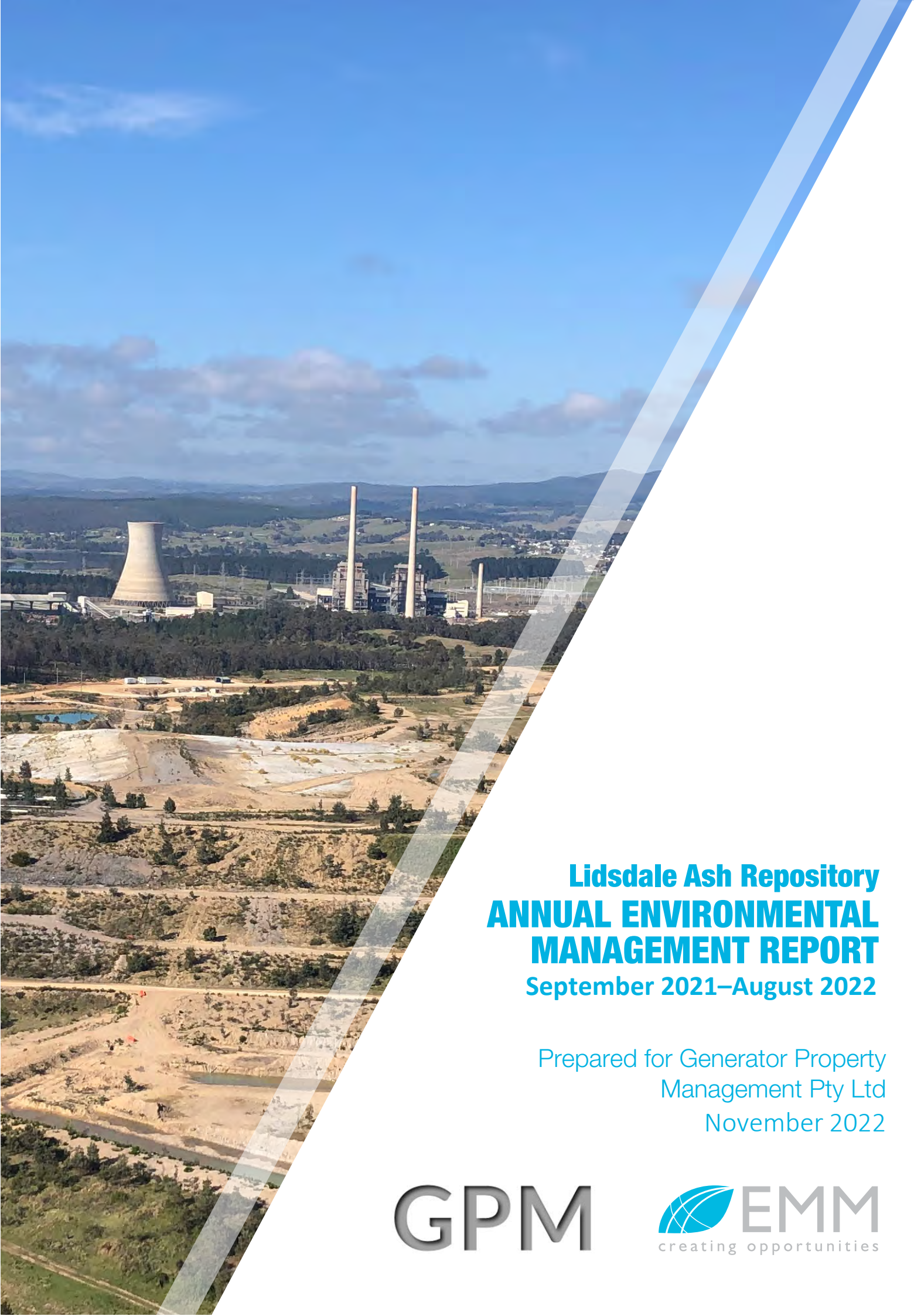


Lidsdale Ash Repository
ANNUAL ENVIRONMENTAL MANAGEMENT REPORT
September 2021–August 2022

Prepared for Generator Property Management Pty Ltd
November 2022

GPM

EMM
creating opportunities

Annual Environmental Management Plan

Lidsdale Ash Repository

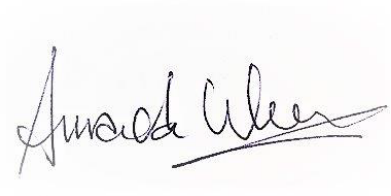
Generator Property Management Pty Ltd

E220952 1

November 2022

Version	Date	Prepared by	Approved by	Comments
1	23/11/22	Nena Lane-Kirwan	Amanda Weston	Final for submission to DPE

Approved by



Amanda Weston
Associate Director
23/11/2022

Level 3 175 Scott Street
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1 Summary of Compliance

The Lidsdale Ash Repository Annual Environment Management Report (AEMR) has been prepared pursuant to Schedule 2, Condition 7.3 of the Project Approval 07_0005. The AEMR has been prepared in accordance with the NSW Government's Post-approval requirements for State significant mining developments Annual Review Guideline dated October 2015.

The Lidsdale Ash Repository site consists of:

- the Kerosene Vale Dry Ash Repository (KVAR) and underlying former Kerosene Vale Ash Dam (KVAD);
- Sawyers Swamp Creek Ash Dam (SSCAD);
- Lidsdale Cut and adjacent asbestos landfills; and
- demolition landfill south of the SSCAD.

A summary of the Lidsdale Ash Repository compliance achieved during the reporting period is provided in Table 1.1. There were no non-compliances recorded during the 2021-22 reporting period (1 September 2021 to 31 August 2022). An extended review of compliance with the Conditions of the Approval (CoA) presented in Appendix A.

Table 1.1 Statement of compliance during the 2021-22 reporting period

Were all conditions of the relevant approval(s) complied with?
Project Approval #07_0005
Environment Projection Licence #21185

The key for compliance assessment provided in Table 1.2 was used in assessing compliance with CoAs in accordance with the NSW Government's Independent Audit Guideline.

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:

- Noise from tree clearing at the Lidsdale Ash Repository was audible at one sensitive receiver on one occasion during the reporting period but was below the $LA_{eq\ (15\ minutes)}$ of 40 dBA limit.
- Air quality monitoring results relating to activities at the Lidsdale Repository site were below the Operational Environment Management Plan (OEMP) assessment criteria for depositional dust gauges located in Wallerawang and Lidsdale townships.
- There were no community complaints received relating to the management of the Lidsdale Ash Repository Area.
- Surface water and groundwater quality trends during the AEMR Period were generally consistent with recent AEMR periods.

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

- review potential sources of contamination as part of future studies that are currently being discussed with regulators; and
- review and update the OEMP to ensure care and maintenance of the site reflects current practices and is in line with best practice. The updated OEMP is in the process of being finalised and is anticipated to be implemented during the 2022-2023 AEMR period.

2 Introduction

2.1 Background

The Lidsdale Ash Repository is located at Skelly Road, Lidsdale NSW (the Site) and is approximately 15 kilometres (km) northwest of Lithgow and 2.5 km north-east of former Wallerawang Power Station (WPS). The Site comprises an area of approximately 528 hectares (ha) and is situated primary on Lot 5 in Deposited Plan (DP) 829137 (refer to Figure 2.1).

The Site includes:

- the Kerosene Vale Dry Ash Repository (KVAR) and underlying former Kerosene Vale Ash Dam (KVAD);
- Sawyers Swamp Creek Ash Dam (SSCAD);
- Lidsdale Cut and adjacent asbestos landfills; and
- demolition landfill south of the SSCAD.

The Lidsdale Ash Repository is owned and operated by Generator Property Management (GPM) with the Site having a long history of being used for disposal of waste from the WPS, mining and industrial waste. GPM took ownership of the Site in September 2020 from EnergyAustralia NSW. The Site was used for ash disposal in conjunction with the WPS since the late 1950s but since the closure of WPS in 2014, the Lidsdale Ash Repository has been placed in care and maintenance.

GPM's objectives at the Site include decommissioning, demolition, rehabilitation and management of ongoing regulatory and contractual obligations.

2.2 Site history

The original ash placement operations were at the KVAD. The void was filled with ash transported from the WPS as slurry (ie wet ash placement). When the KVAD was full, it was capped with a clay capping and then ash placement operations began at the SSCAD, which saw wet ash placement take place from 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 (ie 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 stages is outlined 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; and
- there would be a decreased flood risk for Kerosene Vale, Lidsdale 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 Lidsdale Ash Repository (former Wallerawang Ash Repository) from off-site sources.

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; and
- 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 (Figure 2.2).

In January 2014, WPS's Unit 7 was removed from service and deregistered from the market; whilst in March 2014, Unit 8 was placed in long term storage. However, in November 2014, EnergyAustralia NSW announced that Unit 8 was to be removed from service and deregistered from the market. 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 Lidsdale Ash Repository.

In 2014 the closure and demolition of the WPS was approved which included the development of an asbestos repository on the Site for the disposal of material from the WPS site. 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 at the Site, pursuant to former section 75W of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A 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 is in the process of drafting a Voluntary Management Proposal (VMP) to investigate and address the contamination.

The Lidsdale Ash Repository has been placed in care and maintenance with the bulk transport and disposal of ash to the KVAD subsequently ceased following the closure of the WPS. Small volumes of ash will be disposed when required during the demolition of the WPS. 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 Lidsdale Ash Repository area.

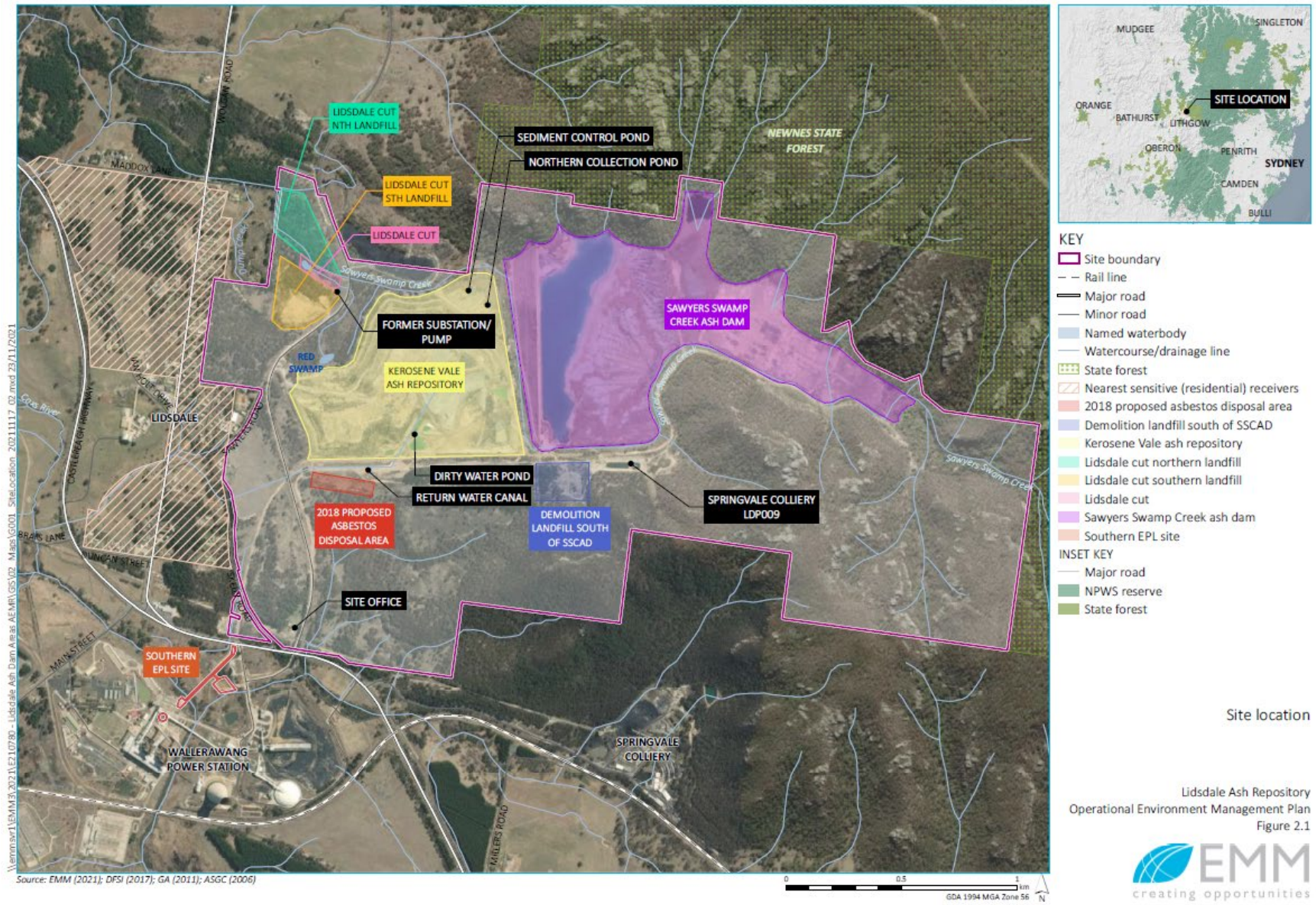

Figure 2.1 Site location and layout

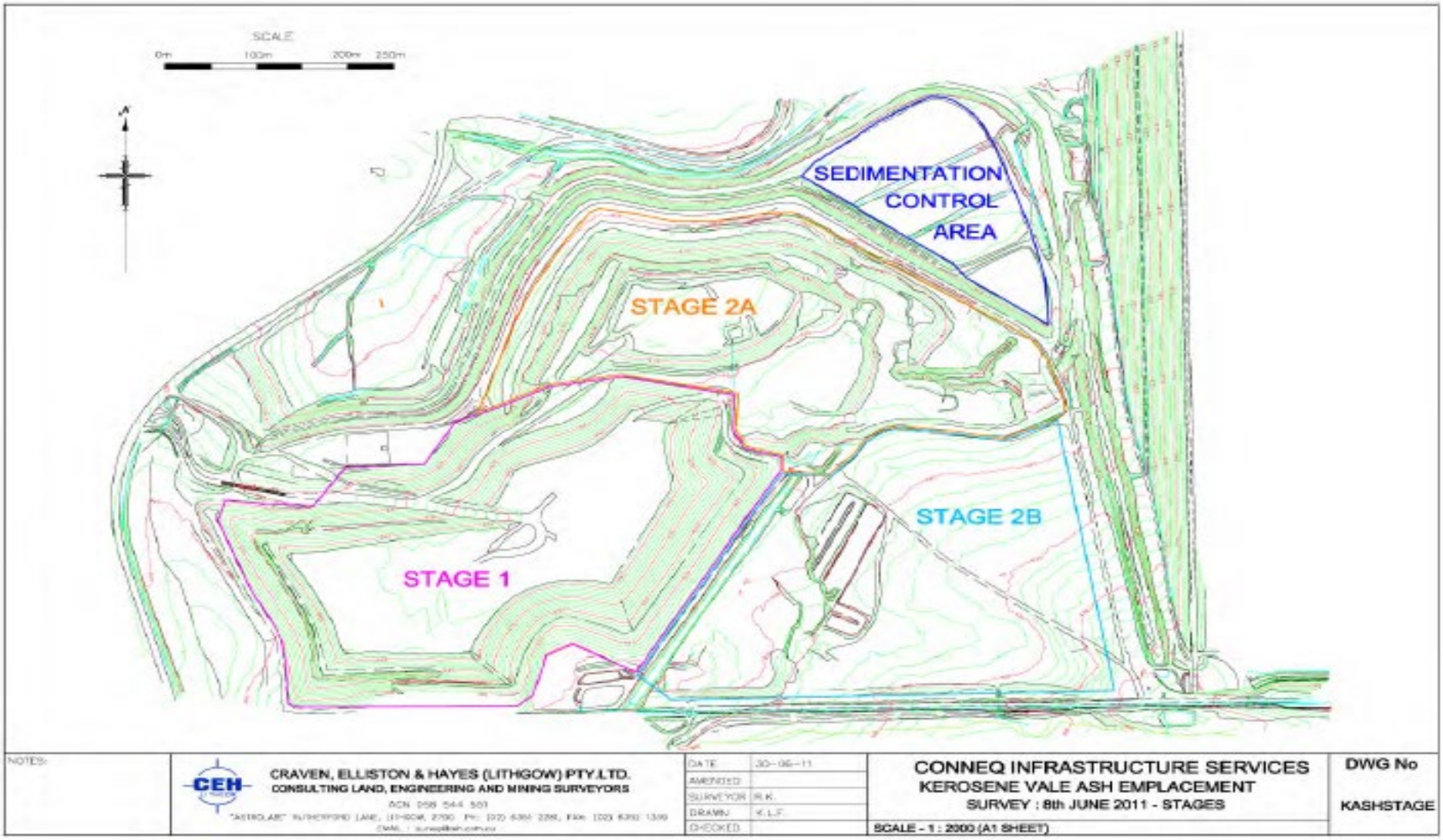

Figure 2.2 revised ash placement strategy for KVAR – Stages 1, 2A and 2B

2.3 Purpose of the AEMR

This AEMR has been prepared in order to satisfy Schedule 2, Condition 7.3 of the Approval (PA) 07_0005. This report covers the operations and environment and community performance of the Site from 1 September 2021 to 31 August 2022 (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 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 Site.

2.4 Project contacts

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

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Mr John Pola

Facility Environment & Safety Manager

M: 0429 205 290

E: john.pola@gpmco.com.au

3 Consents, leases and licenses

Care and maintenance activities will continue to be undertaken in accordance with the Project Approval and Environmental Protection Licence. The monitoring and management of the environmental aspects, including groundwater, surface water air quality and noise emission aspects of the Lidsdale Ash Repository will be 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 reporting period. The statutory authorities that the Lidsdale Ash Repository operates in accordance with are outlined in Table 3.1

Table 3.1 Key consents, leases, licences and permits

Approval/Lease/Licence	Issue date	Expiry Date	Details/Comments
Project Approval 07_0005	29 July 2005 (Renewed: 26 November 2008) 9 August 2018 (MOD 1)	9 August 2023 unless physically commenced.	Granted by the Minister for (former) Department of Planning (DoP), Section 75J of the EP&A Act.
Environment Protection Licence (EPL) No. 21185	14 September 2020	14 September (annual anniversary date)	Granted by NSW Environment Protection Authority (EPA).

Table 3.1 Key consents, leases, licences and permits

Approval/Lease/Licence	Issue date	Expiry Date	Details/Comments
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 Operational Environmental Management Plan (OEMP) provides a framework for managing environmental aspects associated with the operation of the Lidsdale Ash Repository as stipulated in the relevant provisions of Project Approval 07_0005 (MOD 1), 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 Lidsdale Ash Repository area.

4 Operations during reporting period

Due to the closure of WPS in 2014, the Lidsdale 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 has engaged 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 8.

