0080**
Iron (filtered)	mg/L	-	0.02 – 4.50	2	0.06	0.310	0.560
Mercury	mg/L	0.00006	0.0000 – 0.0002	1	<0.0001	0.00005	0.00005
Manganese	mg/L	1.9	0.0 – 0.2	3	0.02	0.02	0.03
Molybdenum	mg/L	0.034	NM	2	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	3	<0.001	0.001	**0.037**
Lead	mg/L	0.0034	0.0005 – 0.0160	3	<0.001	0.0005	0.0005
Selenium	mg/L	0.005	0.001 – 0.001	3	<0.01	0.005	0.005
Zinc	mg/L	0.008	0.030 – 0.240	3	**0.127**	**0.179**	**0.182**

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 relates to the total metal concentrations.

5.3.2 Groundwater monitoring location D2

Groundwater monitoring bore D2 is located to the south of the KVAR (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 2023b). As the bore is located near the KVAR and downgradient from SSCAD, there is potential for groundwater quality impacts.

Three samples were collected from 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 that ranges from 5.3 to 5.5 and low salinity. Median concentrations of aluminium, nickel, silver and zinc exceeded DGVs, but were generally within the baseline range and were similar to concentrations at monitoring bore D1 (which is located upgradient of SSCAD). Accordingly, there is no evidence of groundwater contamination at D2 over the AEMR 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 recent AEMR periods (ie 2018 to the current period).

Table 5.5 Groundwater monitoring location D2 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	3.7 – 5.1	3	**5.3**	**5.4**	**5.5**
EC	µS/cm	350	278 – 502	3	171	349	**352**
Total dissolved solids	mg/L	-	120 – 315	3	227	235	274
Anions							
Chloride	mg/L		12 – 104	3	19	19	32
Fluoride	mg/L		0.0 – 0.1	3	<0.1	0.1	0.1
Sulfate	mg/L		57 – 180	3	116	118	142
Cations							
Sodium	mg/L	-	17 – 58	3	30	32	38
Potassium	mg/L	-	0 – 5	3	3	4	4
Calcium	mg/L	-	1 – 5	3	2	2	6
Magnesium	mg/L	-	7 – 22	3	16	17	21
Metals[1]							
Aluminium	mg/L	0.055	NM	2	**0.180**	**1.570**	**2.960**
Arsenic	mg/L	0.013	0.001 – 0.025	3	<0.001	0.001	0.001
Silver	mg/L	0.00005	0.00025 – 0.00500	2	<0.001	**0.00050**	**0.00050**
Barium	mg/L	-	0.04 – 0.13	2	0.027	0.02750	0.02800
Boron	mg/L	0.94	0.01 – 0.15	3	<0.05	0.03	0.10

Table 5.5 Groundwater monitoring location D2 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Cadmium	mg/L	0.0002	0.0001 – 0.0010	3	0.0002	0.0002	**0.0004**
Chromium	mg/L	0.001	0.001 – 0.010	3	<0.001	0.001	0.001
Copper	mg/L	0.0014	0.001 – 0.005	3	<0.001	0.0005	**0.0100**
Iron (filtered)	mg/L	-	0.03 – 5.70	2	<0.05	0.113	0.200
Mercury	mg/L	0.00006	0.0000 – 0.0002	1	<0.0001	0.00005	0.00005
Manganese	mg/L	1.9	0.3 – 0.7	3	0.45	0.47	0.88
Molybdenum	mg/L	0.034	NM	2	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	3	**0.043**	**0.049**	**0.089**
Lead	mg/L	0.0034	0.0020 – 0.0080	3	<0.001	0.0005	0.0005
Selenium	mg/L	0.005	0.001 – 0.003	3	<0.01	0.005	0.005
Zinc	mg/L	0.008	0.048 – 0.130	3	**0.052**	**0.055**	**0.136**

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 relates to the total metal concentrations.

5.3.3 Groundwater monitoring location D3

Groundwater monitoring bore 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 KVAD/KVAR and SSCAD.

Three samples were collected from 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 4.8 to 5.3 and low salinity.

Median concentrations of most metals sampled exceed the DGV and for boron, cadmium, selenium and zinc the baseline range was exceed at the median concentration. These concentrations were significantly higher than concentrations at monitoring bore D1 (which is located upgradient of SSCAD). Accordingly, groundwater at D3 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 (ie 2018 to the current period).

Table 5.6 Groundwater monitoring location D3 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	5.8 – 6.7	3	**4.8**	**5.1**	**5.3**
EC	µS/cm	350	332 – 773	3	346	**528**	**671**
Total dissolved solids	mg/L	-	238 – 538	3	436	440	629

Table 5.6 Groundwater monitoring location D3 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Anions							
Chloride	mg/L		32 – 140	3	30	37	38
Fluoride	mg/L		0.1 – 0.2	3	0.2	0.4	0.5
Sulfate	mg/L		54 – 130	3	239	258	320
Cations							
Sodium	mg/L	-	35 – 96	3	58	60	62
Potassium	mg/L	-	5 – 12	3	10	13	14
Calcium	mg/L	-	11 – 27	3	24	25	32
Magnesium	mg/L	-	11 – 30	3	26	27	33
Metals[1]							
Aluminium	mg/L	0.055	NM	2	**0.240**	**0.375**	**0.510**
Arsenic	mg/L	0.013	0.001 – 0.025	3	<0.001	0.001	0.002
Silver	mg/L	0.00005	0.00025 – 0.00500	2	<0.001	**0.00050**	**0.00050**
Barium	mg/L	-	0.05 – 0.13	2	0.027	0.03650	0.04600
Boron	mg/L	0.94	0.01 – 0.06	3	0.29	0.40	0.52
Cadmium	mg/L	0.0002	0.0001 – 0.0010	3	**0.0012**	**0.0014**	**0.0035**
Chromium	mg/L	0.001	0.001 – 0.010	3	<0.001	0.001	0.001
Copper	mg/L	0.0014	0.001 – 0.006	3	<0.001	**0.0060**	**0.0060**
Iron (filtered)	mg/L	-	0.01 – 6.50	2	0.67	5.635	10.600
Mercury	mg/L	0.00006	0.0000 – 0.0002	1	<0.0001	0.00005	0.00005
Manganese	mg/L	1.9	0.2 – 1.1	3	0.92	0.93	1.73
Molybdenum	mg/L	0.034	NM	2	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	3	**0.109**	**0.150**	**0.277**
Lead	mg/L	0.0034	0.0005 – 0.0080	3	<0.001	0.0005	0.0005
Selenium	mg/L	0.005	0.001 – 0.003	3	<0.01	0.005	0.005
Zinc	mg/L	0.008	0.030 – 0.061	3	**0.117**	**0.176**	**0.315**

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 relates to the total metal concentrations.

5.3.4 Groundwater monitoring location D4

Groundwater monitoring bore 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 (Table 5.1). The groundwater flow direction at this bore is interpreted to be to the south-west, towards Swayers Swamp Creek (EMM 2023b). There is potential for groundwater quality impacts at this location due to its proximity to the SSCAD embankment.

Two samples were collected from D4 over the AEMR Period with most analytes being sampled 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 of 5.8 and salinity (as indicated by EC) that is elevated relative to both the DGV and baseline range.

Median concentrations of manganese and zinc exceeded DGVs. Manganese was also outside 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 (ie 2018 to the current period).

Table 5.7 Groundwater monitoring location D4 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	5.0 – 6.6	2	**5.8**	**5.8**	**5.8**
EC	µS/cm	350	492 – 1,331	2	**941**	**1,271**	**1,600**
Total dissolved solids	mg/L	-	270 – 1210	2	1,040	1,095	1,150
Anions							
Chloride	mg/L		16 – 86	3	36	41	46
Fluoride	mg/L		0.0 – 0.1	3	<0.1	0.1	0.1
Sulfate	mg/L		77 – 770	3	749	759	769
Cations							
Sodium	mg/L	-	27 – 91	3	87	132	176
Potassium	mg/L	-	5 -10	3	6	7	7
Calcium	mg/L	-	38 – 100	3	79	112	145
Magnesium	mg/L	-	21 – 73	3	45	61	76
Metals[1]							
Aluminium	mg/L	0.055	NM	3	<0.01	0.005	0.005
Arsenic	mg/L	0.013	0.001 – 0.025	3	<0.001	0.001	0.001
Silver	mg/L	0.00005	0.00025 – 0.00500	3	<0.001	**0.00050**	**0.00050**
Barium	mg/L	-	0.03 – 0.13	3	0.042	0.04200	0.04200
Boron	mg/L	0.94	0.23 – 1.30	3	0.58	0.58	0.58
Cadmium	mg/L	0.0002	0.0001 – 0.0010	3	<0.0001	0.0001	0.0001
Chromium	mg/L	0.001	0.001 – 0.010	3	<0.001	0.001	0.001

Table 5.7 Groundwater monitoring location D4 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Copper	mg/L	0.0014	0.001 – 0.005	3	<0.001	0.0008	0.0010
Iron (filtered)	mg/L	-	22.0 – 71.0	3	89.3	89.300	89.300
Mercury	mg/L	0.00006	0.0000 – 0.0002	3	<0.0001	0.00005	0.00005
Manganese	mg/L	1.9	6.0 – 20.0	3	**5.55**	**6.77**	**7.98**
Molybdenum	mg/L	0.034	NM	3	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	3	0.007	**0.025**	**0.042**
Lead	mg/L	0.0034	0.0005 – 0.0100	3	<0.001	0.0005	0.0005
Selenium	mg/L	0.005	0.001 – 0.003	3	<0.01	0.005	0.005
Zinc	mg/L	0.008	0.020 – 0.090	3	**0.026**	**0.036**	**0.045**

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 relates to the total metal concentrations.

5.3.5 Groundwater monitoring location D5

Groundwater monitoring bore 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 Table 5.1) downgradient of the KVAD/KVAR 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 KVAD/KVAR (EMM 2023b). There is potential for groundwater quality impacts at this location due to its proximity to the KVAD/KVAR. Previous groundwater assessments (Aurecon 2020) noted that this bore has been known to be dry since July 2019, which is when controlled discharges for Springvale Colliery to Sawyers Swamp Creek ceased.

Three samples were collected from 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 5.4 to 5.6 with low salinity. Median concentrations of silver, manganese and nickel exceeded DGVs, with manganese and nickel generally within the baseline range. Overall, the groundwater quality is similar to bore D2 suggesting that the groundwater quality at the bore location is not ash affected.

Table 5.8 Groundwater monitoring location D5 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	5.0 – 6.6	3	**5.4**	**5.5**	**5.6**
EC	µS/cm	350	492 – 1,331	3	169	**622**	**671**
Total dissolved solids	mg/L	-	270 – 1210	3	436	478	584
Anions							

Table 5.8 Groundwater monitoring location D5 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Chloride	mg/L		16 – 86	3	51	59	60
Fluoride	mg/L		0.0 – 0.1	3	<0.1	0.1	0.1
Sulfate	mg/L		77 – 770	3	235	308	333
Cations							
Sodium	mg/L	-	27 – 91	3	52	54	56
Potassium	mg/L	-	5 -10	3	6	6	6
Calcium	mg/L	-	38 – 100	3	23	28	30
Magnesium	mg/L	-	21 – 73	3	25	29	30
Metals[1]							
Aluminium	mg/L	0.055	NM	2	<0.01	0.005	0.005
Arsenic	mg/L	0.013	0.001 – 0.025	3	<0.001	0.001	0.002
Silver	mg/L	0.00005	0.00025 – 0.00500	2	<0.001	**0.00050**	**0.00050**
Barium	mg/L	-	0.03 – 0.13	2	0.04	0.04950	0.05900
Boron	mg/L	0.94	0.23 – 1.30	3	0.27	0.48	0.69
Cadmium	mg/L	0.0002	0.0001 – 0.0010	3	<0.0001	0.0001	0.0001
Chromium	mg/L	0.001	0.001 – 0.010	3	<0.001	0.001	0.001
Copper	mg/L	0.0014	0.001 – 0.005	3	<0.001	0.0005	0.0010
Iron (filtered)	mg/L	-	22.0 – 71.0	2	31.8	35.800	39.800
Mercury	mg/L	0.00006	0.0000 – 0.0002	2	<0.0001	0.00005	0.00005
Manganese	mg/L	1.9	6.0 – 20.0	3	1.59	**1.93**	**2.16**
Molybdenum	mg/L	0.034	NM	2	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	3	**0.028**	**0.030**	**0.040**
Lead	mg/L	0.0034	0.0005 – 0.0100	3	<0.001	0.0005	0.0005
Selenium	mg/L	0.005	0.001 – 0.003	3	<0.01	0.005	0.005
Zinc	mg/L	0.008	0.020 – 0.090	3	<0.005	0.006	0.008

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes not monitored or not provided in the baseline data set.

2. Reported metal concentrations for the current AEMR Period are from filtered samples. The Baseline range relates to the total metal concentrations.

5.3.6 Groundwater monitoring location D6

Groundwater monitoring bore D6 is located to the west of the KVAD/KVAR (see Figure 5.1). The bore is screened in the regional system (see Table 5.1) downgradient of the KVAD/KVAR and SSCAD, but upgradient from Lidsdale Cut. The groundwater flow direction at this bore is interpreted to be to the west, away from the KVAD/KVAR

(EMM 2023b). There is potential for groundwater quality impacts at this location due to its proximity to the KVAD/KVAR.

Three samples were collected from 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 3.8 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 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 (ie 2018 to the current period).

Table 5.9 Groundwater monitoring location D6 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	3.1 – 5.5	3	**3.8**	**4.2**	**4.5**
EC	µS/cm	350	283 – 1,013	3	**549**	**811**	**902**
Total dissolved solids	mg/L	-	200 – 902	3	585	752	912
Anions							
Chloride	mg/L		14 – 118	3	22	24	32
Fluoride	mg/L		0.0 – 0.2	3	0.5	0.6	1.0
Sulfate	mg/L		89 – 360	3	480	508	609
Cations							
Sodium	mg/L	-	25 – 58	3	94	94	113
Potassium	mg/L	-	4 – 9	3	5	6	6
Calcium	mg/L	-	4 – 24	3	8	9	11
Magnesium	mg/L	-	12 – 29	3	56	60	71
Metals[1]							
Aluminium	mg/L	0.055	NM	2	**3.870**	**6.345**	**8.820**
Arsenic	mg/L	0.013	0.004 – 0.025	3	<0.001	0.001	0.001
Silver	mg/L	0.00005	0.00100 – 0.00500	2	<0.001	**0.00050**	**0.00050**
Barium	mg/L	-	0.02 – 0.07	2	0.017	0.02600	0.03500
Boron	mg/L	0.94	0.12 – 0.82	3	0.34	0.44	0.61
Cadmium	mg/L	0.0002	0.0010 – 0.0010	3	**0.0008**	**0.0008**	**0.0009**
Chromium	mg/L	0.001	0.002 – 0.010	3	<0.001	0.001	0.001
Copper	mg/L	0.0014	0.002 – 0.010	3	**0.003**	**0.0040**	**0.0130**
Iron (filtered)	mg/L	-	13 – 104	2	0.99	1.570	2.150

Table 5.9 Groundwater monitoring location D6 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Mercury	mg/L	0.00006	0.0001 – 0.0002	2	<0.0001	0.00005	0.00005
Manganese	mg/L	1.9	0.6 – 4.3	3	0.58	0.67	0.84
Molybdenum	mg/L	0.034	NM	2	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	3	**0.386**	**0.398**	**0.472**
Lead	mg/L	0.0034	0.0020 – 0.0110	3	0.003	**0.0040**	**0.0060**
Selenium	mg/L	0.005	0.001 – 0.003	3	<0.01	0.005	0.005
Zinc	mg/L	0.008	0.050 – 0.566	3	**0.983**	**1.210**	**1.420**

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes analyte was not monitored

1. Metals results for current AEMR Period are reported as filtered

5.4 Summary

The groundwater quality results for the AEMR Period indicate that:

- groundwater quality trends during the AEMR Period were generally consistent with recent AEMR periods (ie 2018 to the current period)
- groundwater quality at monitoring bore D3 (located between SSCAD and the KVAD/KVAR) may be degraded, relative to baseline water quality trends, and
- groundwater quality at monitoring bore D6 (located downgradient of KVAD/KVAR) is consistent with ash affected water.

Potential groundwater contamination sources, pathways and receptors are being investigated as part of the VMP process (see Section 1.4).

References

ANZG 2018, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Governments and Australian state and territory governments, https://www.waterquality.gov.au/anz-guidelines.

Aurecon 2020, Wallerawang Ash Repository, Water Quality Assessment from April 2019 to March 2020 in Relation to the Decommissioned Wallerawang Power Station

BoM 2023, Climate Driver Update, Bureau of Meteorology, http://www.bom.gov.au/climate/enso/

EMM 2022, Water Management Assessment, prepared for GPM

EMM 2023a, Surface Water Characterisation Report: EPL Condition E1.2, prepared for GPM.

EMM 2023b, Initial Groundwater Characterisation Report, prepared for GPM.

Energy Australia 2018, Wallerawang Ash Repository, Operational Environmental Management Plan