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

Table 4.1 Operations summary

Activity	Previous reporting period	This reporting period	Next reporting period
Total Ash footprint (ha)	37.07	37.07	37.07
Area of repository capped (ha)	33.4	33.5	TBC (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 Lidsdale Ash Repository outside the normal operating hours during the reporting period.

4.2 Abnormal or emergency operation conditions

Abnormal or emergency operating hours are defined as operation outside the normal operating hours (as outlined above). Conditions under which operations outside the normal hours of operation can occur have been detailed in Condition 2.10 of PA 07_0005 and are as follows:

- where it is required to avoid the loss of lives, property and/or to prevent environmental harm;
- where a breakdown of plant and/or equipment at the repository or the Wallerawang Power Station can affect or limit the capacity of ash storage at the power station itself outside the normal operating hours;
- where a breakdown of an ash haulage truck(s) prevents haulage during the operating hours stipulated under '*Normal Conditions*' combined with insufficient storage capacity at the Wallerawang Power Station to store ash outside of the normal operating hours; and
- in the event that the National Electricity Market Management Company (NEMMCO), or a person authorised by NEMMCO, directs GPM (as a licensee) under the National Electricity Rules to maintain, increase or be available to increase power generation for system security and there is insufficient ash storage capacity at the Wallerawang Power Station to allow for the ash to be stored.

Under these circumstances, GPM is required to notify nearby sensitive receivers (as shown in Figure 2.1) prior to any emergency ash haulage or placement operations, as well as the NSW EPA and the Secretary of the Department of Planning, Industry and Environment (DPIE), within 1 week after the emergency operations have occurred.

No operating conditions have occurred outside the normal operating hours during the reporting period at the Lidsdale Ash Repository.

4.3 Construction activities

Minor construction/upgrade activities were undertaken at the Lidsdale Ash Repository, in association with Site maintenance works including:

- capping upgrades and maintenance have been undertaken within the closed asbestos landfill area (refer to section 8 for further details);
- Capping of approximately 0.1 ha of the of the eastern end of KVAR Stage 2B area commenced in August 2022;

- The northern side of KVAR was regraded and seeded;
- installation of exclusion wombat fencing in the now closed northern asbestos disposal area at Lidsdale Ash Repository.
- progressive improvements the Site's water management system to:
    - comply with dam safety management obligations;
    - improve the capture and containment of contaminated water;
    - improve the treatment of water discharged from site; and
    - reduce the volume of contaminated water that requires management

    Improvements to the discharge water management system include:

    - modifications to the caustic injection plant to reduce metal loads and concentrations in discharged water
    - progressive addition of mixing tanks, settling ponds and coagulants to further reduce metal loads and concentrations in discharged water.

4.4 Asbestos disposal areas

4.4.1 Closed Asbestos Compound

Maintenance works of the closed asbestos area was undertaken during this reporting period. Works included vegetation maintenance, upgrading to fences to stop wombats entering and digging into the disposal area as well as upgrades and maintenance of the capping material.

4.4.2 Operational asbestos disposal area

The asbestos disposal area has been prepared to enable disposal of asbestos and asbestos contaminated materials arising from the demolition of Wallerawang power station. The Site's EPL permits the area to be used for this purpose based on the Development Consent for the demolition of Wallerawang Power Station. Management of disposal is being conducted in accordance with the EPA's practice guide for asbestos landfill. No asbestos waste was received from the demolition of Wallerawang Power Station during the reporting period.

5 Actions required from previous AEMR

GPM received a letter dated 20 December 2021 from the DPE, that stated the Department was generally satisfied that the 2020-21 Annual Review adequately addressed the relevant requirements of the Project Approval. No further actions were requested by DPE.

6 Environmental management performance

Environmental monitoring for the Lidsdale Ash Repository operations is designed to comply with the regulatory requirements specified in Section 3 of this AEMR, and also to provide an ongoing analysis of the condition of the environment surrounding the Site.

Environmental monitoring is performed as part of the monitoring program at the monitoring locations shown in Figure 6.1. 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:

- Ash Delivery and Placement Sub-plan;
- 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; and
- Waste Management Sub-Plan.

A summary of the environmental management measures and associated performance is summarised below in Table 6.1.

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

Table 6.1 Environmental performance

Aspect	Approval criteria	Prediction	Lidsdale 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 4 2021.** Day $L_{Aeq(15minute)}$ Location A: 35 dB Location B: Inaudible Location C: 35 dB Evening $L_{Aeq(15minute)}$ Location A: Inaudible Location B: Inaudible Location C: Inaudible **Quarter 1 2022** Day $L_{Aeq(15minute)}$ Location A: Inaudible Location B: Inaudible Location C: Inaudible Evening $L_{Aeq(15minute)}$ Location A: Inaudible Location B: Inaudible Location C: Inaudible **Quarter 2 2022** Day $L_{Aeq(15minute)}$ Location A: Inaudible Location B: Inaudible Location C: Inaudible Evening $L_{Aeq(15minute)}$ Location A: Inaudible Location B: Inaudible Location C: Inaudible	NA – no exceedance of criteria.	Nil additional management actions required.
Ecological	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
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 0.4 to 2.01 g/m^2/month deposited dust	Annual average dust levels show a slight increasing trend.	Nil additional management actions required

Table 6.1 Environmental performance

Aspect	Approval criteria	Prediction	Lidsdale Ash Repository performance during reporting period	Trends/ management implications	Management actions
Waste	Waste disposal in accordance with EPL 21185.	Wastes disposed of accordingly.	Nil waste disposed of at the asbestos disposal area during the reporting period	Decrease in waste disposed of at the repository as demolition of the Wallerawang power station is completed.	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	No additional heritage sites have been identified during the reporting period.	Nil additional management actions required

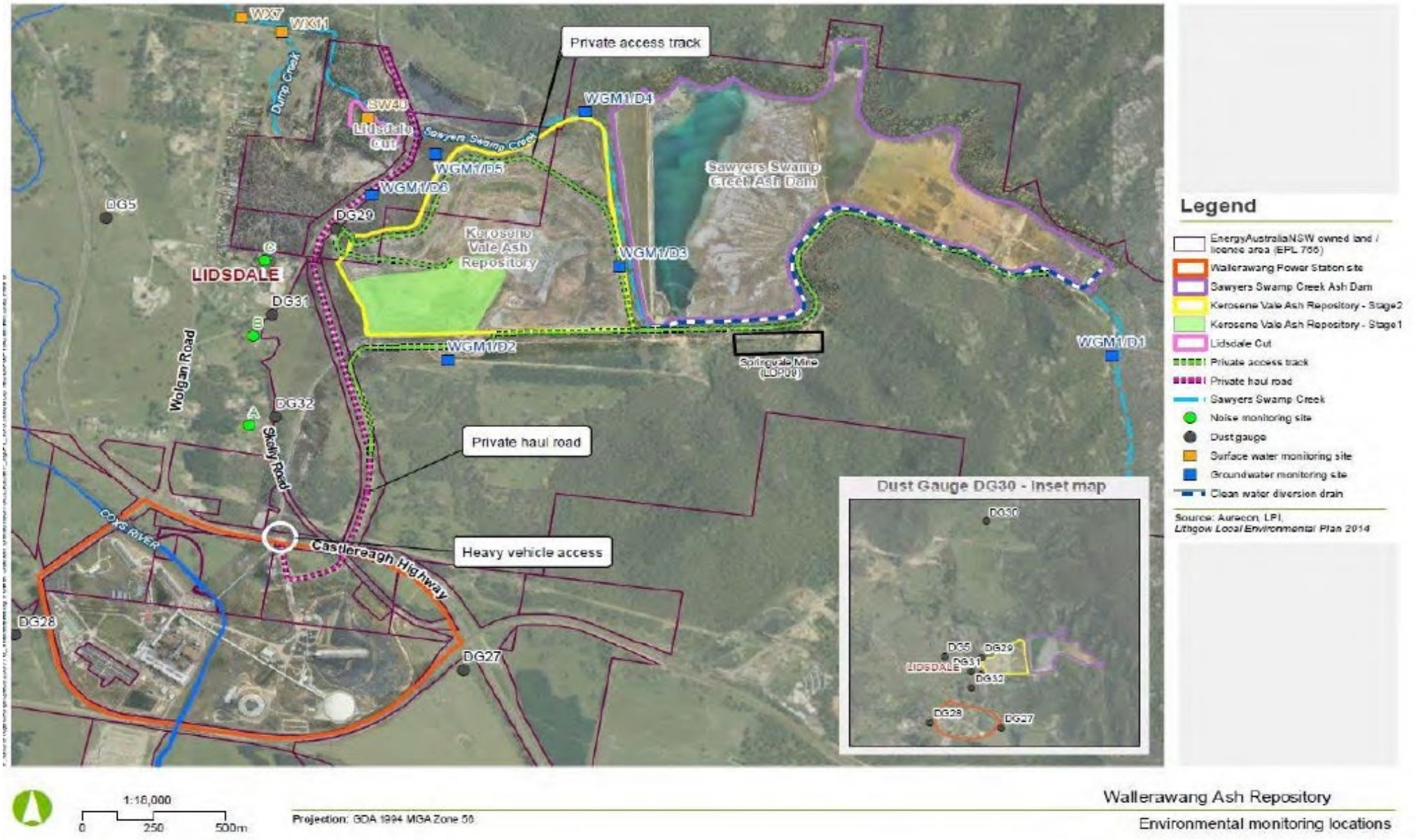

Figure 6.1 **Environmental monitoring locations**

6.1 Ash delivery and placement

Due to the closure of WPS, no ash has been placed at Lidsdale 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.

6.2 Meteorology data

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

6.2.1 Monitoring data resources

There are no official meteorological measurements collected at the Site. 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.

6.2.2 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 2021 and 31 August 2022 and is presented in Table 6.2.

The BoM Marrangaroo AWS recorded a minimum temperature of -6.9°C in July, and a maximum temperature of 29.1°C in January.

The highest total monthly rainfall recorded over the period was in January 2021 with 215.2 mm and the lowest recorded monthly rainfall was in July 2022 with 14 mm. Total annual rainfall for the reviewed period was 1,187.2

Table 6.2 Statistics for temperature and rainfall – BoM Marrangaroo AWS – September 2021-August-2022

Month	Minimum temperature (°C)	Maximum temperature (°C)	Total rainfall (mm)	Cumulative Rainfall (mm)
Sep-21	-4.4	21.2	60.8	60.8
Oct-21	-0.7	26.3	37.4	98.2
Nov-21	2.7	22.2	186.6	284.8
Dec-21	3.4	29.1	94.2	379.0
Jan-22	9.8	28.3	215.2	594.2
Feb-22	6.5	28.0	78.8	673.0
Mar-22	5.1	25.8	205.0	878.0
Apr-22	-2.5	20.5	68.4	946.4
May-22	0.2	22.2	78.8	1,025.2
Jun-22	-2.5	20.5	68.4	1,093.6
Jul-22	-6.9	13.7	14.0	1,107.6

An annual wind rose created from wind speed and direction data collected at the BoM Marrangaroo AWS from September 2021 to August 2022 is presented in Figure 6.2. The winds recorded were predominately from the south-east and west-north-west. Annual average wind speeds were 1.6 m/s, and the annual average frequency of calm conditions (windspeeds less than 0.5 m/s) were 27.3%.

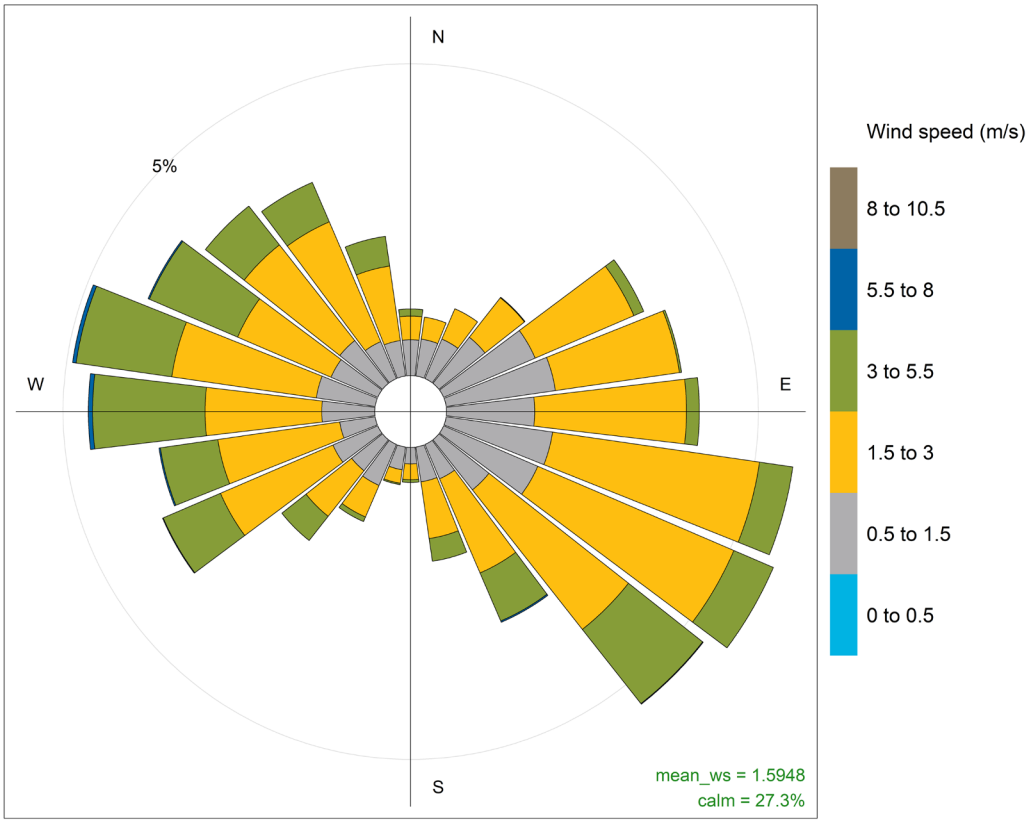

Figure 6.2 Annual wind speed and direction – BoM Marrangaroo AWS – September 2021 - August 2022

Monthly wind roses for the BoM Marrangaroo AWS from September 2021 to August 2022 are presented in Figure 6.3. Monthly average wind speeds ranged from 1.2 m/s to 1.8 m/s. The monthly average frequency of calm conditions ranged from 20.2% to 35.8%. The predominant wind direction patterns recorded during the warmer months (ie January, February, March and December) were from the south-east. The dominance of the south-eastly winds reduced between autumn and spring, with an increase in winds from the west to north-west.

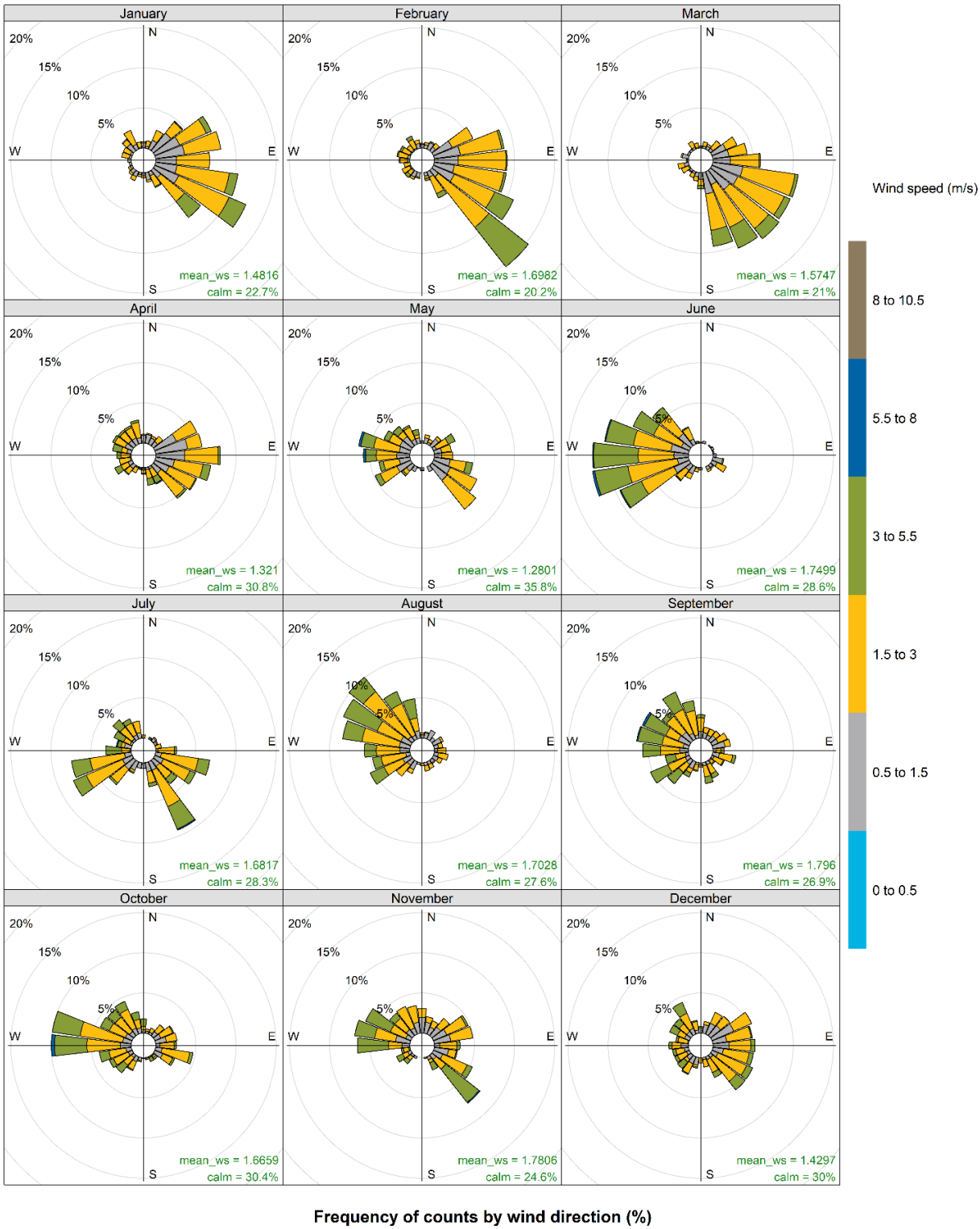

Figure 6.3 **Monthly wind speed and direction – BoM Marrangaroo AWS – September 2021 – August 2022**

6.3 Operational noise monitoring

6.3.1 Environmental management

An Operational Noise and Vibration Management Sub-plan (ONVMSP) has been 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 Lidsdale Ash Repository site post the completion of KVAR Stage 2.

The ONVMP 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 Lidsdale. The residential receivers are located within 300 metres (m) from the haul and are identified in Table 6.3 and depicted in Figure 2.1.