Appendix A
Surface water quality charts

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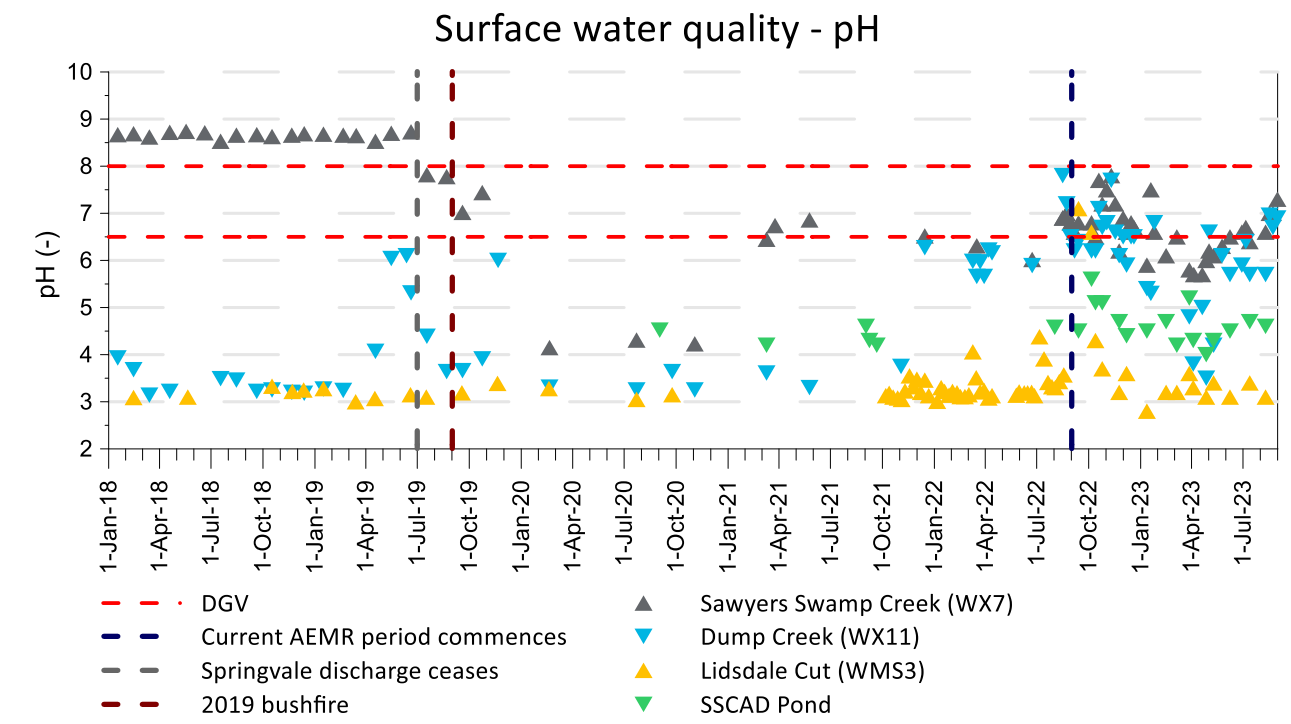
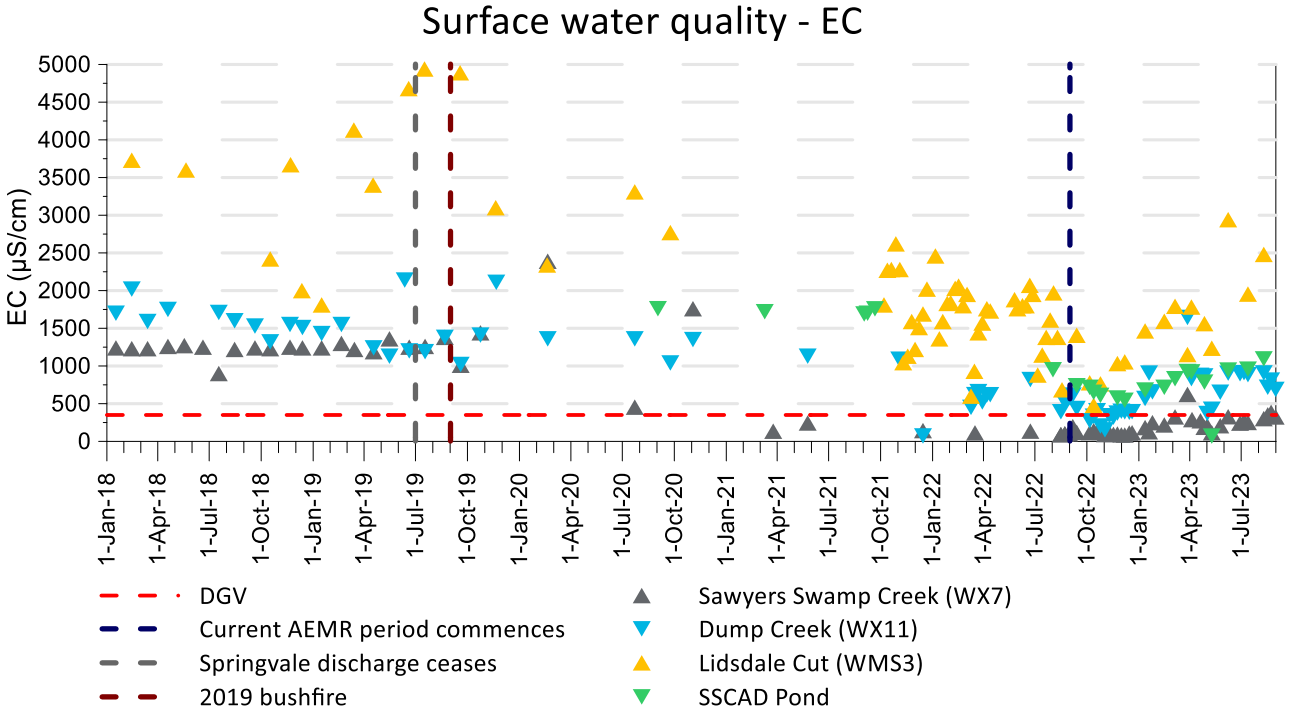
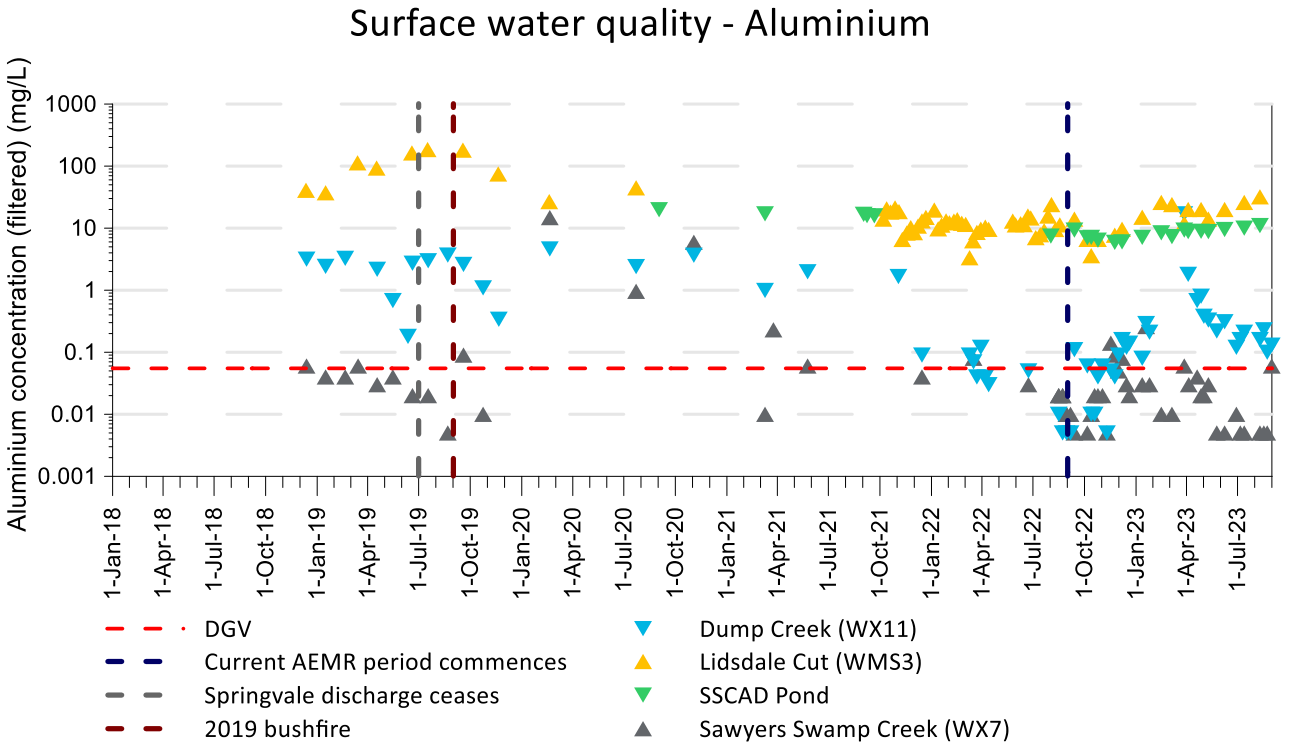
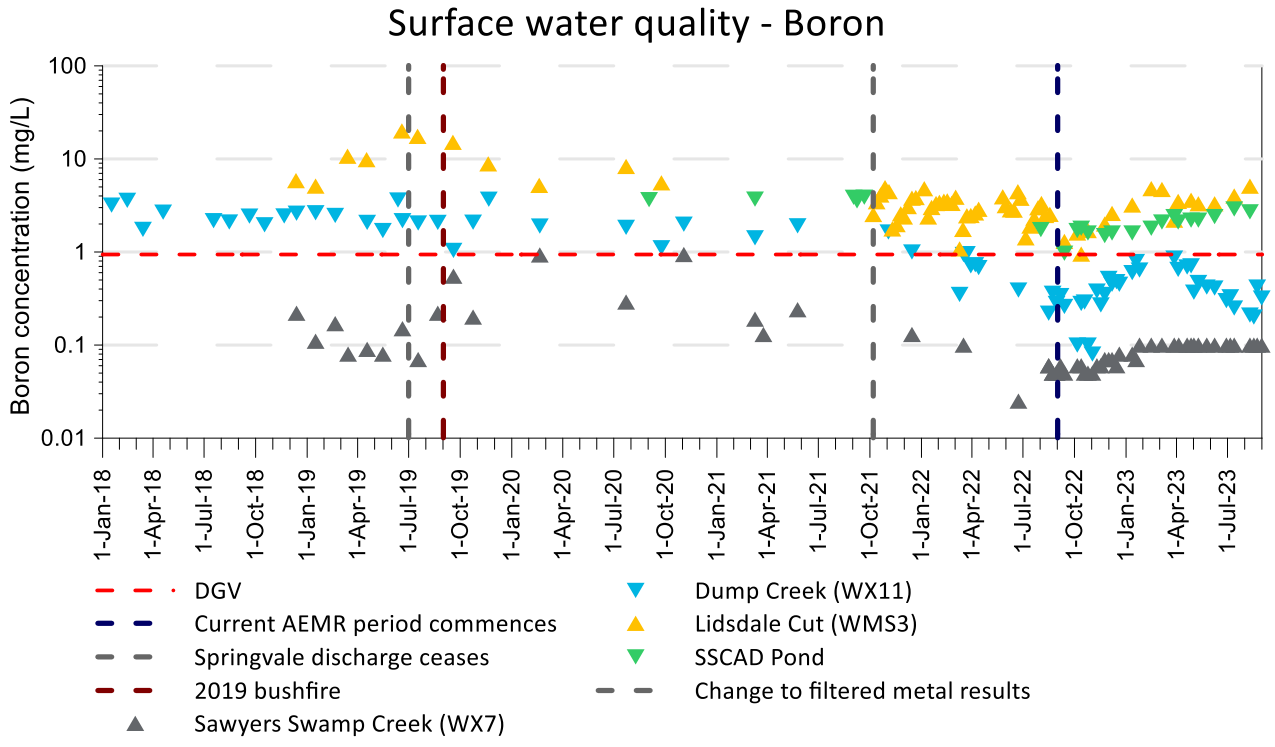
A.1 Physico-chemical parameter charts