Table 6.3 Noise monitoring locations

Monitoring location	Distance to Haulage road (m)
Location A - 60 Skelly Road, Lidsdale	300
Location B – Corner Sawyers Road and Skelly Road, Lidsdale	270
Location C – End of Neubeck Street, Lidsdale	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 Lidsdale Ash Repository area operates solely during the day and evening periods, it was assumed that temperature inversion conditions were not present during monitoring.

6.3.2 Environmental performance

Minor earthworks and maintenance activities at the ash placement were undertaken during the reporting period which may have the potential to cause noise impacts to sensitive receivers (as identified in Figure 2.1 Site location

and layout). 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 Global Acoustics during the reporting period during the day and evening periods of 16/17 November 2021 (Quarter 4). 22 March 2022 (Quarter 1) and 19/20 May 2022 (Quarter 2). Noise monitoring for Quarter 3 was completed in September 2022, this falls outside of this AEMR reporting period and will be captured in the 2023 AEMR.

A summary of the noise generating activities during each of the reporting periods is provided below in Table 6.4.

Table 6.4 Noise generating activities during the reporting period

Noise monitoring (day and evening)	Noise generating activities
Quarter 4 – 2021	Tree clearing, aircraft and road traffic, wildlife and breeze in foliage primarily generated measured noise levels during the Quarter 4 impact noise generated noise level. Tree clearing activities from KVAR were audible throughout the day measurement at Location A, generating the site-only L_{Aeq} of 35 dB.
Quarter 1 – 2022	Road traffic, conveyors from another mining operation, birds, dogs and frogs primarily generated measured noise levels during the Quarter 1. Power station maintenance was also audible during the day measurement at Location A, contributing to the measure L_{A10} and L_{Aeq} of less than 30dB.
Quarter 2 – 2022	Road traffic, conveyors, demolition and birds primarily generated measured noise levels during the Quarter 2. A demolition continuum was responsible for all measured noise level during the day measurement at Location A,

Based on site observations and information reviewed, potential noise impacts from the operation and maintenance of the Lidsdale Ash Repository 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.

6.3.3 Reportable incidents

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

6.3.4 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.

6.4 Ecological monitoring

It was noted that a realignment of Sawyers Swamp Creek on the western side of the KVAR (refer to Figure 2.1) was planned to be undertaken to facilitate structural stabilisation works for the Stage 2 KVAR. The proposed alignment intended to reduce sediment loads and increase filtration/treatment of runoff from the Site 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 was never undertaken but is still being considered in support GPM’s safe decommissioning, demolition, rehabilitation of the Site.

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

6.5 Air quality monitoring

6.5.1 Environmental management

The Air Quality Monitoring Program, as outlined in the OEMP, includes an Implementation Strategy. The strategy outlines site specific actions to manage dust generated through transportation and emplacement of ash, these measures include an extensive sprinkler system and water cart applications and continuous monitoring for dust/airborne particulates.

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

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

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 site.

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 7 depositional dust gauges up to April 2022 then reduced to 5 depositional dust gauges from April 2022 onwards. Dust gauges DG27 and DG28 were removed from the monitoring program as these are located on the former WPS site, now owned and operated by Greenspot (Figure 6.1). 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 Lidsdale Ash Repository and it should be noted that data collected from these locations include dust from all land use practices in the local area.

6.5.2 Environmental performance

i Dust deposition monitoring

Dust gauge data for Lidsdale Ash Repository has been reviewed for the reporting period. As mentioned above, collection of data from DG27 & DG28 ceased in April 2022. The dust gauge data obtained for DG 27 and DG28 during the September 2021 – March 2022 monitoring period, complied with the compliance criteria

Dust gauge data obtained from the reporting period of Lidsdale Ash repository confirm emissions have complied with compliance criteria at dust gauges DG29, DG30 and DG32.

Two exceedances of insoluble matter were recorded at DG31 during the reporting period. The first exceedance was during the April dust monitoring period 31/03/2022 – 29/04/2022. The second exceedance was during the August dust monitoring period 29/07/2022 – 30/08/2022. The insoluble mater recorded during the April and August dust monitoring period was well above the yearly average, with results recorded 7.5 g/m^2 and 9.7 g/m^2 respectively. The cause of this exceedance is most likely to be related to the amount of organic matter recorded in the dust gauge sample relating to contamination of the dust gauge with high volumes of organic matter including leaf litter and insects.

Annual average depositional dust data for each of the seven dust deposition gauges presented over the previous 12 month period is presented in Figure 6.4 to Figure 6.9.

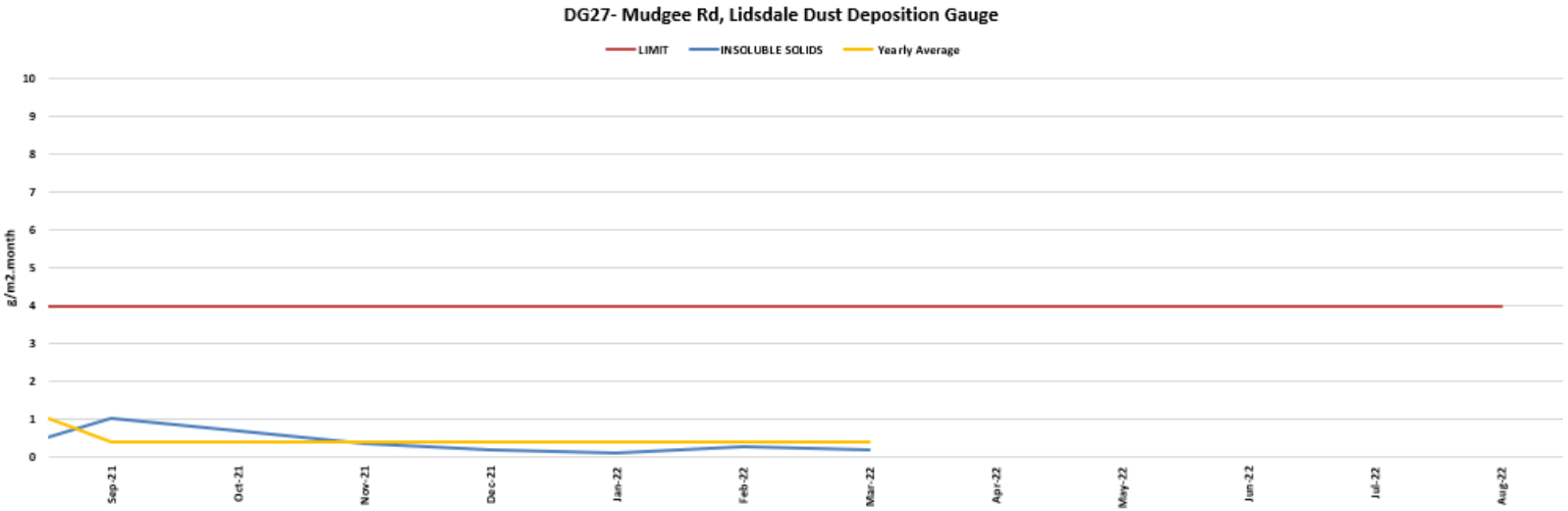

Figure 6.4 **Depositional dust summary – Dust Gauge 27**

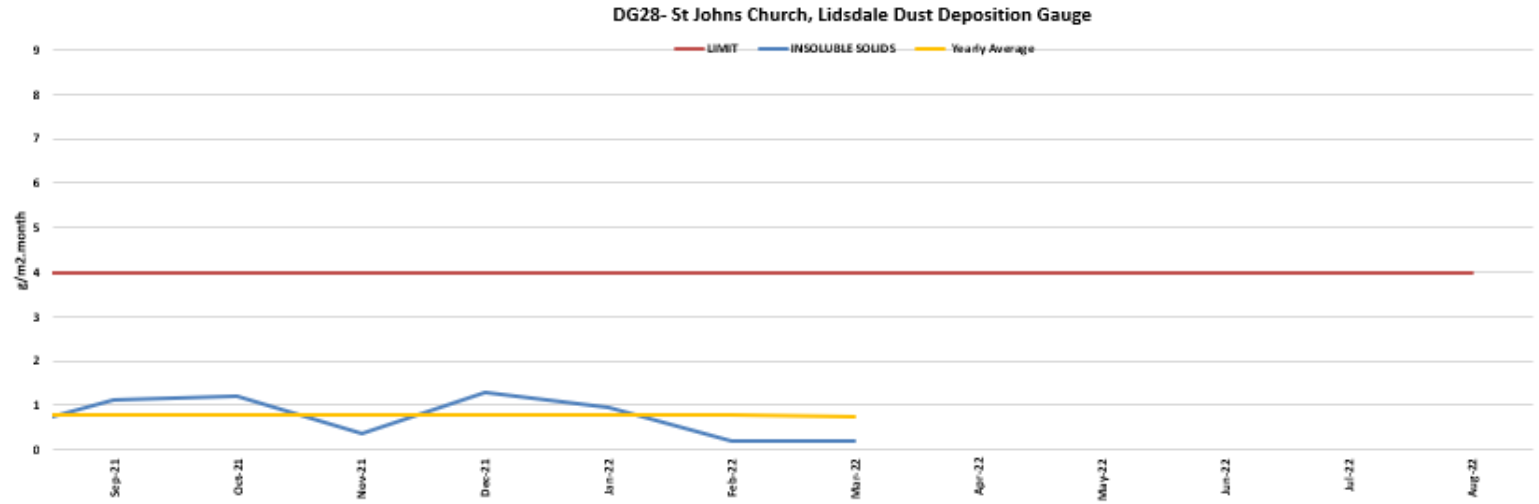

Figure 6.5 **Depositional dust summary – Dust Gauge 28**

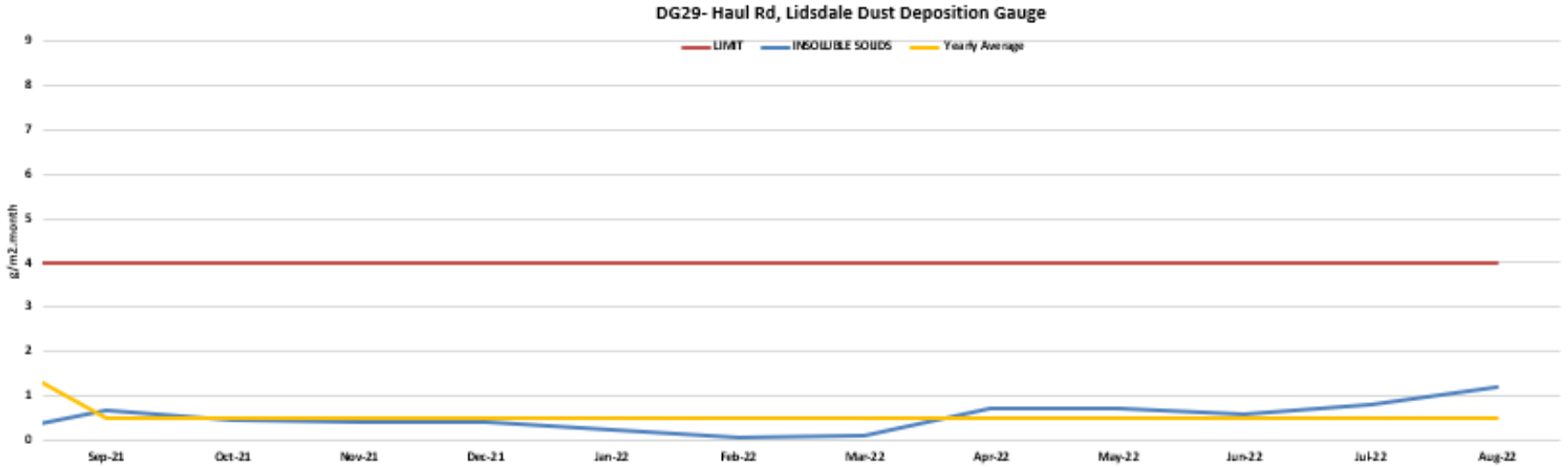

Figure 6.6 Depositional dust summary – Dust Gauge 29

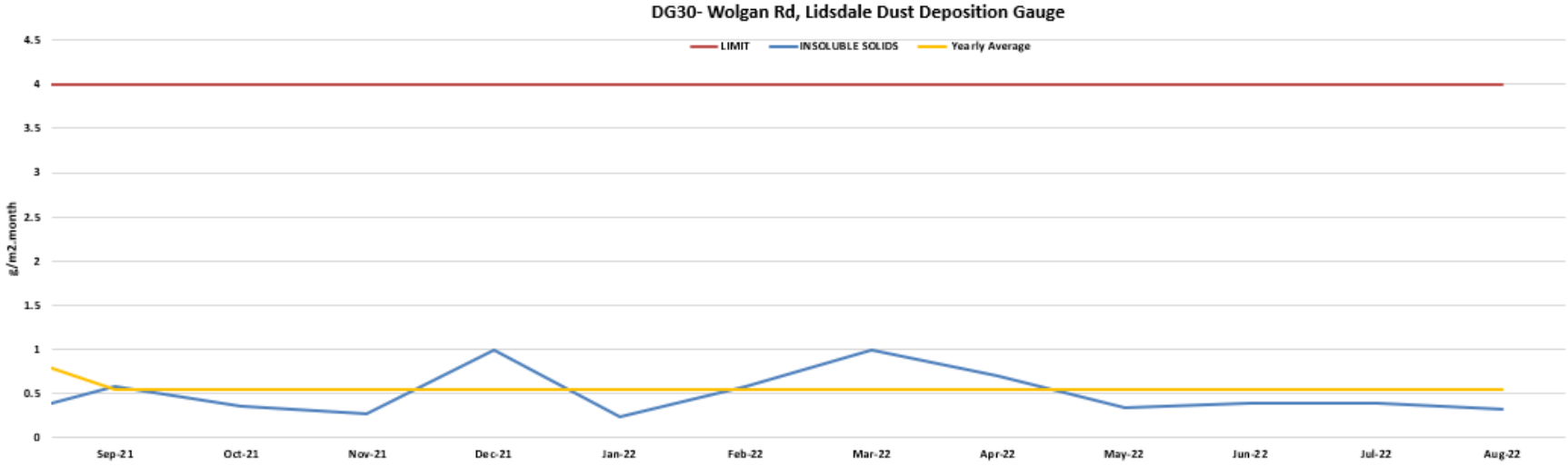

Figure 6.7 Depositional dust summary – Dust Gauge 30

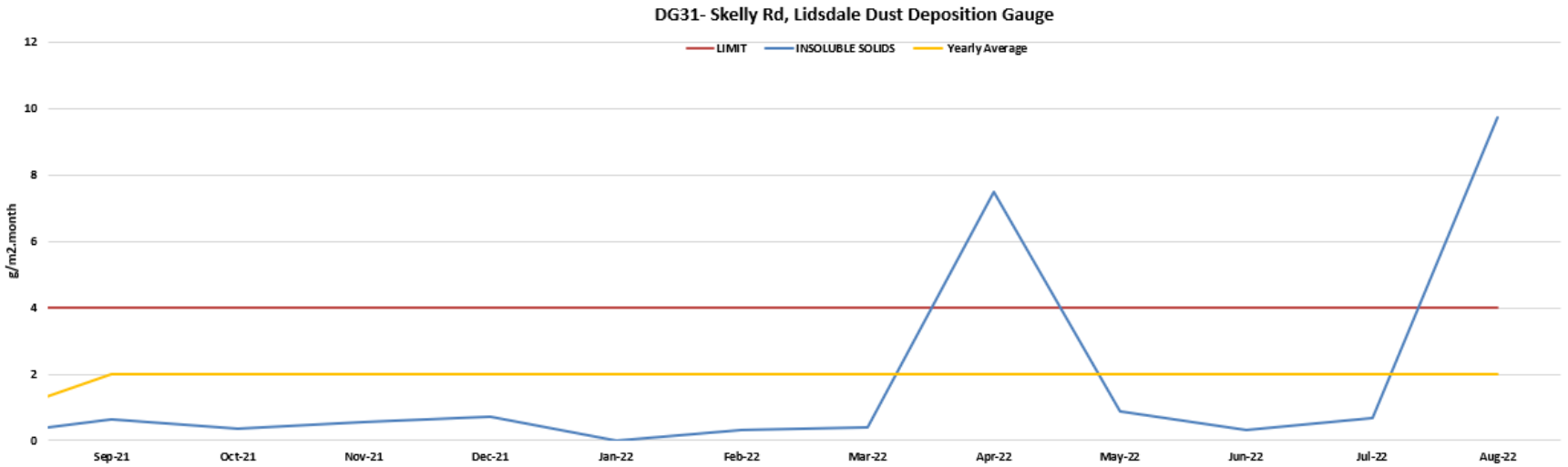

Figure 6.8 **Depositional dust summary – Dust Gauge 31**

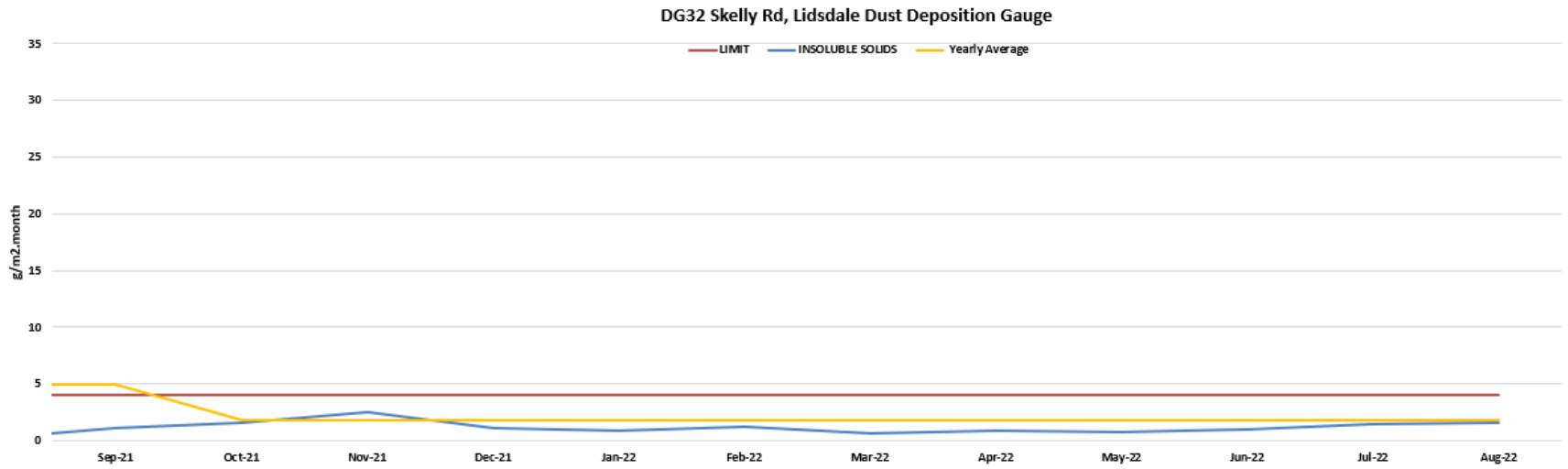

Figure 6.9 **Depositional dust summary – Dust Gauge 32**

6.5.3 Reportable incidents

No reportable incidents have been received in relation to air quality management for the reporting period

6.5.4 Further improvements

Investigate if methods are available to minimise bugs infestation and vandalism (eg stealing or breaking) to dust gauge bottles, particularly gauges located near residential areas.