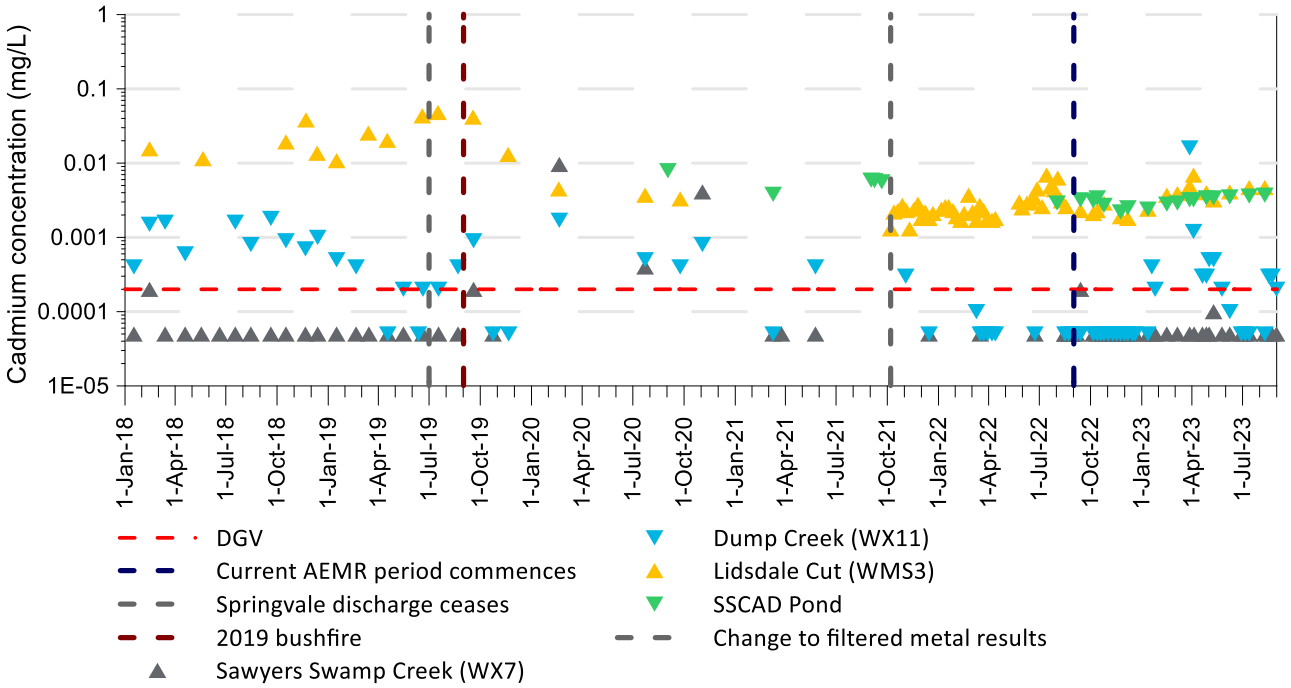


A.2 Metals charts

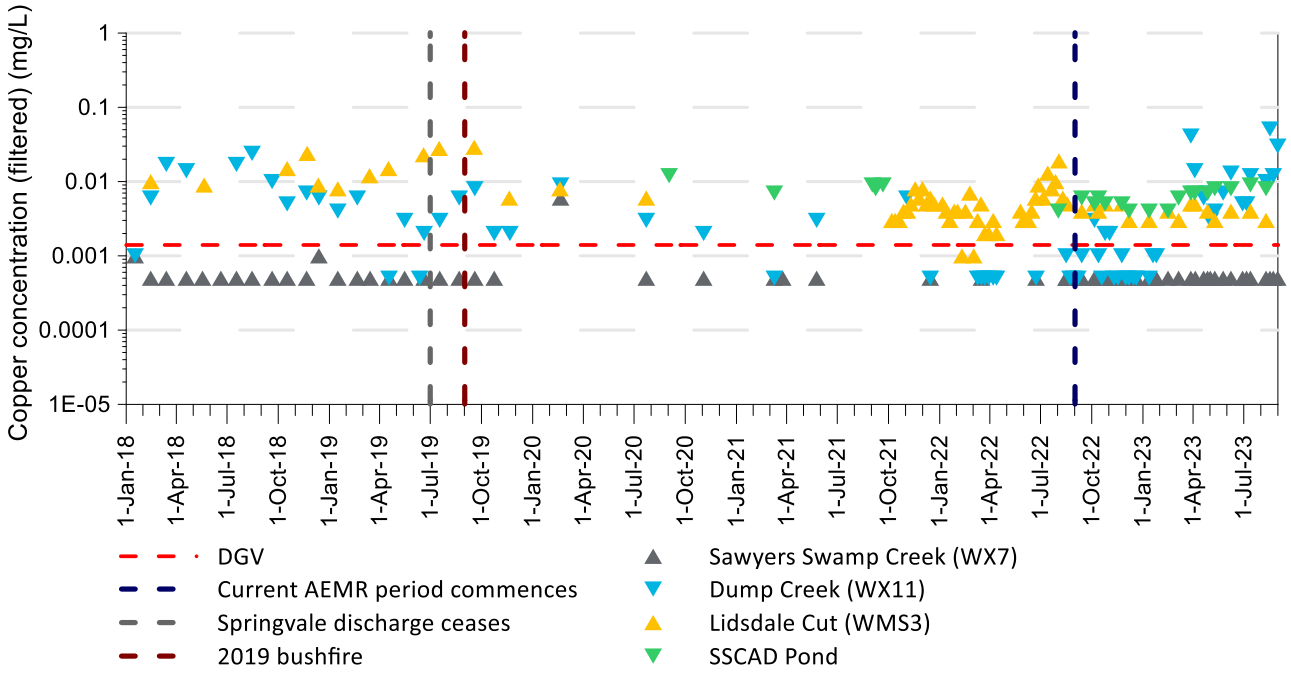


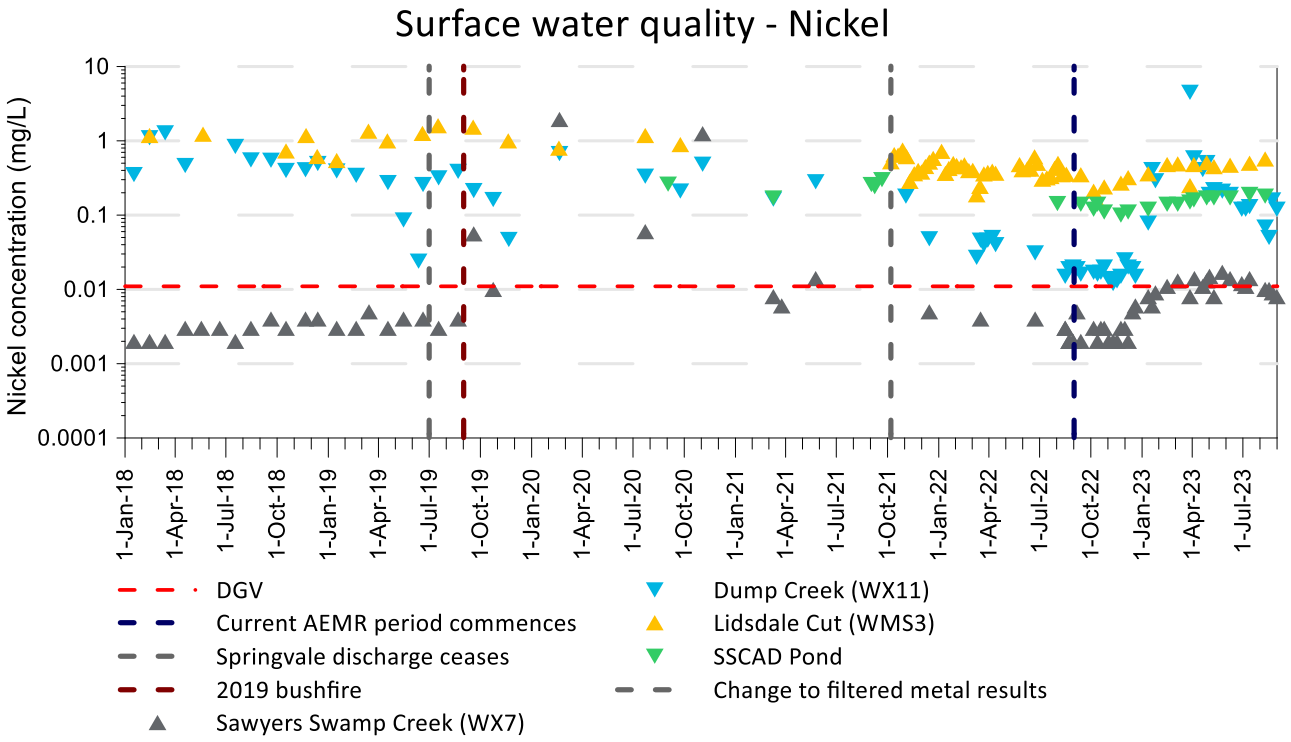


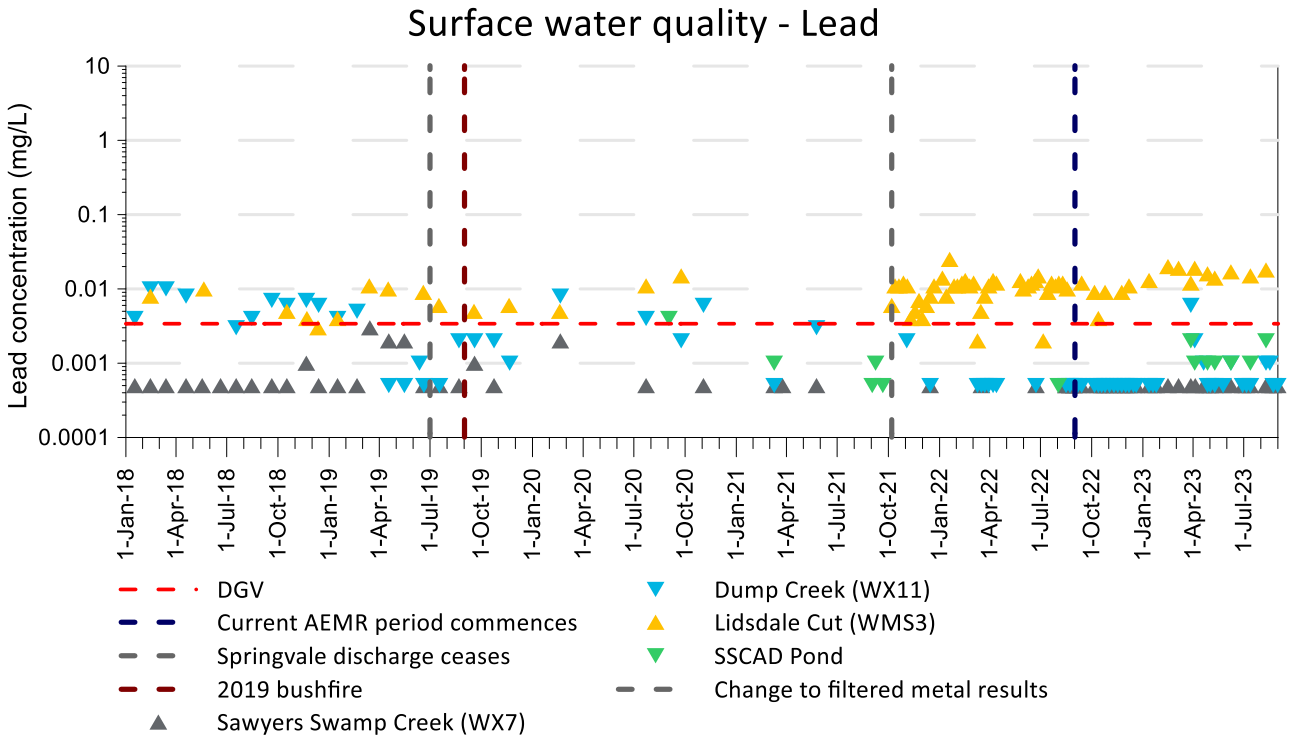
Surface water quality - Cadmium

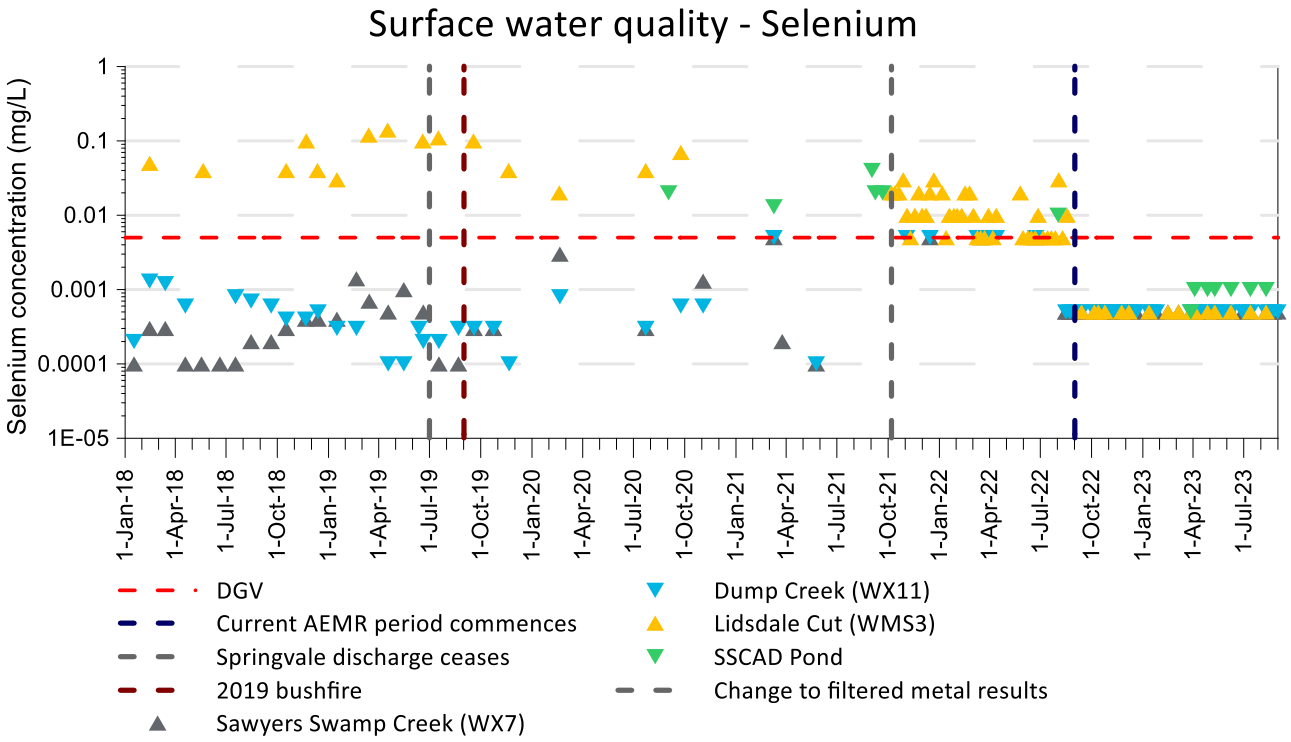


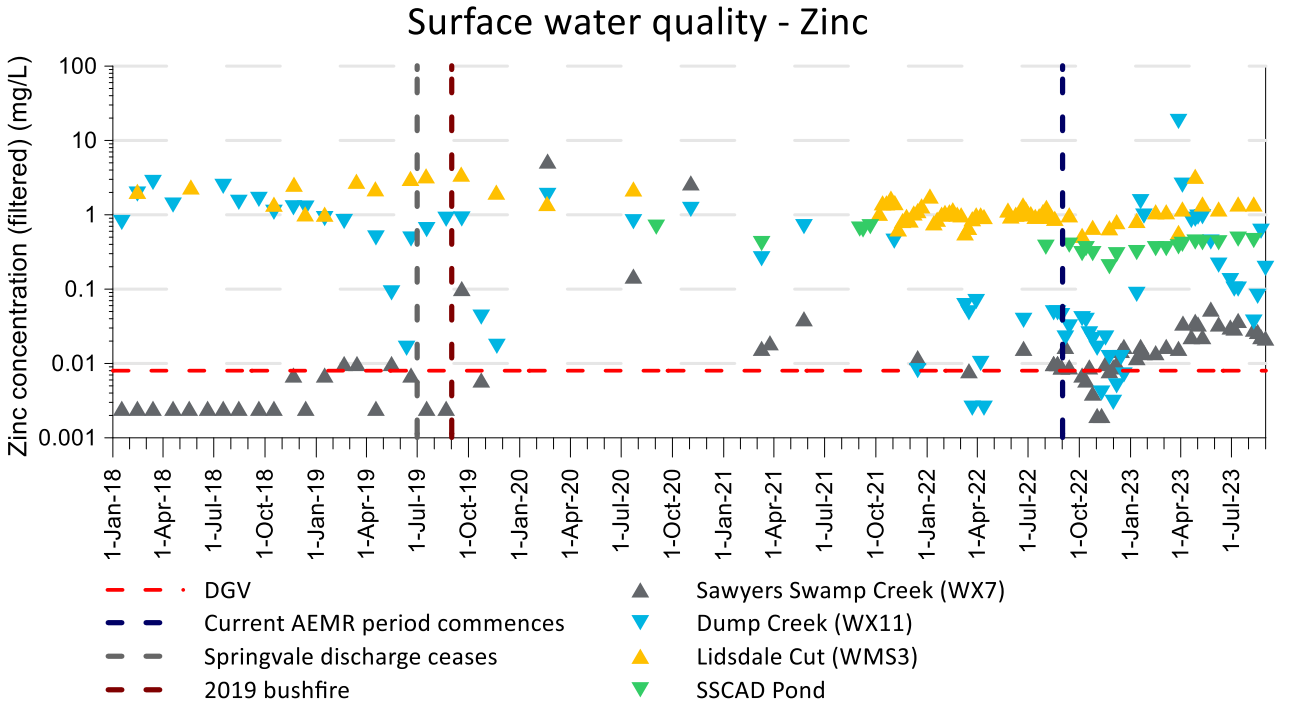
Surface water quality - Copper




Surface water quality - Nickel
Nickel concentration (mg/L)
10
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
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek (WX7)
Dump Creek (WX11)
Lidsdale Cut (WMS3)
SSCAD Pond
Change to filtered metal results


Surface water quality - Lead
Lead concentration (mg/L)
10
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
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek (WX7)
Dump Creek (WX11)
Lidsdale Cut (WMS3)
SSCAD Pond
Change to filtered metal results


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
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek (WX7)
Dump Creek (WX11)
Lidsdale Cut (WMS3)
SSCAD Pond
Change to filtered metal results


Surface water quality - Zinc
Zinc concentration (filtered) (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
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek (WX7)
Dump Creek (WX11)
Lidsdale Cut (WMS3)
SSCAD Pond

Appendix B
Groundwater quality charts

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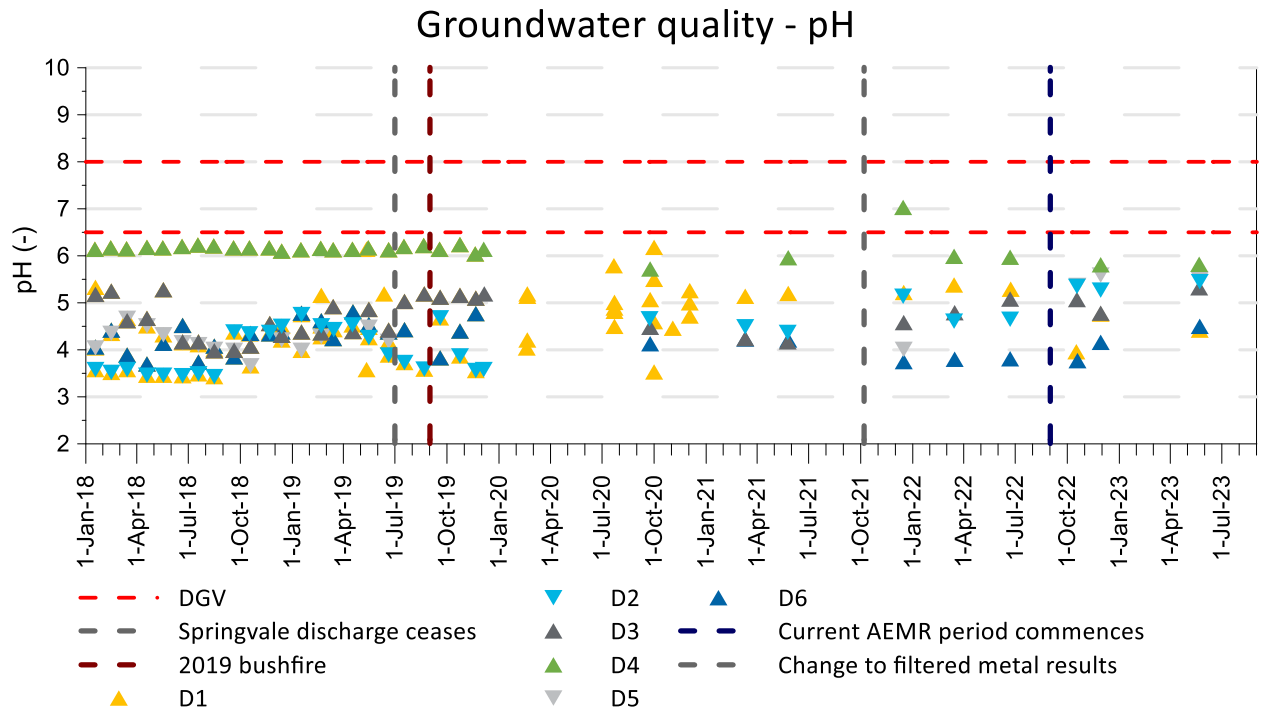
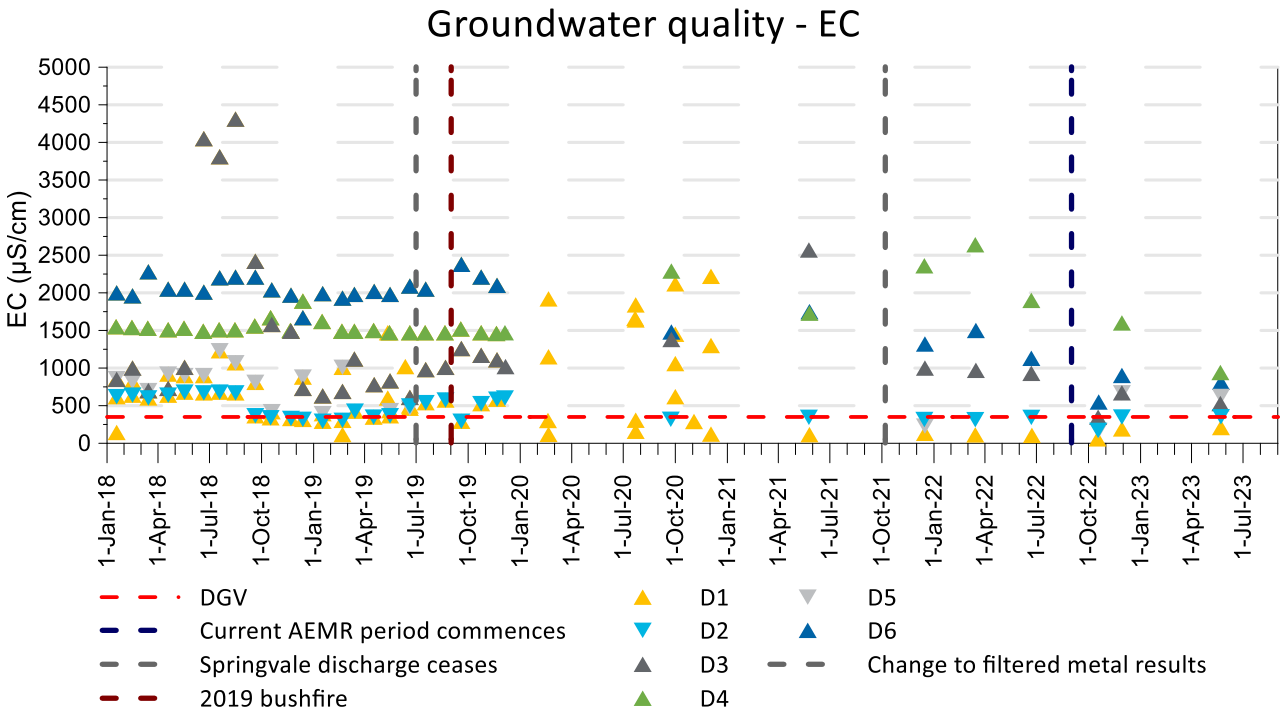
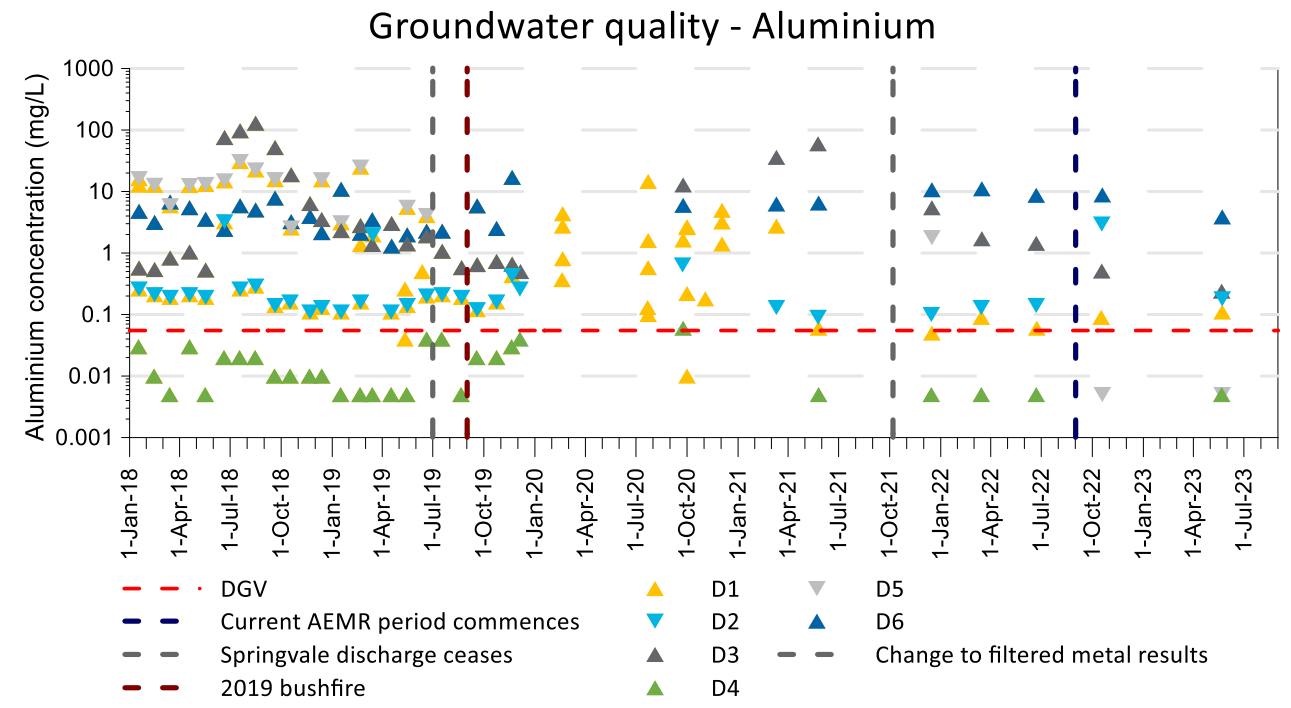
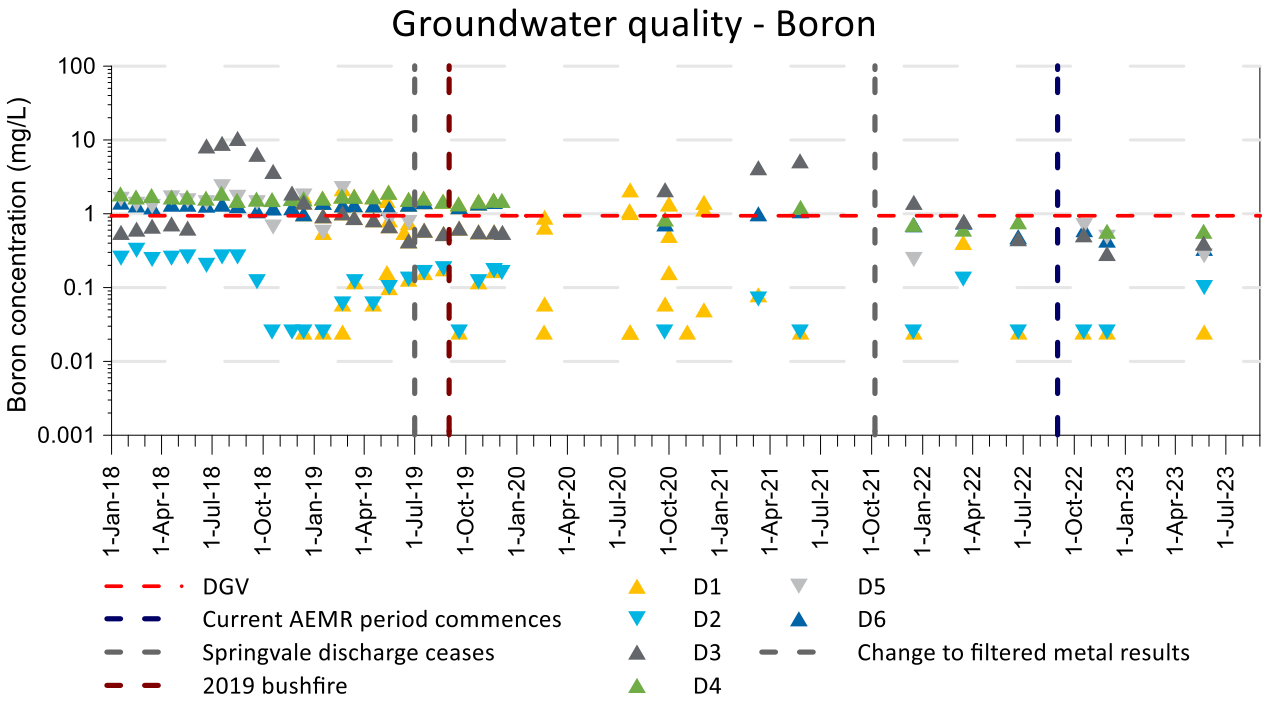
B.1 Physico-chemical parameter charts