6.6 Waste

6.6.1 Environmental management

Waste disposal practices at the Site 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 section 6.8 of the OEMP Sub-Plan.

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).

6.6.2 Environmental performance

Nil wastes were received and placed at the Lidsdale Ash Repository during the reporting period. The activities at the Site were deemed to have met compliance obligations for waste management for the reporting period.

6.6.3 Reportable incidents

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

6.6.4 Further improvements

No further waste management improvements are proposed.

6.7 Heritage management

6.7.1 Environmental management

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.

An Environmental Assessment was performed by Parsons Brinckerhoff (2008b) for KVAR Stage 2 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.

During the reporting period, GPM has undertaken and completed caretaking of the locally listed heritage barn located on Skelly Road (Item no I196). The barn previously served as a coach stop and later as a dairy, although known as the "Hospital Farm Barn", the association with any hospital is unclear. While the exact age of the barn is unknown, the structure is listed under the NSW Heritage Act, and all maintenance works carried out met those standards required when maintaining listed heritage structures. 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.

6.7.2 Environmental performance

Care and maintenance works were undertaken on the heritage barn. These activities included replacing burnt rafters, removing rubbish, extensive mowing and tree pruning works, installation of new fencing, and roof sheeting. Additionally, asbestos pipe removal was also carried out.

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

6.7.3 Reportable incidents

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

6.7.4 Further improvements

No additional heritage management improvements are proposed.

7 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. It refers to an Annual Water Quality Review (AWQR) which addresses the surface and groundwater monitoring and reporting requirements established in the OEMP. The AWQR is provided in Appendix D.

7.1 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.

7.1.1 Water management system

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. Sections 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 potentially 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. The 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 to adjusts pH and reduces metal concentrations. Controlled discharges at LDP3 are regulated by EPL no. 21185, which has restrictions on when discharge can occur.

  - **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 the 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.

  - **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 (as shown on **Error! Reference source not found.**):
  - **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 separate contaminated land investigations.

  - **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 7.1 shows the abovementioned features and the OEMP surface and groundwater monitoring sites (described in Section 7.1.3).

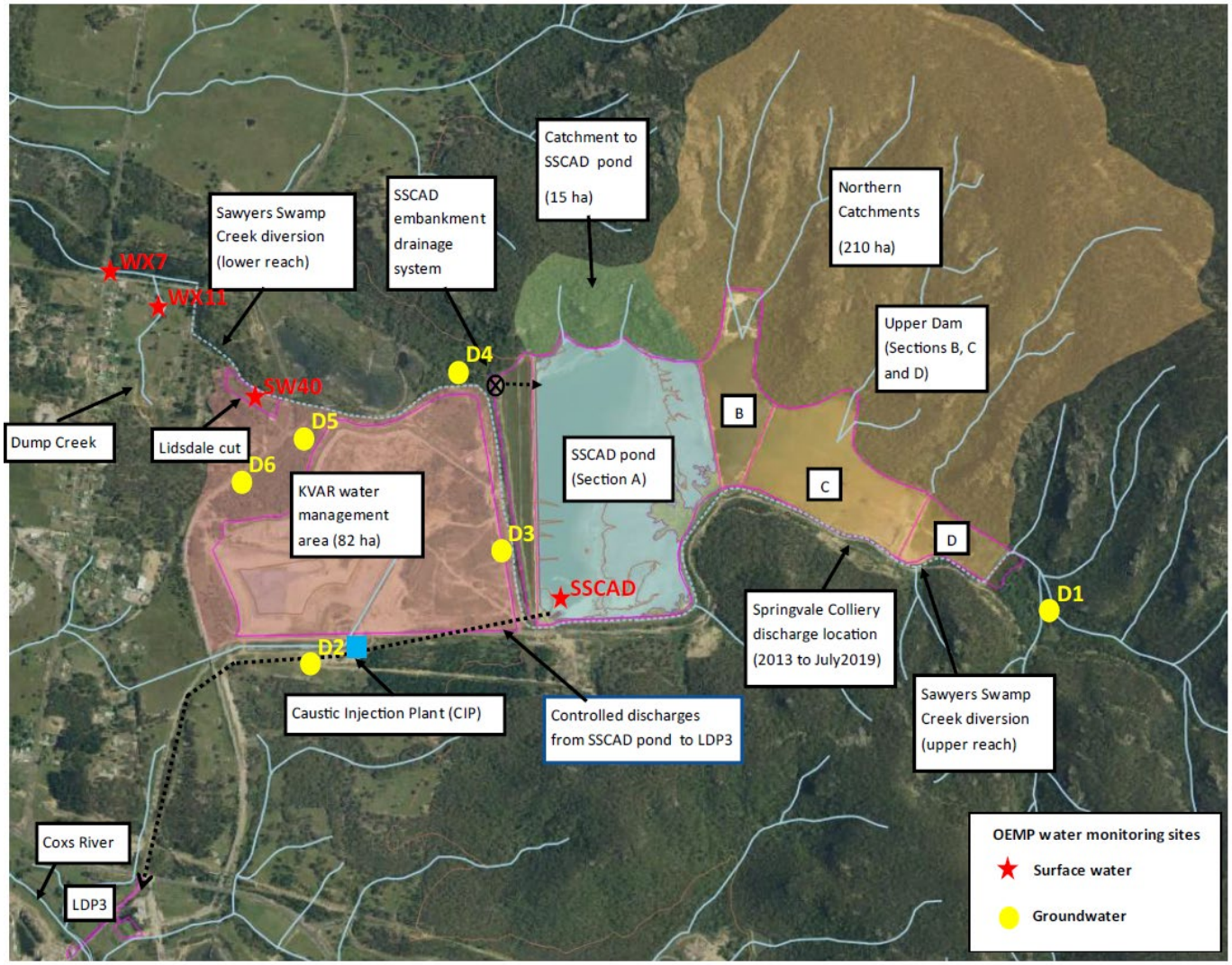

Figure 7.1 Water management features and monitoring locations

7.1.2 Water management actions over the period

7.1.3 Water monitoring over the period

The AWQR addresses the surface and groundwater monitoring and reporting requirements established in the OEMP. Table 7.1 provides a summary of these requirements and notes where each requirement is addressed in the AWQR.

Table 7.1 OEMP – water monitoring and reporting requirements

	Description	OEMP reference	AWQR reference
Surface water			
Monitoring	Monthly water quality monitoring at four locations: • WX7 – Sawyers Swamp Creek, downstream • WX11 – Dump Creek • SW40 – Lidsdale cut • WX7 – 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 – south-east of SSCAD • D2- south of KVAR • D3 – between SSCAD and KVAR • D4 – north of KVAR and immediately to the west of the northern side of the SSCAD embankment. • D5 – northwest of KVAR • 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
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

7.2 Environmental performance

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

- surface water quality trends during the AEMR Period are generally consistent with recent AEMR periods (which are described as 2018 to the current period in the AWQR);
- the water quality in Sawyers Swamp Creek and Dump Creek has improved during the current AEMR period and relative to previous AEMR periods (ie 2018 to the current period). 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; and

- the water quality in Sawyers Swamp Creek downstream of the site (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; and

- groundwater at monitoring bores D3 (located between SSCAD and the KVAR) and D5 (located to the west of the KVAR) is degraded, relative to baseline water quality trends.

7.3 Reportable incidents

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

7.4 Further improvements

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 were either underway or proposed. The plan included a description of each improvement, expected outcome once implemented and an estimated completion timeframe. GPM propose to continue to progressively improve the water management system through implementing the Action Plan commitments

The proposed actions from the Action Plan for water improvements has been summarised below:

- Continued operation of an Interim LDP3 discharge treatment system until the proposed LDP3 discharge system is commissioned. The interim system includes modifications to the caustic injection plant to reduce metal loads and concentrations in discharged water along with progressive addition of mixing tanks, settling ponds and coagulants to further reduce metal loads and concentrations in discharged water;

- Installation, implementation and optimisation of the new proposed LDP3 discharge system, which is expected to be installed during the 2022-2023 AEMR period.

- The ongoing implementation of the SSCAD clean water pumped diversion, these pumped diversion works will continue to be implemented until a gravity based free draining solution is established either by temporary works or as part of the rehabilitation works

- Ongoing improvements to stormwater management in the KVAR/KVAD water management area, including:

    - water categorisation procedure has been established to identify clean water and stormwater.

    - works to separate contaminated water from the stormwater system are ongoing across the site.

    - consideration of several options for stormwater management

- Further works to improve the capture and containment of contaminated water

- Further improvements are anticipated to be completed during the 2022 – 2023 AEMR assessment period, these include:

    - Evaluation of further water treatment opportunities for the LDP3 treatment system, including the identification of a preferred treatment solution and discharge arrangement for the site and the provision of a technical repot that outlined the proposed system

- Design, construction and operation of further water treatment option that can manage water accumulation within SSCAD and can operate within an agreed discharge framework.

GPM has commissioned detailed groundwater studies that are due to be completed in 2023. These studies will result in an improved understanding of groundwater flow and water quality characteristics within the Site and will inform the design of future remediation works.

8 Landscape and revegetation

8.1 Environmental management

The current scope of landscape and revegetation environmental management is provided in the Site Repository Plan and in the Landscape and Revegetation sub-plan of the OEMP. 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 7.0 ha have had topsoil applied and have been seeded and is actively growing and 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.

8.2 Environmental performance

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

Table 8.1 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.
	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 former Wallerawang Power Station.
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 – An additional 0.1 ha of capping of the eastern end of KVAR Stage 2B was undertaken during the 2021-2022 reporting period. Maintenance to existing capping of the asbestos area was undertaken.

Table 8.1 Rehabilitation status summary

Performance indicator	Completion criteria*	Current status (reporting period)
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 Repository Management 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 – Perennial grasses planted include Couch, Phalaris and Poa.
	Planting of shrubs and trees undertaken using tube stock of local provenance tree species to be performed after establishment of perennial grasses.	Satisfactory – Red Stringy Bark, Narrow-leaved Peppermint, Western Scribbly Gum, Silver Wattle and Red Stem Wattle tube stock planted in August 2014.
	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 Lidsdale Ash Repository.
Animal control	Threats to vegetation such as grazing by animals managed accordingly.	Satisfactory – No evidence of animal grazing on revegetated areas. Site fencing in good order. Wombat exclusion fencing has been successfully installed around the closed asbestos area.
Rehabilitation	All new batters rehabilitated as soon as practicable.	No new batters have been constructed on Site. 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 2021-2022 reporting period. Further detail is provided in Section 8.2.1.

Completion criteria taken from the OEMP Landscape and Revegetation Plan

Photograph 8.1 Lidsdale Ash Repository Stage 1 rehabilitation works – planted August 2013, photo taken September 2022

Photograph 8.2 Lidsdale Ash Repository Stage 1 rehabilitation works – planted August 2013, photo taken September 2022

8.2.1 Rehabilitation

Additional revegetation and rehabilitation activities were undertaken during the 2021-22 reporting period, these included:

- regrading and reseeding of the KVAR berms;
- soil blowing trial during the reporting period;
- coal chitter has been removed at the berms adjacent to SSC, with regrading and revegetation to commence in the September 2022.

Photograph 8.3 Regrading of KVAR berms

Photograph 8.4 Revegetation trial soil blowing

8.2.2 Landscaping and revegetation

Landscaping and revegetation at the Site for the 2021-22 reporting period also included the ongoing maintenance of the previous planting and weed management for blackberry, thistle and pampas grass colonisation. The weed management spraying campaign continued through the reporting period bust has been delayed due to high rainfall events across the site. Weed management will continue when weather events are more conducive to spraying.

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 Lidsdale Ash Repository (formerly Wallerawang Ash Dam Area). Capping material will be sourced from various locations across NSW and will comprise virgin excavated natural material (VENM) and excavated natural material (ENM). GPM have undertaken additional capping of the eastern end of KVAR Stage 2B area, along with maintenance and upgrade works on the existing capping associated with the closed asbestos disposal area.

Photograph 8.5 Capping maintenance works on closed asbestos area

Photograph 8.6 Capping maintenance works on closed asbestos area

8.2.3 Wombat exclusion

A contractor was engaged by GPM to undertake exclusion of wombats that were found burying in the now closed northern asbestos disposal area at Lidsdale Ash Repository. Wombat activity had been previously identified at various locations across the site in March 2021. There was concern that wombat activity had the potential to expose buried asbestos in the dump area, as well as jeopardise stability of the ash dams.

Permanent exclusion boundary fencing has been installed around parts of the northern asbestos disposal area during June 2022, after the wombats were excluded from their burrows. The success of the installed exclusion fencing will be monitored and act as a trial for the greater site, where other wombat activity has been identified.

Photograph 8.7 Wombat exclusion fencing

The OEMP requirements with respect to landscaping/revegetation were found to be satisfactory or not applicable as ash has yet to reach the design RL (940 m AHD). The interim landscaping/revegetation activities undertaken as part of the Site's care and maintenance activities are considered to be in line with the relevant OEMP targets.

8.3 Reportable incidents

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

8.4 Further improvements

Care and maintenance activities will continue to be undertaken on site to ensure landscape and revegetation areas progress across the Site.

9 Community

9.1 Community engagement

GPM issued a media release on 11 October 2021, notifying of caretaking works that had been undertaken on the heritage barn located within the Site on Skelly road. Works included replacing burnt Rafters, removing rubbish, extensive mowing and tree pruning works, installing new fencing and roof sheeting. Additionally, asbestos pipe removal was also carried out.

9.2 Community contributions

GPM have undertaken work which benefits the community and region.

9.2.1 Police rescue training day

GPM provided support to the NSW Police Rescue force enabling access to the Site facilities for bomb and rescue training. The training was undertaken on 30 – 31 March 2022.

9.2.2 Vegetation management

GPM have continued to undertake extensive vegetation management works around the Site and Site boundaries to reduce the fire risk to near-by residences and the Site. Work was undertaken in consultation with locals and in accordance with the RFS requirements.

9.3 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 includes:

- the date and time of the complaint;
- the means by which the complaint was made (eg 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; and
- 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.

9.4 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

10 Independent Audit

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.

To date, GPM has engaged the following independent 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.
- Preliminary Site Investigation (PSI).
- Water Quality Discharge Assessment.
- Water Management Assessment (including Site Action Plan).
- Pollution Reduction Study - – Development of a Coal Ash Repository Water Sampling Program (currently underway).
- 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 and potential update to the OEMP, GPM will be updating the Site's Compliance Tracking Program.

11 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 implemented early during the 2022-2023 AEMR period.

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

11.1 Modification to EPL 21185

A modification to EPL 21185 was issued by the EPA in July 2022. In addition to the monitoring and reporting of discharges to air and water, and applications to land, the modified EPL includes the submission of a number of additional reports, including:

- Groundwater Characterisation Study;
- Water Management Assessment; and
- Pollution Reduction Waster Sampling Program.

These studies will be undertaken in accordance with the EPL and will continue to improve the understanding of water cycle process across the Site.

11.2 Contamination declaration

During the 2021-2022 reporting period a preliminary site investigation (PSI) was completed for the Site. 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.

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 is in the process of drafting a Voluntary Management Proposal (VMP) to investigate and address the contamination.

Appendix A

Detailed review checklist and recommendations for conditions of approval

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 Lidsdale 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) – 1.1c) inclusive 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) – 1.1c) inclusive, the most recent document shall prevail to the extent of the inconsistency.

Compliance Assessment Observations and Comments

No inconsistencies were observed between the documents listed above during implementation of the project 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

A letter dated 20 December 2021 from the DPE (formerly known as DPIE), that stated the department was generally satisfied that the 2019-20 Annual Review adequately addressed the relevant requirements of the Project approval. No further actions were requested by DPE.

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

The Project Approval was modified and approved on 9 August 2018 as part of MOD1. Therefore, the approval shall lapse on 9 August 2023 unless physically commenced.

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 Managers EPL 21185 (See 3.1), as per modification issued in July 2022.

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 Co 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 had 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 1.1c) 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

At no time on Sundays or public holidays.

Compliance Assessment Observations and Comments

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

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

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 outside of the hours stipulated in condition 2.3 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

There has been no requirement to vary hours of construction 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 with the potential to exceed background noise levels were undertaken 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

Noise levels from the Lidsdale Ash Repository complied with relevant criteria at all monitoring locations during the Quarter 4 2021, Quarter 1 2022 and Quarter 2 2022 noise surveys.

GPM Co has not entered into any agreements regarding noise from Lidsdale Ash Repository with any potentially affected landholders, nor had any noise related complaints regarding the site (See section 6.2)

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 resultof the review, it is determined that ash haulage and placement times can commence later and/or finish earlier, the Proponent shall aim toobserve the reduced hours whenever possible.

Compliance assessment Observations and Comments

The review was conducted within six months of commencement of operations. EnergyAustralia NSW submitted to the review to the then DPI (now DPIE) on the 26 April 2012. The review determined that ash haulage and placement times could not commence later or finish earlier.

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 have advised that no operational activities have taken place outside of the hours.

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

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 $L_{Aeq\ (15\ minute)}$ of 40 dB(A) at the nearest most affected sensitive receiver during normal operating hours as defined in condition 2.8 of this approval.

This noise criterion applies under the following meteorological conditions:

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

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

Compliance Assessment Observations and comments

Minor earthworks and maintenance activities at the ash placement were undertaken during the reporting period. No fly ash trucks have been hauling to the ash placement area during the reporting period., due to the closure of Wallerawang Power Station

Measured noise levels during the 2021-22 AEMR reporting period indicate Lidsdale Ash Repository is compliant with operational noise criteria (See section 6.2.2)

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.

Compliance Assessment Finding – Not applicable

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 functionality. 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, butnot 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

No non-compliances were identified during the reporting period. Refer to Appendix B for further details.

Compliance Assessment Finding – Compliant

Additional Noise Mitigation Measures

Condition of Approval 2.19

If, after the implementation of all reasonable and feasible source controls, as identified in the report required by condition 2.18, the noise generated by the project exceeds the criterion stipulated in condition 2.15 at:

a) *Any sensitive receiver in existence at the date of this approval; or*

b) *Any residential dwelling for which an approval has been sought or obtained under the Environmental Planning and Assessment Act 1979 no later than six months after the confirmation of operational noise levels;*

Upon receiving a written request from an affected landowner (unless that landowner has acquisition rights under condition 2.20 of this approval and has requested acquisition) the Proponent shall implement additional noise mitigation measures such as double glazing, insulation, air conditioning and or other building acoustic treatments at any residence on the land, in consultation with the landowner.

For the purpose of this condition and condition 2.20, confirmation of operational noise levels means:

a) *Completion of the operational noise review required under condition 3.2 this approval; and*

b) *Implementation of any source controls, as required under condition 2.18 of this approval, should the operational noise review indicate noise levels in excess of the operational noise criterion specified in condition 2.15; and*

c) *Monitoring of operational noise levels, as required under condition 3.3b) of this approval, following the implementation of any sourcecontrols.*

The additional mitigation measures must be reasonable and feasible. If within three months of receiving this request from the landowner the Proponent and landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution, whose decision shall be final.

Compliance Assessment Observations and Comments

No non-compliances were identified during the reporting period. Refer to Appendix B for further details. GPM Co has received no written requests from affected landowners regarding noise mitigation measures.

Compliance Assessment Finding – Compliant

Land Acquisition Criteria

Condition of Approval 2.20

If, after the implementation of all reasonable and feasible source controls, as identified in the report required by condition 2.18, the noise generated by the project exceeds the criterion stipulated in condition 2.15 by more than 5dB(A):

a) *At a sensitive receiver in existence at the date of this approval; or*

b) *At any residential dwelling for which an approval has been sought or obtained under the Environmental Planning and Assessment Act 1979 prior to the landholder receiving written notification that they are entitled to land acquisition rights, as per condition 2.25of this approval; or*

c) *Over 25% or more of the area of a vacant allotment in existence at the date of this approval, and where a dwelling is permissible under the Environmental Planning and Assessment Act 1979 at that date, with the exception of land that is currently used for industrial or mining purposes;*

The Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the proceduresin conditions 2.22 to 2.24 of this approval.

Any landowner that has agreed to, or property that has been the subject of, the application of additional noise mitigation measures under condition 2.19 of this approval waives the right to land acquisition.

Compliance Assessment Observations and Comments

GPM has received no written or verbal requests from landowners to acquire their land.

Compliance Assessment Finding – Compliant

Condition of Approval 2.21

The land acquisition rights under condition 2.20 of this approval do not apply to landowners who have sought approval to subdivide theirland after the date of this approval, unless the subdivision is created pursuant to condition 2.24 of this approval.

Compliance Assessment Observations and Comments

No landholders have applied for approval to subdivide their land according to the land acquisition rights.

Compliance Assessment Finding – Not Applicable

Condition of Approval 2.22

Within three months of receiving a written request from a landowner with acquisition rights under condition 2.20 of this approval, the Proponent shall make a binding written offer to the landowner based on:

- *a) The current market value of the landowner's interest in the property at the date of this written request, as if the property were unaffected by the project which is the subject of the project application, having regard to the:*
  - *i) Existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and*
  - *ii) Presence of improvements on the property and/or any approved building or structure which has been physically commencedat the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of condition 2.19 of this approval;*
- *b) The reasonable costs associated with:*
  - *i) Relocating within the Lithgow local government area, or to any other local government area determined by the Secretary;*
  - *ii) Obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is required; and*
- *c) Reasonable compensation for any disturbance caused by the land acquisition process.*

However, if at the end of this period, the Proponent and landowner cannot agree on the acquisition price of the land, and/or the terms uponwhich the land is to be acquired, then either party may refer the matter to the Director-General for resolution.

Upon receiving such a request, the Secretary shall request the President of the NSW Division of the Australian Property Institute toappoint a qualified independent valuer or Fellow of the Institute, to consider submissions from both parties, and determine a fair and reasonable acquisition price for the land, and/or terms upon which the land is to be acquired.

Within 14 days of receiving an independent valuer's determinations, the Proponent shall make a written offer to purchase the land at a price not less than the independent valuer's determination.

If the landowner refuses to accept this offer within six months of the date of the Proponent's offer, the Proponent's obligations to acquire the land shall cease, unless otherwise agreed by the Director-General.

Compliance Assessment Observations and Comments

No landholders have applied for approval to subdivide their land according to the land acquisition rights.

Compliance Assessment Finding – Not Applicable

Conditions of Approval 2.23, 2.24 and 2.25

2.23- The Proponent shall bear the costs of any valuation or survey assessment requested by the independent valuer or the Secretary the costs of determination referred to above.

2.24- If the Proponent and landowner agree that only part of the land shall be acquired, then the Proponent shall pay all reasonable costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of the plan at the Office of the Registrar-General.

2.25- The Proponent shall provide written notice to all landowners that are entitled to rights under conditions 2.19 and 2.20 within 21 daysof determining the landholdings were additional noise mitigation measures or land acquisition apply. For the purpose of condition 2.20b), this condition only applies where operational noise levels have been confirmed in accordance with the definition in condition 2.19.

Compliance Assessment Observations and Comments

No landholders have applied for approval to subdivide their land according to the land acquisition rights.

Compliance Assessment Finding – Not Applicable

Sawyers Swamp Creek realignment

Condition of Approval 2.26, 2.27, 2.28 and 2.29

EnergyAustralia NSW decided upon commencement of the Project that the realignment of SSC was not necessary, therefore the Conditions of Approval relating to SSC realignment are not applicable. This refers to Conditional of Approvals 2.26 (a – m), 2.27, 2.28 and 2.29.

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 SSCAD Pond. The water is reticulated around the Lidsdale Ash Repository site for the treatment of ash and dust suppression. Discharges from site are in accordance with EPL 21185.

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 reasonableand feasible.

Compliance Assessment Observations and Comments

A minimum buffer zone of 50m has been maintained along the riparian area of SSC for all operations.

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 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 is provided in the AEMR.

Compliance Assessment Finding - Compliant

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 responsibilities of all operations, including:

- Use of perimeter sprays at the ash placement area;
- Water cart (20,000 L) on site during all ash placement operations 8 am to 5 pm Mondays to Sundays;
- Ash placement operations;
- Final capping of ash; and
- General maintenance and rehabilitation of the ash placement area.

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 loadingor unloading ash material.

Compliance Assessment Observations and Comments

No issues with load coverings were recorded for the 2021-22 reporting period.

Compliance Assessment Finding - Compliant

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 Lidsdale 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 Lidsdale Ash Repository site are the HILITE 4000 hired from Coates Hire Operations Pty Ltd. The specification sheets for these lights form part of the Work Procedures Manual for lighting.

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 addresstraffic impacts (and associated noise) along nominated haulage routes.*

Compliance Assessment Observations and Comments

A Construction Traffic Management Plan was submitted to and approved by the DPI 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

No capping Material has been transported to the site during the reporting period. All capping material used during the reporting period has been sourced from existing stockpiles on site. A Transport Management Plan has prepared in consultation with TfNSW and Council.

Compliance Assessment Finding – Not applicable

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

No capping Material has been transported to the site during the reporting period. 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.

Compliance Assessment Finding – Not applicable

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 andnon-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.

No aboriginal or other cultural heritage sites have been identified at Lidsdale Ash Repository.

Compliance Assessment Finding - Compliant

Condition of Approval 2.38

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

Compliance Assessment Observations and Comments

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

Compliance Assessment Finding - Not 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

No waste was disposed of on site during the reporting period. All site waste (eg general waste) is disposed of at appropriately licenced landfills or recycling facilities.

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 Lidsdale 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 Co security personnel are required to report if they encounter any rubbish or wastes outside those that are allowed during routine operations.

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.

Compliance Assessment Finding – Compliant

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

Operation 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 Co 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 localgroundwater 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 inthe 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. GPM Co continue to implement the required groundwater monitoring assessments.

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 Co continue to implement the required surface water monitoring. 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.

Compliance Assessment Finding - Compliant

Swayers Swamp Creek realignment Monitoring

Condition of approval 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.

Compliance Assessment Observations and Comments

EnergyAustralia NSW previously decided upon commencement of the KVAR stage 2 project, that the realignment of SSC was not necessary. Therefore, Conditions of Approvals 3.6 and 3.7 relating to SSC realignment are not applicable.

Compliance Assessment Finding – Not applicable

Condition of 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.

Compliance Assessment Observations and Comments

EnergyAustralia NSW previously decided upon commencement of the KVAR stage 2 project, that the realignment of SSC was not necessary. Therefore, Conditions of Approvals 3.6 and 3.7 relating to SSC realignment are not applicable.

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 Co continue to implement the required air quality monitoring.

Dust monitoring results are recorded monthly with colour and textural observations. These results indicate that Lidsdale Ash Repository is managed effectively for ash dust and as such is in compliance with Conditions of Approval 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 or operation works have commenced during the reporting period, therefore GPM Co have not been required to submit any pre-operation compliance reports.

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 trackcompliance with the requirements of this approval and shall include, but not necessarily be limited to:

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

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

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

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

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

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

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

The Compliance Tracking Program shall be implemented prior to operation of the project with a copy submitted to the Secretary forapproval 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 Lidsdale 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 number of site inspections, pre-start meetings, site water management activities and number of incidents for the month. These reports are in line with conditions of approval, the OEMP and the EPL.

Annual reporting requirements are covered by the preparation of the AEMR.

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 Co are in the process of updating the OEMP which include 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 Lidsdale Ash Repository.

Compliance Assessment Finding - Compliant

Community Information Complaints Management

Provision of information

Conditions of Approval 5.1 and 5.2

Prior to the commencement of the project, the Proponent shall establish and maintain a website for the provision of electronic informationassociated 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 Co 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 andenquiries during construction and operation:

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

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

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

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

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 Lidsdale Ash Repositories for the 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 Co has nominated John Pola as the Environmental Manager. The Environmental Manager oversees the implementation of all operations of Lidsdale Ash Repository through regular client meetings and liaison with the PRJH Mining and other relevant contractors. 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

6.2 – Prior to the commencement of construction work, the Proponent shall prepare and implement a Construction Environmental Management Plan (CEMP). The CEMP shall outline the environmental management practices and procedures to be followed during construction. The CEMP shall be prepared in accordance with Guideline for the Preparation of Environmental Management Plans (DIPNR, 2004).

The Construction Environmental Management Plan for the project (or any stage of the project) shall be submitted to the Secretary for approval at least four weeks prior to the commencement of any construction work associated with the project (or stage as relevant), unless otherwise agreed by the Secretary. Construction shall not commence until written approval has been received from the Secretary.

6.3 – As part of the Construction Environmental Management Plan for the project, the Proponent shall prepare and implement the following plans:

- *a) A **Construction Traffic Management Plan**, prepared in consultation with the RMS, the relevant Council and emergency services to manage the construction traffic impacts of the project, including but not limited to:*
  - *i. Identifying construction vehicle volumes (construction staff vehicles, heavy vehicles and oversized loads) and haulage routes;*
  - *ii. Identifying any road closures and/or traffic detours during the haulage of oversized loads as agreed to by the relevant roads authority;*
  - *iii. Detailing a Construction Vehicle Code of Conduct to set driver behaviour controls to minimise impacts on the land uses alonghaulage routes (including noise minimisation measures); and*
  - *iv. Complying with the document Procedures for Use in the Preparation of a Traffic Management Plan (RTA, 2011).*
- *g. A **Construction Noise Management Plan** to detail how construction noise impacts would be minimised and managed. The Strategy shall be developed in consultation with, and to the satisfaction of, the EPA and shall include, but not necessarily be limited to:*
  - *i. Details of construction activities and an indicative schedule for construction works;*
  - *ii. Identification of construction activities that have the potential to generate noise impacts on sensitive receivers;*
  - *iii. Procedures for assessing noise levels at sensitive receivers and compliance;*
  - *iv. Details of the reasonable and feasible actions and measures to be implemented to minimise noise impacts and, if any noise exceedance is detected, how any non-compliance would be rectified; and*
  - *v. Procedures for notifying sensitive receivers of construction activities that are likely to affect their noise amenity.*
- *h. An **Erosion and Sediment Control Plan** to detail measures to minimise erosion and the discharge of sediment and other pollutants toland and/or water during construction works. The Plan must include, but not necessarily be limited to:*
  - *i. Identification of the construction activities that could cause soil erosion or discharge sediment or water pollutants from the site;*
  - *ii. A description of the management methods to minimise soil erosion or discharge of sediment or water pollutants from the site, including a strategy to minimise the area of bare surfaces, stabilise disturbed areas, and minimise bank erosion; and*

Demonstration that the proposed erosion and sediment control measures will conform with, or exceed, the relevant requirements of Managing Urban Stormwater: Soils and Construction (Landcom, 2004).

Compliance Assessment Observations and Comments

A Construction Environmental Management Plan for KVAR Stage 2B was developed in consultation with EnergyAustralia NSW's Western Environment Section and approved by the DPI in August 2011.

Since taking over the Lidsdale Ash Repository site, GPM Co have not undertaken additional construction works on site.

Compliance Assessment Finding – Not applicable

Operational environmental management

Conditions of Approval 6.4 and 6.5

6.4 – The Proponent shall prepare and implement and Operation Environmental Management Plan to detail an environmental managementframework, practices and procedures to be followed during operation of the project. The Plan shall be consistent with Guideline for the Preparation of Environmental Management Plans (DIPNR, 2004) and shall include, but not be limited to:

- *a) Identification of all statutory and other obligations that the Proponent is required to fulfil in relation to operation of the project,including all approvals, licences and consultations;*
- *b) A description of the roles and responsibilities for all relevant employees (including contractors) involved in the operation of theproject;*
- *c) Overall environmental policies and principles to be applied to the operation of the project*
- *d) Standards and performance measures to be applied to the project, and a means by which environmental performance can beperiodically reviewed and improved, where appropriate;*
- *e) Management policies to ensure that environmental performance goals are met and to comply with the conditions of this approval;*
- *f) The additional plans listed under condition 6.5 of this approval; and*
- *g) The environmental monitoring requirements outlined under conditions 3.3 to 3.5 inclusive and 3.8 of this approval.*

The Plan shall be submitted for the approval of the Secretary no later than four weeks prior to the commencement of operation of the project, unless otherwise agreed by the Secretary. Operation shall not commence until written approval has been received fromthe Secretary.

Nothing in this approval precludes the Proponent from incorporating the requirements of the Operational Environmental Management Planinto existing environmental management systems and plan administered by the Proponent.

6.5 – As part of the Operation Environmental Management Plan for the project, required under condition 6.4 of this approval, the Proponentshall prepare and implement the following Management Plans:

- *a) An **Operational Noise Management Plan** to detail measures to mitigate and manage noise during operation of the project. The Plan shall be prepared in consultation with, and to the satisfaction of, the EPA and include, but not necessarily be limited to:*
  - *iii. Procedures to ensure that all reasonable and feasible noise mitigation measures are applied during operation of the project;*
  - *iv. Identification of all relevant sensitive receivers and the applicable criteria at those receivers commensurate with the noise limit specified under condition 2.15 of this approval;*
  - *v. Identification of activities that will be carried out in relation to the project and the associated noise sources;*
  - *vi. Noise monitoring procedures (as referred to in condition 3.3 of this approval) for periodic assessment of noise impacts at the relevant receivers against the noise limits specified under this approval and the predicted noise levels as detailed in the report referred to under condition 1.1b) of this approval;*
  - *vii. Details of all management methods and procedures that will be implemented to control individual and overall noise emissions from the site during operation;*
  - *viii. Procedures and corrective actions to be undertaken if non-compliance against the operational noise criteria is detected; and*
  - *ix. Provisions for periodic reporting of results to EPA.*
- *i. A **Groundwater Management Plan** to detail measures to mitigate and manage groundwater impacts. The Plan shall be prepared inconsultation with, and to the satisfaction of, WaterNSWand include, but not necessarily be limited to:*
  - *i. Baseline data on groundwater quality, depth and flow in the project area;*
  - *ii. Groundwater objectives and impact assessment criteria;*
  - *iii. A program to monitor groundwater flows and groundwater quality in the project area as required by condition 3.4 of this approval;*
  - *iv. A protocol for the investigation of identified exceedances of the groundwater impact assessment criteria;*
  - *v. A response plan to address potential exceedances and groundwater impacts; and*
  - *vi. Provisions for periodic reporting of results to the WaterNSW.*

j. *A **Surface Water Management Plan** to outline measures that will be employed to manage water on the site, to minimise soil erosionand the discharge of sediments and other pollutants to land and/or waters throughout the life of the project. The Plan shall be basedon best environmental practice and shall be prepared in consultation with, and to the satisfaction of, WaterNSWand Fisheries. The Plan shall include, but not necessarily be limited to:*

   i. *Baseline data on the water quality and flow in Sawyers Swamp Creek up to the date of this approval;*
   ii. *Water quality objectives and impact assessment criteria for Sawyers Swamp Creek;*
   iii. *A program to monitor surface water quality in Sawyers Swamp Creek as referred to in condition 3.5 of this approval;*
   iv. *A protocol for the investigation of identified exceedances in the impact assessment criteria;*
   v. *A response plan to address potential adverse surface water quality exceedances;*
   vi. *A site water management strategy identifying clean and dirty water areas for Stage A, B and C of the project and the associated water management measures including erosion and sediment controls and provisions for recycling/reuse of water and the procedures for decommissioning water management structures on the site; and*
   vii. *Provisions for periodic reporting of Fisheries and WaterNSW.*

k. *An **Air Quality Management Plan** to outline measures to minimise impacts from the project on local air quality. The Plan shall be prepared in consultation with, and to the satisfaction of, the EPA and include, but not necessarily be limited to:*

   i. *Baseline data on dust deposition levels;*
   ii. *Air quality objectives and impact assessment criteria;*
   iii. *An air quality monitoring program as referred to in condition 3.8 of this approval;*
   iv. *An assessment of alternative methods of ash placement to minimise the exposure of active placement areas to prevailing winds;*
   v. *Mitigation measures to be incorporated during emplacement activities and haulage of ash;*
   vi. *An operating protocol for the repository irrigation system including activation rates, application rates and area of coverage;*
   vii. *A protocol for the investigation of visible emissions from the repository area;*
   viii. *A response plan to address visible emissions from the repository area; and*
   ix. *Provisions for periodic reporting of results to the EPA.*

l. *A **Landscape/Revegetation Plan** to outline measures to minimise the visual impacts of the repository and ensure the long-term stabilisation of the site and compatibility with the surrounding land fabric and land use. The Plan shall include, but not necessarily be limited to:*

   i. *Identification of design objectives and standards based on local environmental values, vistas, and land uses;*
   ii. *A description of short- and long-term revegetation measures;*
   iii. *A schedule of species to be used in revegetation;*
   iv. *Timing and progressive implementation of revegetation works as placement areas are completed, including landscape plans; and*
   v. *Procedures and methods to monitor and maintain revegetated areas during the establishment phase and long-term. Revegetation works must incorporate the use of local native species.*

m. an Operational Transport Management Plan for the project, which must:

   i. *be prepared in consultation with RMS and Council, prior to importing capping material from sources outside of the Lithgow local government area;*
   ii. *detail the route to be used to transport capping material;*
   iii. *detail the measures that would be implemented to minimise traffic safety issues for other road users (including cyclists), including:*
      - notifying the community about project-related traffic impacts;

- a procedure to address complaints about project-related traffic;
- minimising potential traffic conflicts with school buses and during local school drop-off and pick-up times;
- scheduling heavy vehicle movements to minimise convoy length or platoons;
- responding to local climate conditions that may affect road safety such as fog, dust, wet weather; and
- responding to emergency repair or maintenance requirements; and

iv. include a Driver Code of Conduct, which addresses:

- travelling speeds;
- driver fatigue;
- adherence to the designated transport route; and
- safe driving practices.