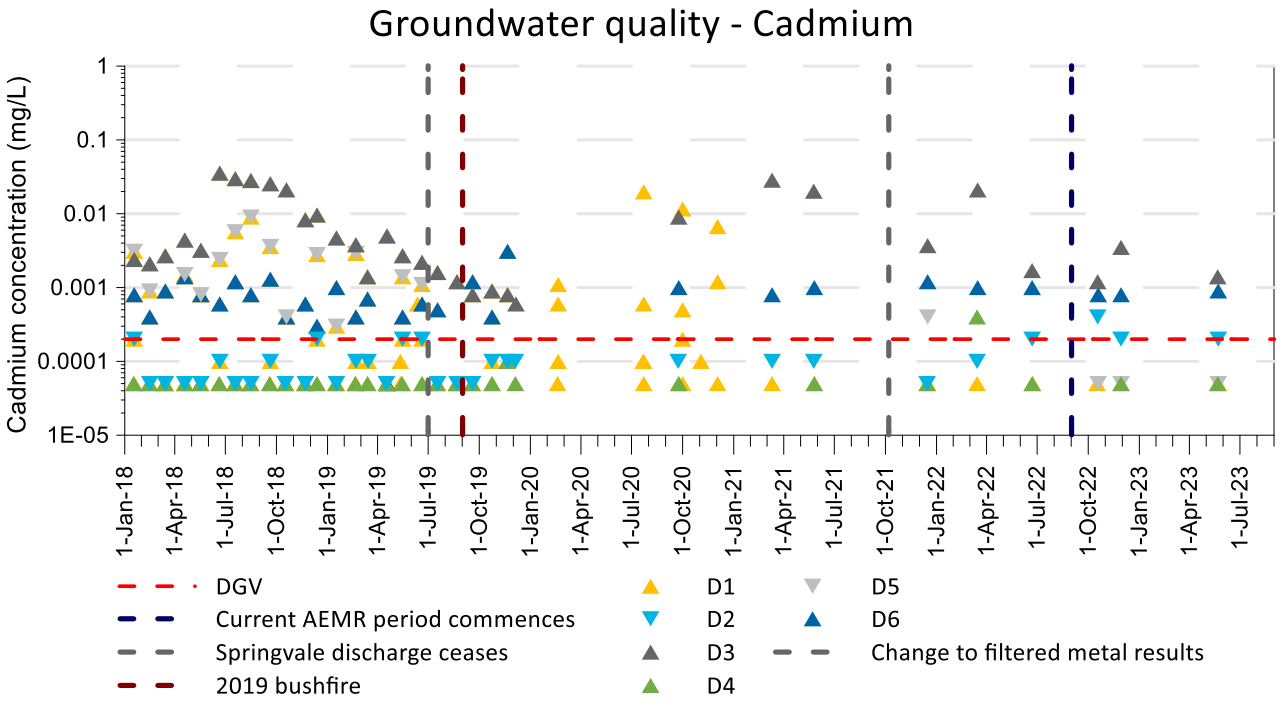


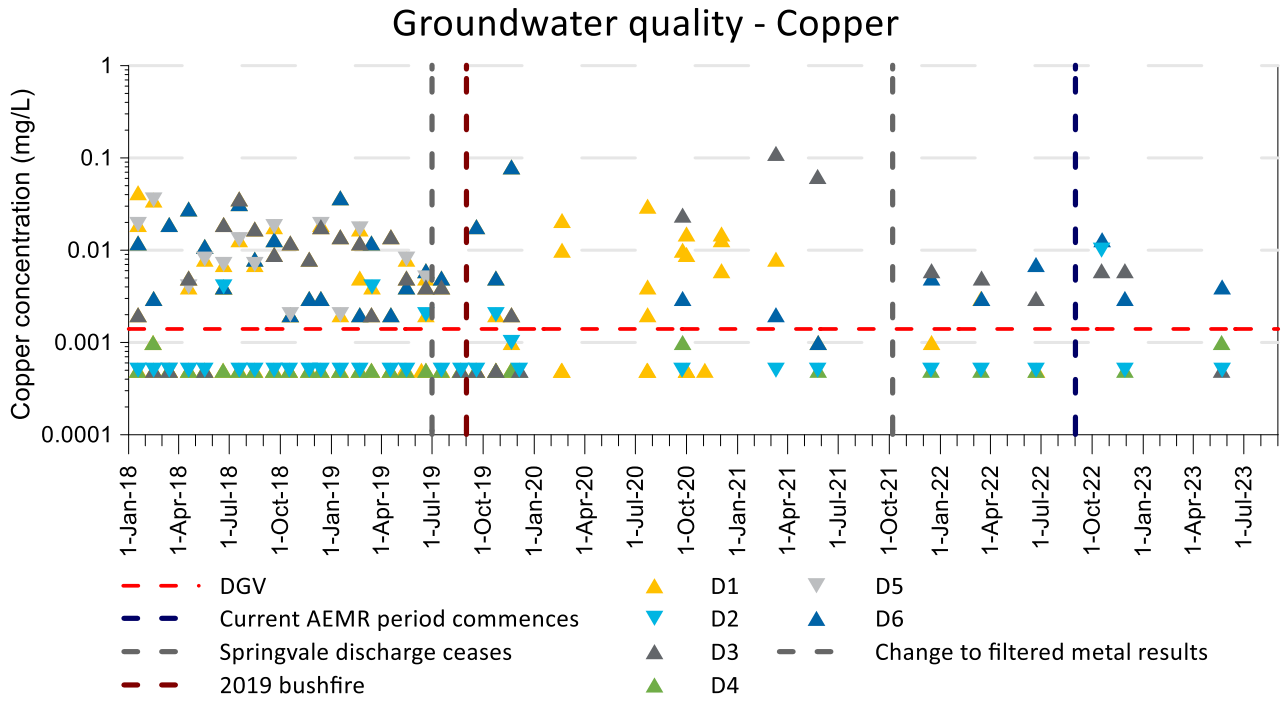


B.2 Metals charts






Groundwater 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
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Change to filtered metal results


Groundwater quality - Copper
Copper concentration (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
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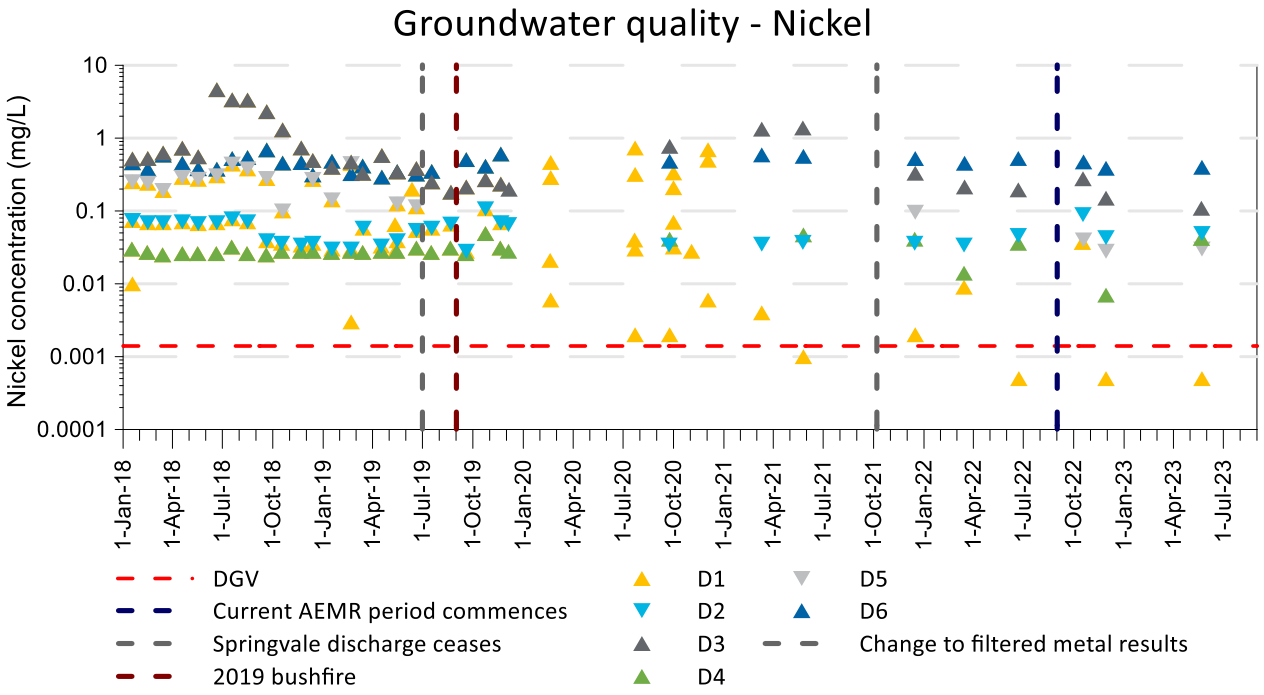
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Change to filtered metal results