Compliance Assessment Observations and Comments

The Operation Environmental Management Plan was prepared by Parsons Brinckerhoff. Approval was 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

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. The review will include the development of the Transport Management Plan consistent with Conditions of Approval 36A, & 6.5 f.

Compliance Assessment Findings - Compliant

Revision of Strategies

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 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. TheProponent 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, asit related to this approval, reported in accordance with condition 7.1 of this approval, within such period as the Secretary may require.

Compliance Assessment Observations and Comments

There were no reportable incidents during the 2020-2021 reporting period.

Compliance Assessment Finding - Compliant

Annual performance reporting

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

- *a) Details of compliance with the conditions of this approval;*
- *b) A copy of the Complaints Register (refer to 5.4 of this approval) for the preceding twelve-month period (exclusive of personal details), and details of how these complaints were addressed and resolved;*
- *c) Identification of any circumstances in which the environmental impacts and performance of the project during the year have not been generally consistent with the environmental impacts and performance predicted in the documents listed under condition 1.1 ofthis 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 recurrenceof 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 tobe 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

Lidsdale 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
JULY 2022

Index

1. EXECUTIVE SUMMARY

July was our eighth month as the Lidsdale Site Operations Maintenance Contractor.

At the beginning of the month we had a lot of heavy rain, including 140mm total on Sun/Mon the 3&4 July. This caused not much work to be performed in the first week and some areas of the site we are still waiting for it to dry out so equipment can get back into the areas.

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 Bulk Fuel Tank was delayed slightly and is now due in the third week of August.

This tank has a capacity of 30,000litres of Diesel and will save time for the Pumping/Refuelling person as they will no longer need to leave site to fill the tank on the Site Vehicle. Also, all machines on site that are not on tracks will be able to refuel themselves and this will also save time for the pumping person.

The additional Site Light Vehicle is being delivered to Sydney ready for pickup on 18th August.

Safety Auditing of our system was ongoing during the month with excellent results and positive feedback from the client, GPM, on how we are managing safety & compliance on site. During the month we started a Trainee Operator and have in place the necessary Training & Documentation to ensure this is done with minimal risk and recorded correctly.

Up till the end of July, we have not had any significant Safety / Environmental Incidents or Equipment Damage. The Rectified Hazards Register and July-22 Risk Identifier Reports are attached at the back of this monthly report.

The 'Plant Assessor' service which enables each machine to have a thorough ITS (Introduction to Site) completed, then a formal Plant Risk Assessment has continued well during July and we now have almost all of the machines on site complete.

We will continue to use this program on the remaining equipment on site to formalise the ITS and Plant Risk Assessment verifying compliance to all NSW Rules & Regulations.

Other Safety Statistics and KPI's are detailed in section 2 of this report.

Preparation of the area where Collection Pond No.1 is to be constructed was suspended during July due to the large amount of rain encountered at the beginning of the month.

It is continuing to drain off the surface water via the shallow drainage canals that we installed to divert the water to sumps where pumps take the water away.

By mid to late August it should be dry enough for construction to commence again.

The new Sawyers Creek Truck Crossing held up during the big rain event at the start of the month and we should be able to commence backfilling in late August to allow for the road to be built over it.

The Green Climber is now mowing/mulching other parts of the site including the KVAR vegetation and land near the site entrance and access road.

Widening of the main Dam wall road is not yet completed, with run-off facilities still to be considered and installation of barriers on side of road yet to commence.

July was a four-week period.

A flow metre has been installed on the Water Truck Standpipe but it is currently not in service as the North Pond in no longer required.

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 7mths
Medically Treated Injuries	0	0						0
Near Miss Incidents	0	0						0
Lost Time Injuries	0	0						0
Breach of Safety Systems/Plans	0	0						0

Safety Item – Leading Indicators	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Total 7mths
Task Observations	7	3						10
Weekly Inspections	0	1						1
Monthly Audits	0	0						0
Toolbox Talks	2	1						3
Risk Assessments	8	3						11
Hazard Reports	5	2						7
Take 5's	164	133						297

We have engaged a Site Admin and Fitter part time to assist us with reporting, servicing, defects, and compliance on site.

Another tool that we use for a leading safety indicator is the 'Risk Identifier Report' which summaries each of the items identified during the Take 5 process. The monthly summary of this 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						14,466
Marangaroo Timbers	430	82						512
Other	351	14						365
PROJECT TOTALS	**13,272**	**2,070**	**0**	**0**	**0**	**0**	**0**	**15,343**

Our number of employees during July increase by one as we had a trainee operator commence.

July was a four week period. The table has been updated to show the full amount of labour hours since we commenced on site.

TABLE. 2.3 – Other KPI's

ITEM – Environmental KPI's	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Total 7mths
Environmental Incidents	None	None						0
Visible Dust Raising	None	None						0
Breach of EPL or Other Approvals	None	None						0
ITEM – Reporting KPI's								
Completion of Reports on Time	Yes	Yes						0
Quality of Reports (Error Free)	Yes	Yes						0
Timely Provision of Information	Yes	Yes						0
ITEM – Site Support KPI's	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Total 7mths
No Delays to Project/Works due to Contractor	Yes	Yes						0
Equipment Delivered to Site on Time	Yes	Yes						0
Works Completed to Satisfaction of Third Parties	Yes	Yes						0
Safe Work Procedures	Yes	Yes						0

TABLE. 2.4 – Incidents

Date	Incident	Outcome

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 July-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						**83.8**
Backhoe	106.5	118.4						**224.9**
Rigid Truck	108.1	90.2						**198.3**
Pumps	n/a	n/a						**0.0**
Generator	n/a	n/a						**0.0**
Site Light Vehicles	n/a	n/a						**0.0**
Extra Rigid Truck	38.1	36.5						**74.6**
7tn Excavator	144.4	124.0						**268.4**
25/30tn Exc - Cat 300	119.2	0.0						**119.2**
25/30tn Exc - Hyundai	215.0	101.0						**316.0**
8tn Exc - Hyundai	n/a	99.0						**99.0**
5.5tn Excavator	121.6	126.0						**247.6**
Green Climber	94.1	87.0						**181.1**
12H Grader	33.3	28.5						**61.8**
Barford 9tn Trk (Days)	4.7	n/a						**4.7**
Bobcat / SkidSteer	61.0	132.0						**193.0**
Roller	5.3	10.0						**15.3**
980H Loader	73.2	32.0						**105.2**
1.7tn Exc (Days)	9.0	1.0						**10.0**
Other	0	0.0						**0.0**
PROJECT TOTALS	**1,191**	**1,012**	**0**	**0**	**0**	**0**	**0**	**2,202.7**

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						**656**
Backhoe	533	737						**1,270**
Rigid Truck	495	324						**819**
Pumps	2,471	1,427						**3,898**
Generator	781	0						**781**

Site Light Vehicles	336	632						968
Extra Rigid Truck	196	242						438
7tn Excavator	652	1,036						1,688
25/30tn Exc - Cat 300	1,078	120						1,198
25/30tn Exc - Hyundai	3,159	1,423						4,582
8tn Exc - Hyundai	n/a	599						599
5.5tn Excavator	546	719						1,265
Green Climber	318	377						695
12H Grader	206	110						316
Barford 9tn Truck	56	0						56
Bobcat / SkidSteer	266	664						930
Roller	0	30						30
980H Loader	1,055	500						1,555
1.7tn Exc	88	0						88
Other	0	0						0
PROJECT TOTALS	**8,772**	**8,940**	**0**	**0**	**0**	**0**	**0**	**21,830**

4. WATER USED & PUMPED

The Water Truck we used on site during July 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 30 for a volume of 420,000ltrs.

5. WORK UNDERTAKEN & COMPLETED

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

- Moving Electrical Poles next to Haul Road
- Remove Fence & Place Gravel in Drains
- Levelling Batters in KVAR
- De vegetation around Dams
- Marangaroo Timbers ongoing Tree Cutting & Mulching at the Red Swamp
- Install Drainage at KVAR
- Picking up loose poly pipe
- Tidy up in KVAR
- Remove Vegetation at GPM office & improve Drainage
- Cut Vegetation on Skelly Road
- Marangaroo Timbers Tree Cutting & Mulching at the Asbestos Dump
- Remove Posts on Dam Wall & Fill with Topsoil

- Tidy-up Nth Pond Road
- Pile up Trees in Asbestos Dump for Chipping
- Cut Vegetation on Dam Wall
- Load & Haul Material to Dam Wall
- Relocate & Place Concrete Barriers
- General Maintenance of Dam Wall Surface
- Cleanup Dump Area in KVAR
- Reshaping Batters & Drainage on 920 Road
- Remove Ash for KVAR Drainage & Concrete Block Installation

6. OUTLOOK & FUTURE PROJECTS

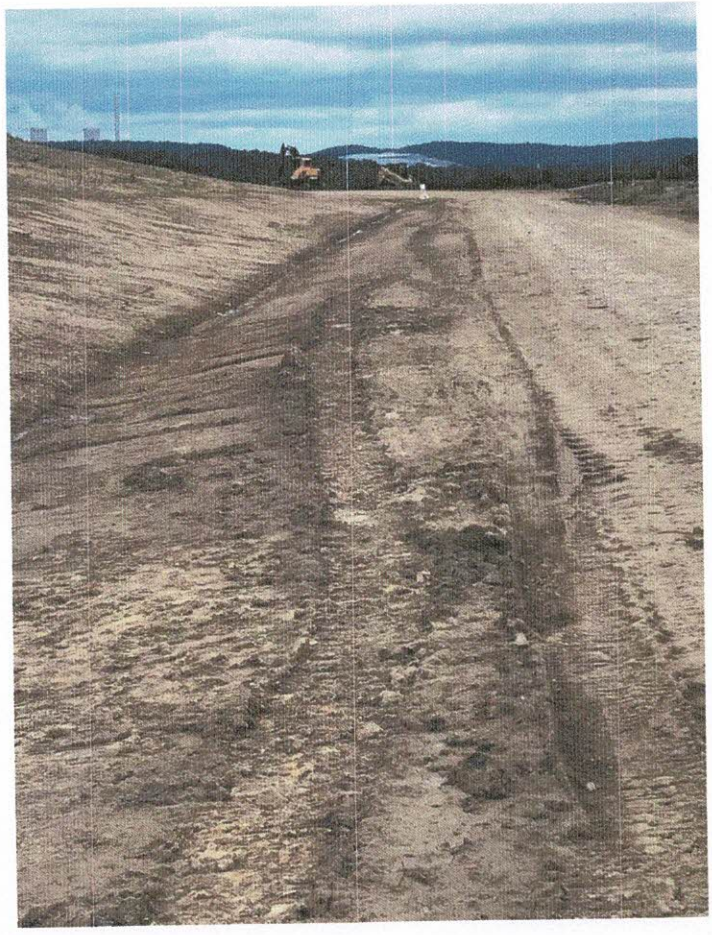
Extra Tasks/Projects we are looking to Commence/Complete during August Include:

- Continue the Construction the first Clean Water Collection Pond on the North Side of Cell C/D
- Continue Installing Drainage Structure at the bottom of KVAR
- Continue cleaning vegetation opposite GPM Site Office
- Grinding Tree Stumps out of batters so Green Climber can be used instead of brush cutters on vegetation control
- General fill Material delivery management for capping the Closed Asbestos Landfill to the design and survey pegged levels
- General fill Material delivery management for capping material to old Lidsdale Town Dump
- General Fill Material delivery and management for capping the Open Asbestos Landfill
- Cleaning Drains on KVAR
- The Sawyers Creek Truck Crossing needs to be backfilled once dry to create the road over the creek
- Continue with installation of Perimeter and Internal Roads on the SCAD Area including the use of Geofabric as per the road design
- Ongoing works on site Batters/Slopes to make Vegetation Growth easier to manage

7. PICTURES

Installation of Drainage in KVAR

Drainage at 920RL Road on KVAR



Batter and Drainage Cleaning on the KVAR

Vegetation and Site Cleaning opposite GPM Site Office

Surface Water from Heavy Rain in Cell D of SCAD

Surface Water from Heavy Rain at SCAD Collection Pond No.1

New 8tn Hyundai Excavator

Tree Removal – Western Side of KVAR

412 - LID - Site Hazard Register

Part 2 of 2 - Rectified Hazards Register

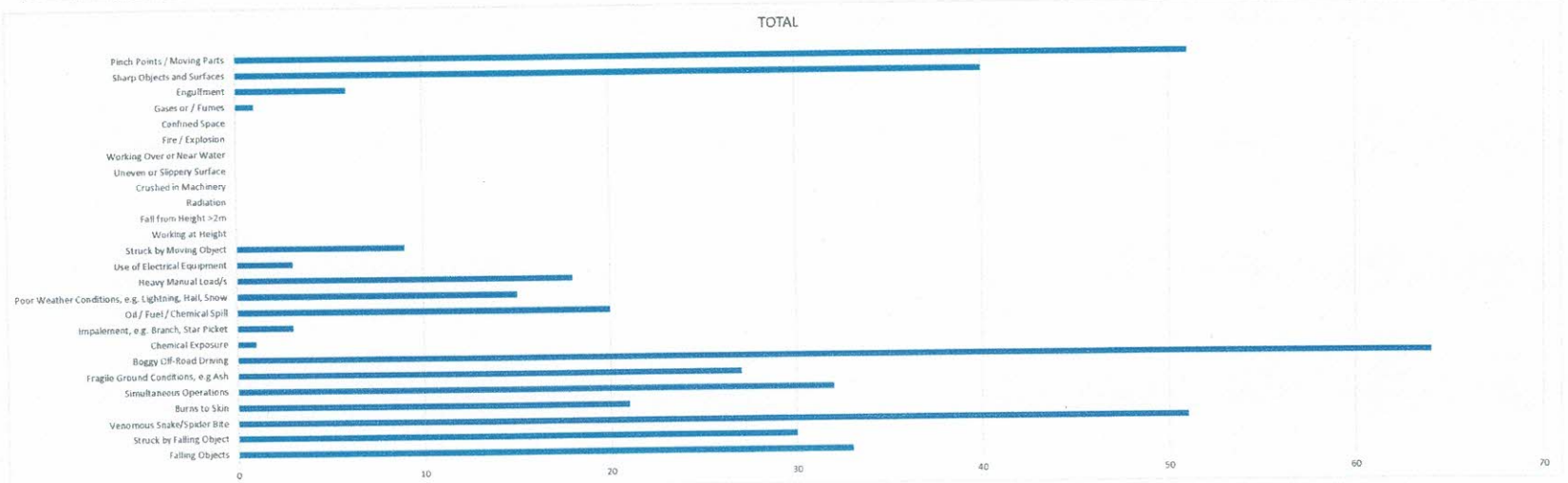
Last Updated on: Wednesday, 20 July 2022

Area on Site	Plant No. (if applicable)	Date of Hazard Report	Hazard Description	Raised By	How Was Hazard Identified	Initial Action Taken	Work Completed to Rectify	Date	Signed off by supervisor and manager
Storage Container Area	N/A	13.05.22	Untidy area at containers	J O'Connor	Visual	Tidy area	Tidy area	22/05/2013	Barry O'Sullivan Tony O'Connor
Carpark	N/A	18.05.22	Drop off from carpark to storage area	B O'Sullivan	Visual	Place concrete blockson top level	Placement of blocks	18.05.22	Barry O'Sullivan Tony O'Connor
Pumphouse Lidsdale Cut	N/A	08.06.22	Open pit in pumphouse	K Jewell	Visual	Lock door to room	Lock door to room	08.06.22	Barry O'Sullivan
Pumphouse Lidsdale Cut		20.06.22	Open pit in pumphouse			Cover pit with steel plate		20.06.22	Barry O'Sullivan
KVAR	N/A	18.05.22	Sump in KVAR not bunded	R McKechnie	Visual	Fill in sump	Fill in sump	18.05.22	Tony O'Connor
Access Gate	N/A	2.07.22	Access gate chain and locks	B O'Sullivan	Visual	Use gloves	Remove unused locks	2.07.22	Tony O'Connor
Ramp out of KVAR	N/A	17.07.22	Slippery ramp when wet	B O'Sullivan	Visual	Sheet ramp	Sheet ramp	17.07.22	Barry O'Sullivan
920 Road	Skidsteer	24.07.22	Reverse camera not working	B O'Sullivan	Visual	Use mirrors	Order parts	27.07.22	Barry O'Sullivan
Ramp to water fill	N/A	13.08.22	Slippery ramp to water fill	S O'Sullivan	Loss of traction	Don't use ramp	Sheet ramp	13.08.22	Barry O'Sullivan
KVAR	N/A	19.08.22	Light vehicles not calling up when entering live circuit	C O'Sullivan	Lack of communication	Toolbox - extra signage	More signage	20.08.22	Barry O'Sullivan
CIP	Water Truck	2.09.22	Uncompacted road edge around CIP	C O'Sullivan	Water truck sank on edge	Block off area	Concrete blocks	2.09.22	Barry O'Sullivan
Black Hole	N/A	9.09.22	Over hanging branches along road	P Lemon	Trees fallen over	Stay away from area	Get trees cut		Barry O'Sullivan

935 - LID - Part 2 of 2

Kerosene Vale - Lidsdale Site Operations - Take 5/SLAMS's Hazards Identified - August 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	2	1	1			1	2	2	2	1	1	2	1			1	3	1	1				2	2		2			1	2	32
2	Struck by Falling Object	1	4	1	1			1	2	2	2	3	1	2	1			1	3	1	1				1	1	1	2	1		2	3	38
3	Venomous Snake/Spider Bite	2	4	4	1		1	2	3	3	2	4	2	2	1		2	1	4	2	1		2	2	2	2	2	4	1		2	3	61
4	Burns to Skin	1						1	2			1	1	1	1				1		1						1	1	1			1	14
5	Simultaneous Operations	1	5	2	2			2	4	3	1	5	3	1	1	1	3	2	4	3	1		3	3	2	1	3	4			3	4	67
6	Fragile Ground Conditions, e.g Ash	2	7	5	3		1	2	4	4	3	4	3	1	1	1	3	4	5	2	1	1	3	5	2	3	1	3	1	1	5	5	86
7	Boggy Off-Road Driving	2	9	8	5	1	2	2	4	4	5	7	5	3	1	2	7	4	5	2			5	6	5	6	2	5	1		8	6	122
8	Chemical Exposure																		1														1
9	Impalement, e.g. Branch, Star Picket		1	1	1				1	3	1						1	1	3						2	2	1						18
10	Oil / Fuel / Chemical Spill	1						1	2		1	1	2	1	1				1		1							1	1				14
11	Poor Weather Conditions, e.g. Lightning, Hail, Snow	2	3	3	4						1								1	1				1	3						1	1	21
12	Heavy Manual Load/s	1	2	2				1	2	1	2	3	1	1	1		1		2	1	1		2	1	1	1	2	3	1		1		34
13	Use of Electrical Equipment																1																1
14	Struck by Moving Object	1	2	2				2	2	2	2	5		1		1	1	1	1						2		2	2			1	2	32
15	Working at Height			1	1							1	1			1	1	1		1			1		1	1						1	12
16	Fall from Height >2m																																0
17	Radiation																																0
18	Crushed in Machinery	1	1	2	2		1	1	3	1	2	3	2	1	1	1	2		2		1		1		2	1	3	3	1	1	1	3	43
19	Uneven or Slippery Surface	4	6	7	3		2	3	6	5	3	8	3	3	2	5	5	3	7	4	2	1	5	4	4	5	5	6	2	1	6	6	126
20	Working Over or Near Water	3	6	5	2	1	1	2	4	1	1	3	2	1	2	2	3	2	5	2	1	1	3	5	2	2	1	4	1		2	2	72
21	Fire / Explosion	1	1					1	1			1	1	1	1				2		1							1	1				13
22	Confined Space		1										1																				2
23	Gases or / Fumes		1	1	1																												3
24	Engulfment		1	1	1				1	1	1	1	1			1	1		1								1	1				1	14
25	Sharp Objects and Surfaces	1	2	2	1	1	1	1	2	2	1	2	2	2	1		1		3	1	2		1		1	1	2	4	2		1	1	41
26	Pinch Points / Moving Parts	1	2	2	1	1	1	1	2	2	2	4	2	2	1	2	1		3	1	2		2		2	1	2	4	1		2	2	49
	TOTALS	26	60	50	30	4	10	24	47	36	32	57	34	25	17	17	33	21	57	22	17	3	28	27	34	29	29	50	15	3	36	43	916



Appendix C
Noise report

EMM
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Kerosene Vale Ash Repository

Environmental Noise Monitoring

Quarter 4 2021

Prepared for

Generator Property Management Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Kerosene Vale Ash Repository

Environmental Noise Monitoring
Quarter 4 2021

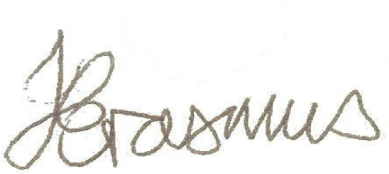
Reference: 21252_R01
Report date: 5 December 2021

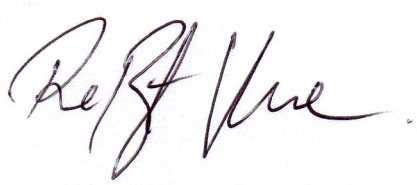
Prepared for

Generator Property Management Pty Ltd
PO Box 132
Budgewoi NSW 2262

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322





Prepared:	Jonathan Erasmus Consultant	QA Review:	Robert Kirwan Consultant

Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Generator Property Management Pty Ltd to conduct a quarterly noise survey of operations at Kerosene Vale Ash Repository (KVAR). The purpose of the survey was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the day and evening periods of 16/17 November 2021 at a total of three monitoring locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown in Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: MONITORING LOCATIONS

Site Reference	Description
Location A	Skelly Road, Lidsdale NSW
Location B	Corner Sawyers road and Skelly Road, Lidsdale NSW
Location C	End of Nuebeck Street, Lidsdale NSW

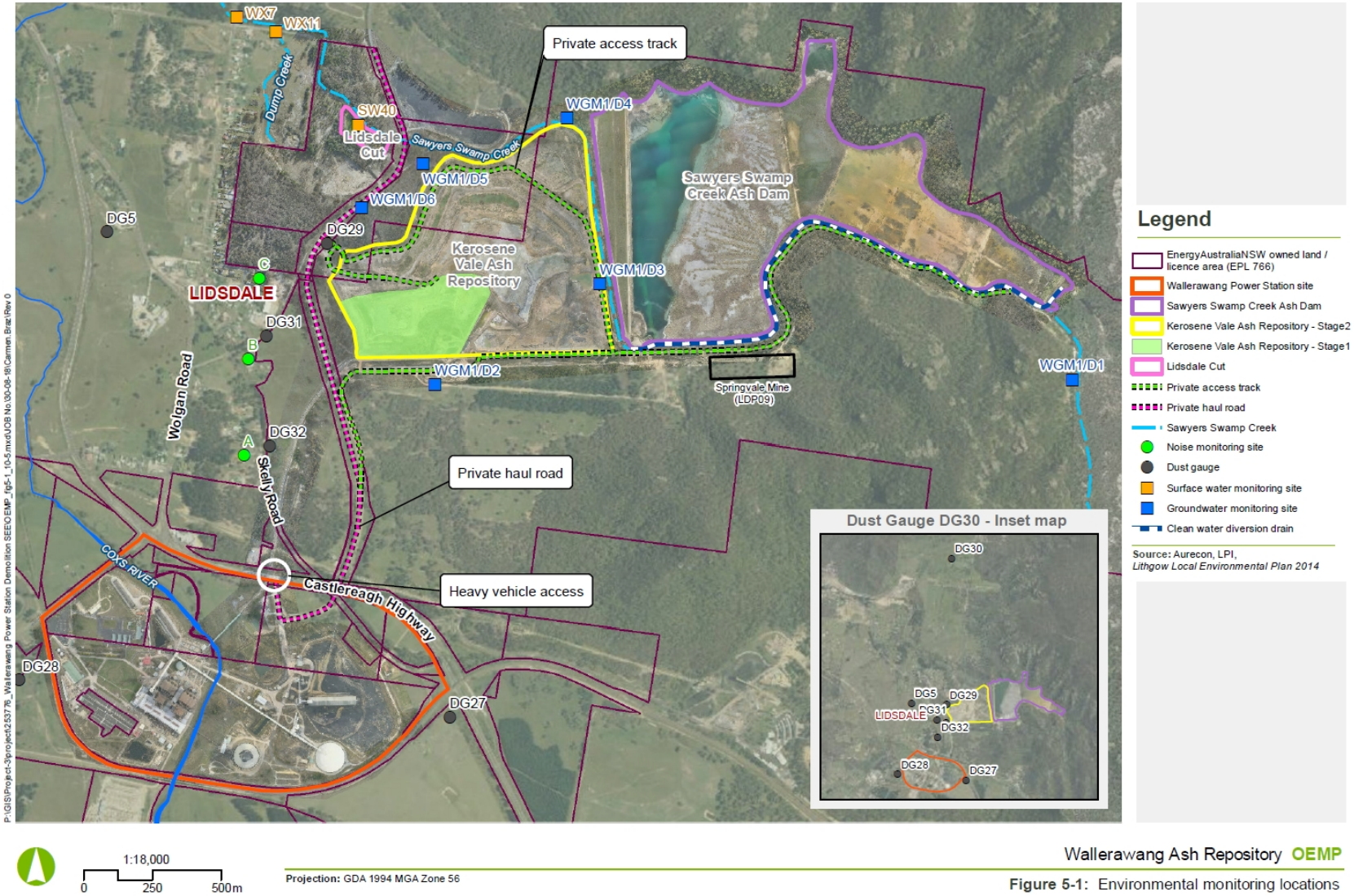


Figure 1: KVAR Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise.
L_{Amax}	The maximum A-weighted noise level over a time period.
L_{A1}	The noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The noise level which is exceeded for 10 percent of the time.
L_{Aeq}	The average noise A-weighted energy during a measurement period.
L_{A50}	The noise level which is exceeded for 50 per cent of the time and the median noise level during a measurement period.
L_{A90}	The level exceeded for 90 percent of the time. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
SC	Stability class (or category) is determined from measured wind speed and either sigma-theta or VTG.
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	This is the period 7:00am to 6:00pm.
Evening	This is the period 6:00pm to 10:00pm.
Night	This is the period 10:00pm to 7:00am.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Development Consent

The current development consent for KVAR is 07_0005 (August 2018). Section 2 of the KVAR development consent details specific conditions relating to noise generated by KVAR. Relevant sections of the KVAR development consent are reproduced in Appendix A.

2.2 Environment Protection Licence

KVAR holds Environment Protection Licence (EPL) No. 21185 issued by the Environment Protection Authority (EPA) on 18 November 2020. Relevant sections of the EPL are reproduced in Appendix A.

2.3 Noise Management Plan

The KVAR Operational Environmental Management Plan (OEMP) was most recently updated in October 2018. Section 6.3 of the OEMP contains an Operational Noise and Vibration Management Plan as an appendix. Relevant sections of the OEMP are reproduced in Appendix A.

2.4 Noise Criteria

Noise criteria detailed in Table 2.1 have been adopted for each monitoring location based on the EPL.

Table 2.1: KVAR OPERATIONAL NOISE CRITERIA, dB(A)

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$
All residences	40	40

2.5 Meteorological Conditions

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

a) *wind speeds up to 3 m/s at 10 metres height above ground; and/or*

b) *temperature inversion conditions of up to 3C/100m, (or alternatively stability category F temperature inversion conditions) and source to receiver gradient winds of up to 2m/s at 10 metres 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 KVAR operations solely during the day and evening periods, it has been assumed that temperature inversion conditions were not present during monitoring.

2.6 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017. For assessment of modifying factors, the NPfI immediately superseded the 'Industrial Noise Policy' (INP, 2000), as outlined in the EPA document 'Implementation and transitional arrangements for the Noise Policy for Industry' (2017). Assessment and reporting of modifying factors has been undertaken in accordance with Fact Sheet C of the NPfI.

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', relevant NSW EPA requirements, and the OEMP.

3.2 Attended Noise Monitoring

During this survey, attended monitoring was undertaken during the day and evening period at each location. The duration of each measurement was 15 minutes. Atmospheric condition measurement was also undertaken at each monitoring location.

This survey presents noise levels gathered during attended monitoring that are the result of many sounds reaching the sound level meter microphone during monitoring. Received levels from various noise sources were noted during attended monitoring and particular attention was paid to the extent of KVAR's contribution, if any, to measured levels. At each receptor location, KVAR's $L_{Aeq,15minute}$ (in the absence of any other noise) was measured directly, where possible, or, determined by frequency analysis.

If the exact contribution of the source of interest (in this case KVAR) cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise descriptors in accordance with Section 7.1 of the NPfI. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted as NM in this report are due to one or more of the following reasons:

- Site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- Site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- It was not feasible, nor reasonable to employ methods such as move closer and back calculate. Cases may include, but are not limited to, 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.

Often extraneous noise events (for example, road traffic pass-bys and dogs) interfere with the measurement of site noise levels in the frequency range of interest. Where required, the sound level meter is paused during these occurrences to aid in quantification of the site only noise.

3.3 Modifying Factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable, such that the site-only L_{Aeq} was not "NM" or less than a maximum cut off value (e.g. "<20 dB" or "<30dB").

If applicable, modifying factors have been reported and added to measured site-only L_{Aeq} noise levels when meteorological conditions satisfied requirements for site noise criteria to be applicable. Low-frequency modifying factors have only been applied to site-only L_{Aeq} levels if KVAR was the only contributing low-frequency noise source.

3.4 Attended Noise Monitoring Equipment

Equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are provided in Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	01070590	11/06/2022
Pulsar 106 acoustic calibrator	74813	10/06/2022

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – QUARTER 4 2021[1]

Location	Start Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A50} dB	L_{A90} dB	L_{Amin} dB
				Day				
A	17/11/2021 09:20	72	52	41	44	37	35	33
B	17/11/2021 08:58	66	52	46	43	39	36	32
C	17/11/2021 08:38	66	57	49	46	40	35	32
				Evening				
A	16/11/2021 18:45	56	49	42	39	36	33	29
B	16/11/2021 18:24	76	64	49	51	40	37	33
C	16/11/2021 18:03	56	51	46	42	38	34	30

Notes:

1. *Levels in this table are not necessarily the result of activity at KVAR.*

4.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.3 Attended Noise Monitoring

Table 4.2 details noise levels from KVAR in the absence of other noise sources. Noise criteria are applicable if weather conditions during the measurement were within parameters outlined in the KVAR development consent and EPL.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY KVAR AGAINST NOISE CRITERIA – QUARTER 4 2021

Location	Start Date and Time	Wind Speed m/s	Criterion $L_{Aeq,15min}$ dB	Criterion Applies?[2]	KVAR $L_{Aeq,15min}$ dB [3,4]	Exceedance [5]
			Day			
A	17/11/2021 09:20	1.9	40	Yes	35	Nil
B	17/11/2021 08:58	1.9	40	Yes	IA	Nil
C	17/11/2021 08:38	1.9	40	Yes	35	Nil
			Evening			
A	16/11/2021 18:45	1.1	40	Yes	IA	Nil
B	16/11/2021 18:24	1.1	40	Yes	IA	Nil
C	16/11/2021 18:03	1.7	40	Yes	IA	Nil

Notes:

1. *Meteorological conditions required for noise criteria to apply are detailed in Section 2.5;*
2. *Meteorological data required to determine temperature inversion conditions was not available. It has been assumed that temperature inversion conditions were not present during monitoring;*
3. *Site-only $L_{Aeq,15minute}$ attributed to KVAR, including modifying factors if applicable;*
4. *Bold results in red indicate an exceedance of relevant criterion; and*
5. *NA in exceedance column means meteorological conditions outside conditions specified in Section 2.5.*

4.4 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.3. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.3: MEASURED ATMOSPHERIC CONDITIONS – QUARTER 4 2021

Location	Start Date and Time	Temperature ° C	Wind Speed m/s	Wind Direction ° Magnetic North[1]	Cloud Cover 1/8s
		Day			
A	17/11/2021 09:20	12	1.0	320	7
B	17/11/2021 08:58	19	0.4	20	8
C	17/11/2021 08:38	13	0.3	50	7
		Evening			
A	16/11/2021 18:45	17	0.0	-	0
B	16/11/2021 18:24	16	0.9	275	1
C	16/11/2021 18:03	17	1.3	250	1

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the Marrangaroo AWS.

5 DISCUSSION

5.1 Noted Noise Sources

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

An example is provided as Figure 2 where it can be seen that frogs and insects are generating noise at frequencies above 1000 Hz while mining noise is at frequencies less than 1000 Hz, which is typical. Adding levels at frequencies that relate to mining only allows separate statistical results to be calculated. This analysis cannot always be performed if there are significant levels of other noise at the same frequencies as mining, such as dogs, cows, or (most commonly) road traffic.

It should be noted that the method of summing statistical values up to a cut-off frequency can overstate the L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

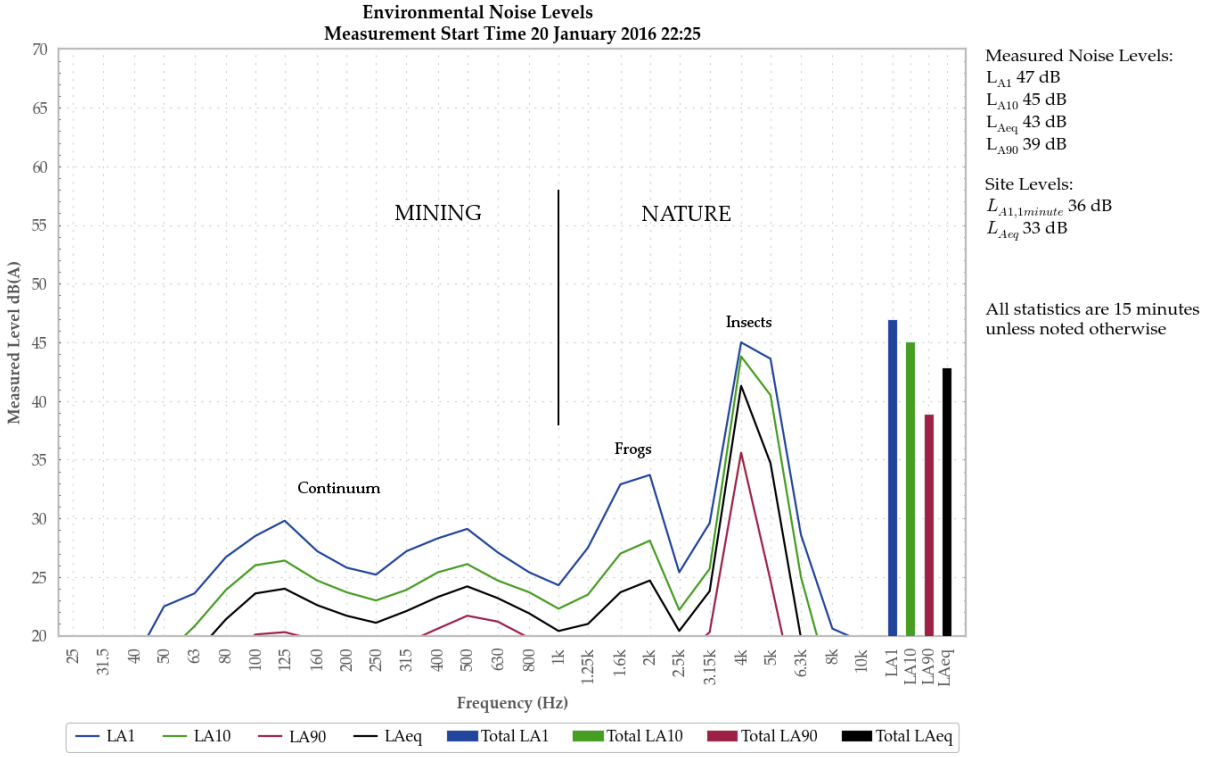


Figure 2: Example Graph (refer to section 5.1 for explanatory note)

5.1.1 Location A – Day

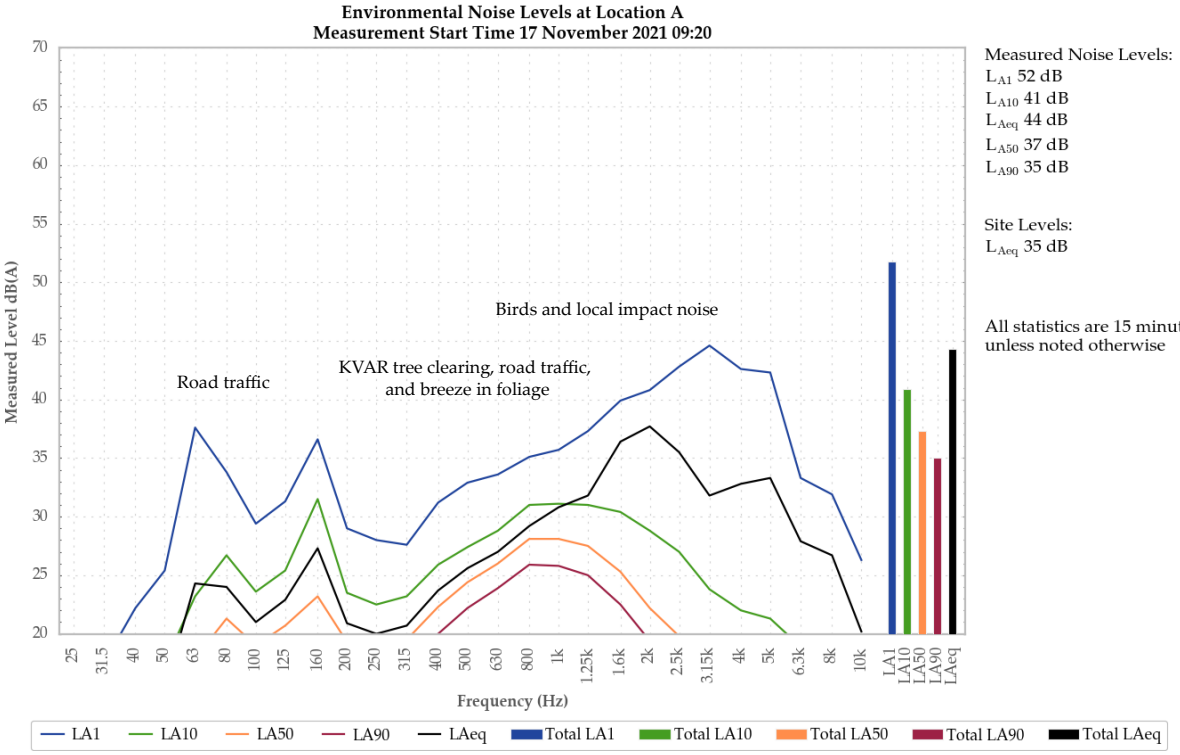


Figure 3: Environmental Noise Levels, Location A

Tree clearing activities from KVAR were audible throughout the measurement generating the site-only L_{Aeq} of 35 dB.