Groundwater quality - Nickel
Nickel concentration (mg/L)
10
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
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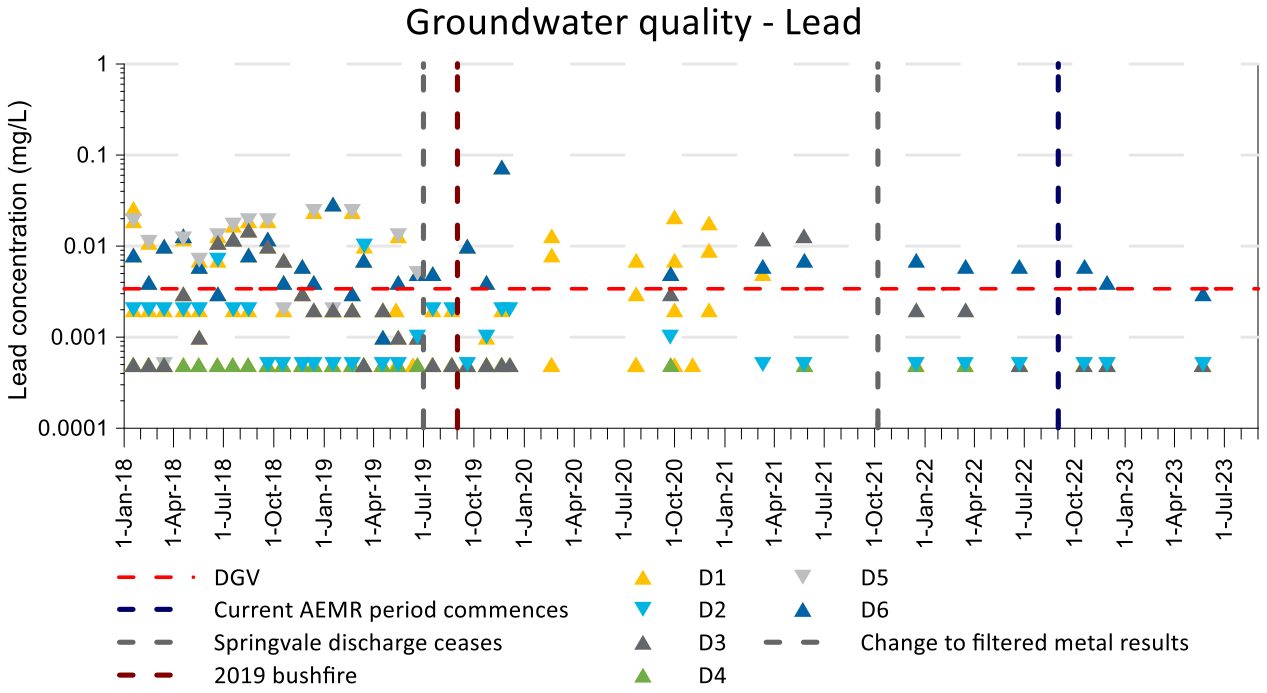
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Change to filtered metal results


Groundwater quality - Lead
Lead concentration (mg/L)
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0.01
0.001
0.0001
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1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
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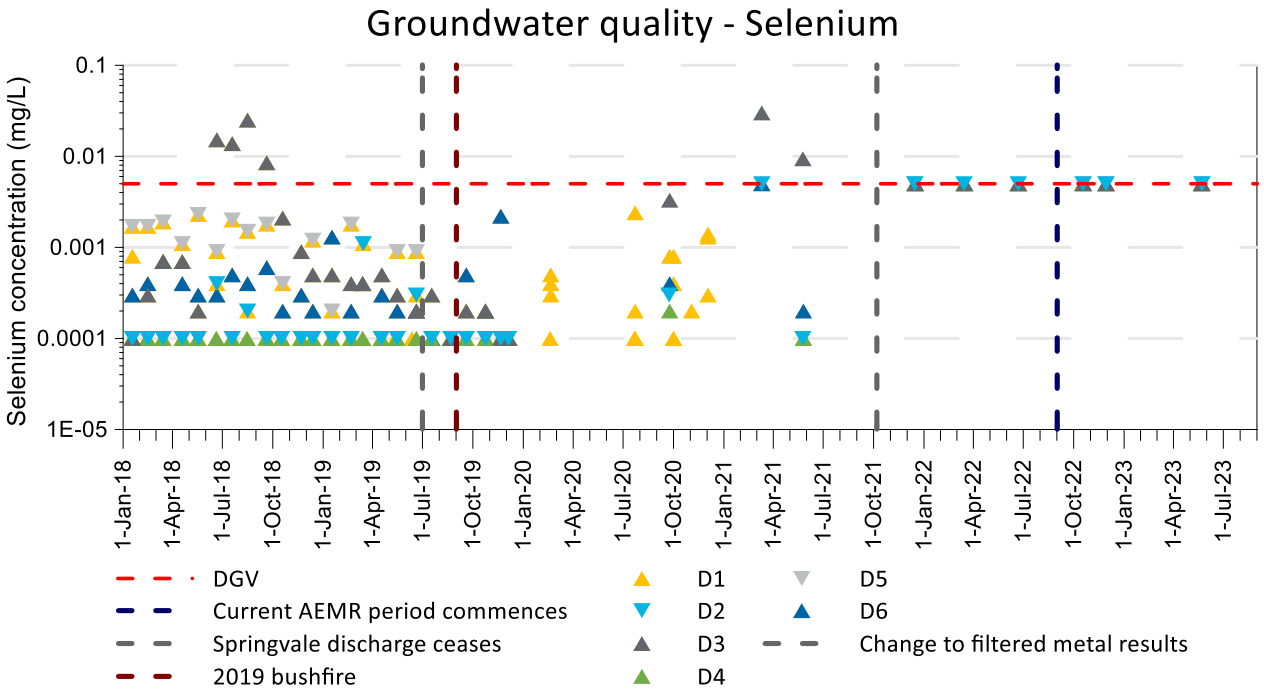
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Change to filtered metal results


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
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1-Jan-23
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DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
D1
D2
D3
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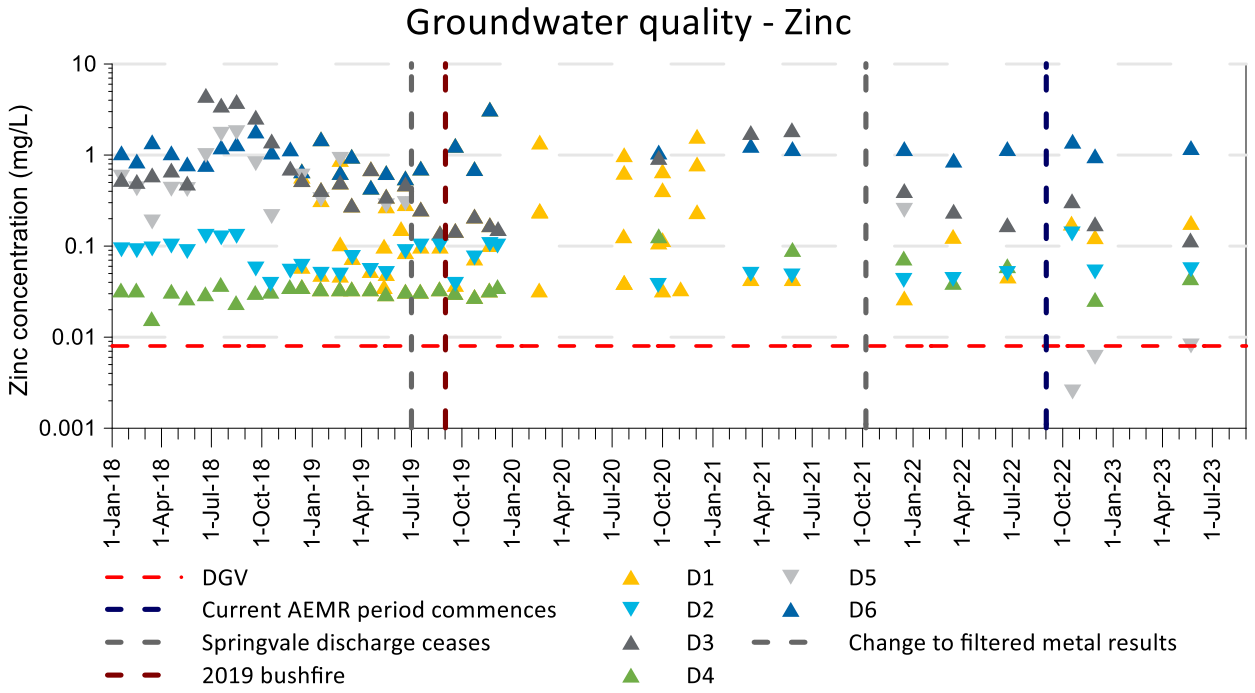
D5
D6
Change to filtered metal results


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
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1-Apr-22
1-Jul-22
1-Oct-22
1-Jan-23
1-Apr-23
1-Jul-23
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
D1
D2
D3
D4
D5
D6
Change to filtered metal results

Australia

SYDNEY
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Level 3 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 1 87 Wickham Terrace
Spring Hill QLD 4000
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CANBERRA
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15 London Circuit
Canberra City ACT 2601

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Adelaide SA 5000
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MELBOURNE
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Melbourne VIC 3000
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