Birds and local impact noise generated the measured L_{A1} and L_{Aeq}. Road traffic and the tree clearing noise from KVAR generated the measured L_{A10}, L_{A50}, and L_{A90}.

5.1.2 Location A – Evening

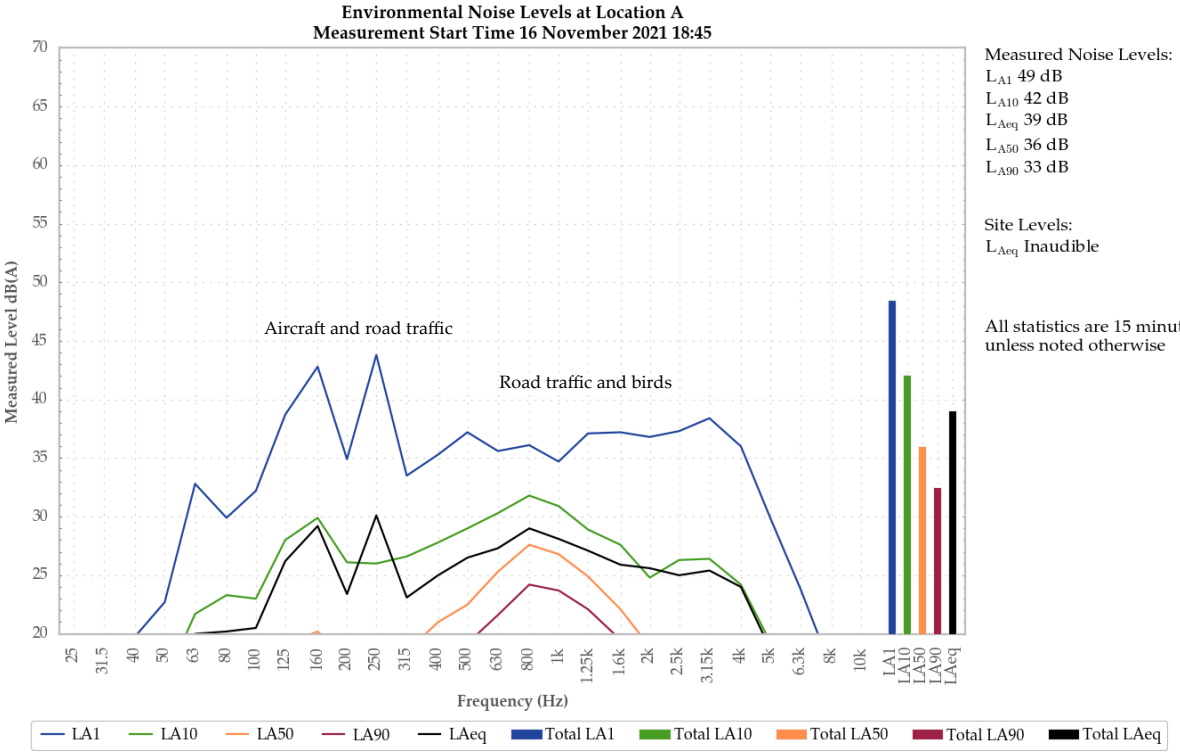


Figure 4: Environmental Noise Levels, Location A

KVAR was inaudible during the measurement.

Aircraft and road traffic primarily generated the measured L_{A1} and L_{Aeq}. Birds were a minor contributor to the measured L_{A1} and L_{Aeq}. Road traffic generated the measured L_{A10}, L_{A50}, and L_{A90}.

Dogs were also noted.

5.1.3 Location B – Day

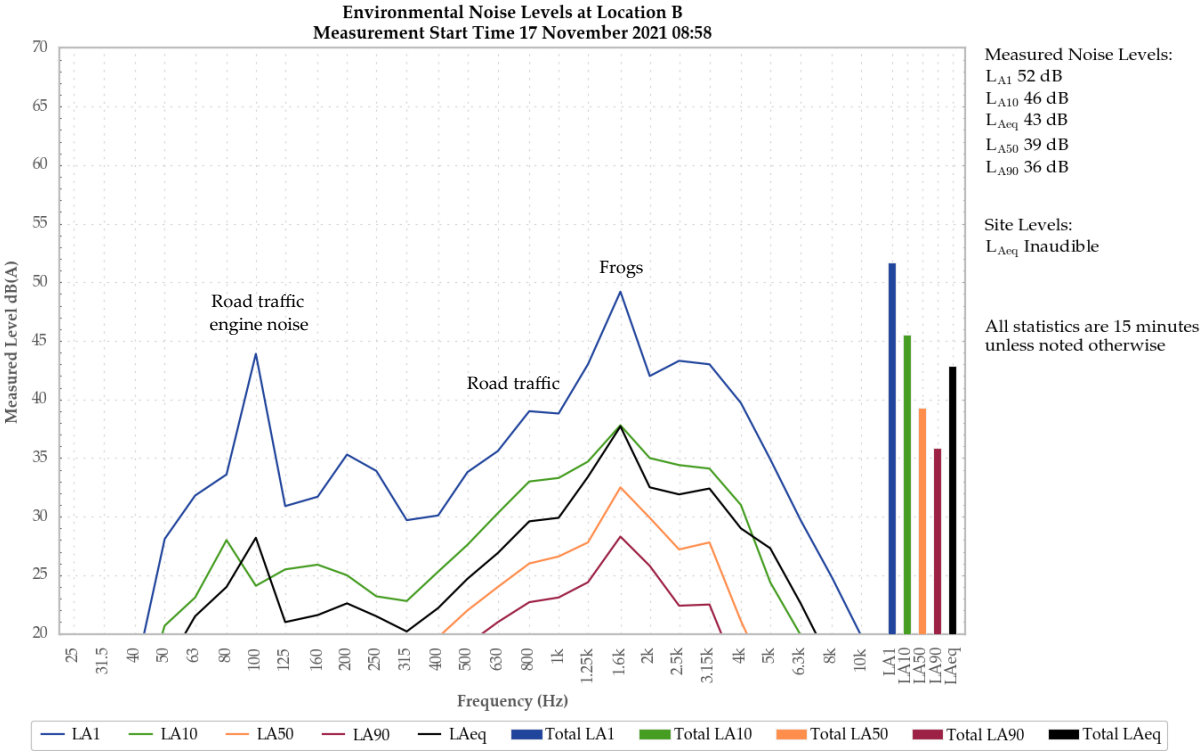


Figure 5: Environmental Noise Levels, Location B

KVAR was inaudible during the measurement.

Frogs and road traffic generated the measured L_{A1}. Frogs generated the measured L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

Birds and breeze in foliage were also noted.

5.1.4 Location B – Evening

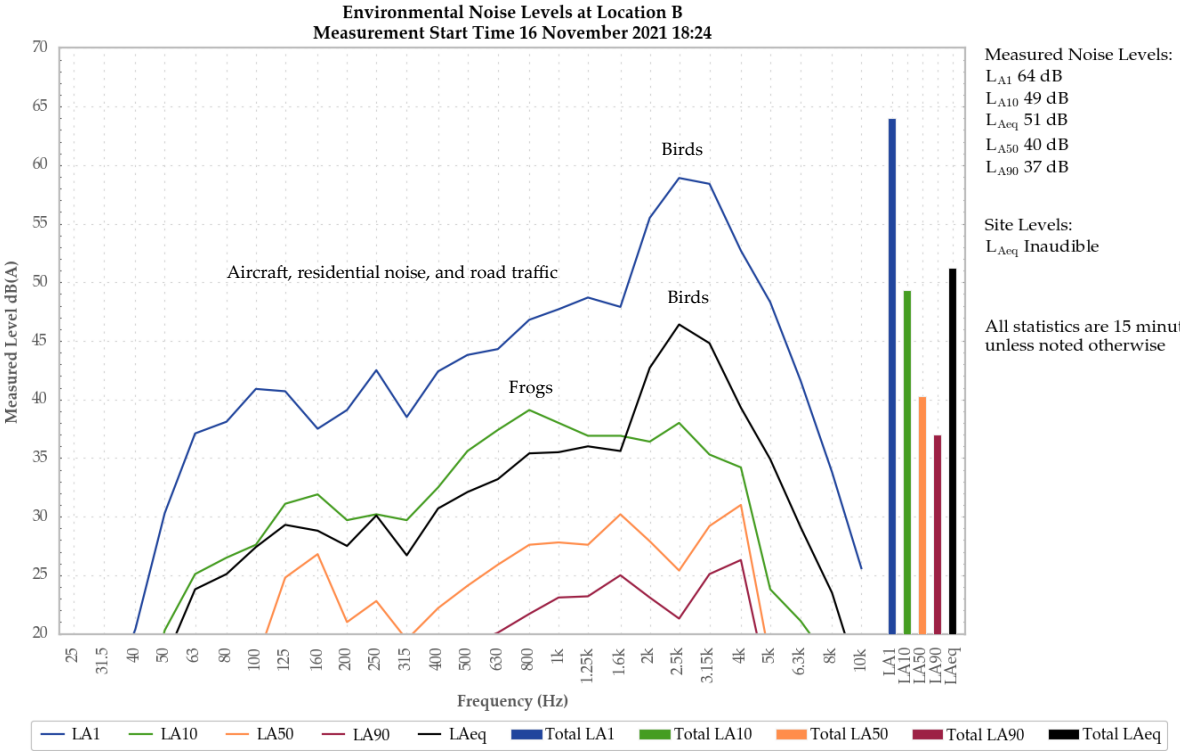


Figure 6: Environmental Noise Levels, Location B

KVAR was inaudible during the measurement.

Birds generated the measured L_{A1} and primarily the measured L_{Aeq}. Frogs were a primary contributor to the measured L_{A10} and with road traffic and residential noise contributed to the measured L_{Aeq}. Frogs and other wildlife noise generated the measured L_{A50} and L_{A90}.

5.1.5 Location C – Day

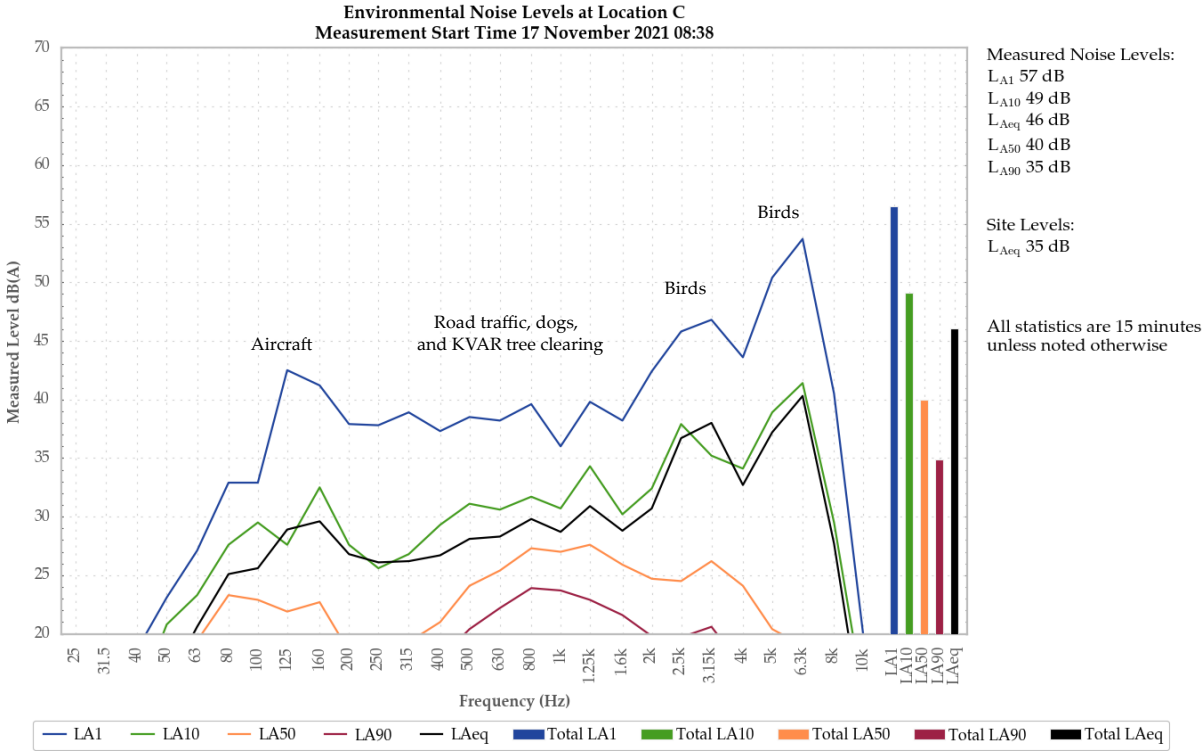


Figure 7: Environmental Noise Levels, Location C

Tree clearing activities from KVAR were audible throughout the measurement generating the site-only L_{Aeq} of 35 dB.

Birds and dogs generated the measured L_{A1}. Birds primarily generated the measured L_{A10} and L_{Aeq}. Road traffic contributed to the measured L_{A10} and L_{Aeq}.

Residential noise, aircraft, and breeze in foliage were also noted.

5.1.6 Location C – Evening

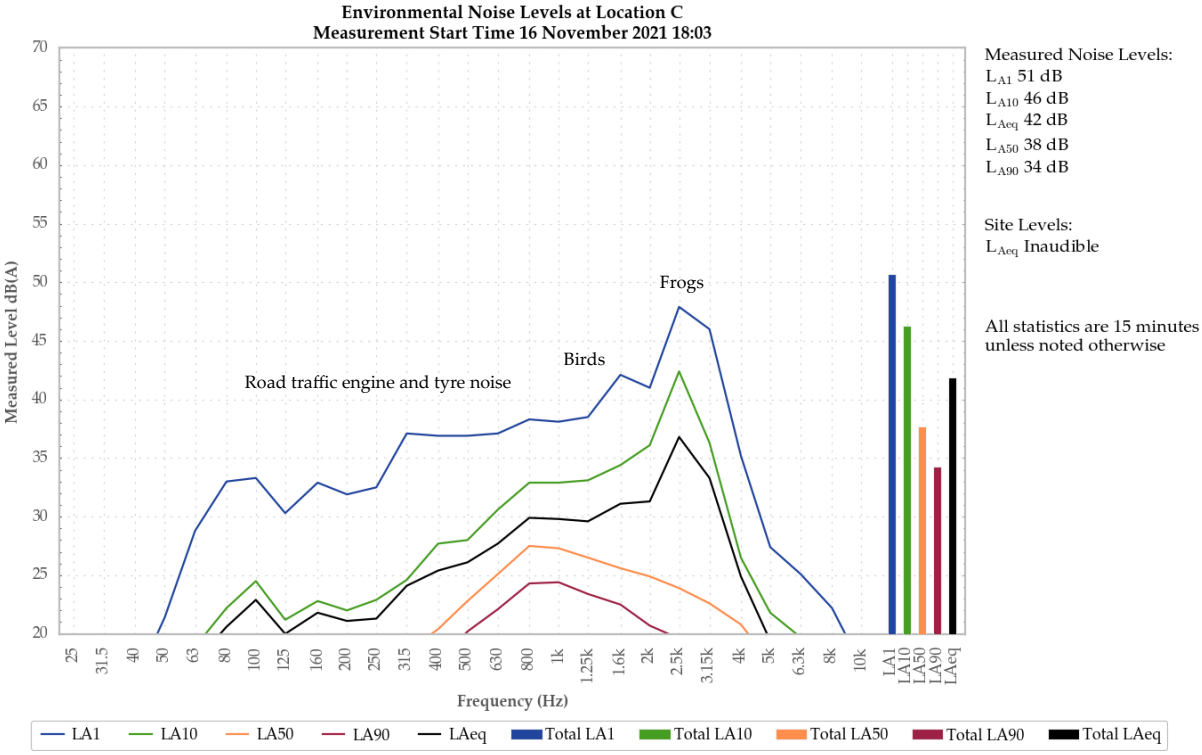


Figure 8: Environmental Noise Levels, Location C

KVAR was inaudible during the measurement.

Frogs and birds primarily generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Road traffic contributed to the measured L_{A1}, L_{A10}, and L_{Aeq}. Road traffic and breeze in foliage generated the measured L_{A50} and L_{A90}.

Residential noise was also noted.

6 SUMMARY

Global Acoustics was engaged by Generator Property Management Pty Ltd to conduct a quarterly noise survey of operations at KVAR. The purpose of the survey was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the day and evening periods of 16/17 November 2021 at a total of three monitoring locations.

Noise levels from KVAR complied with relevant criteria at all monitoring locations during the Quarter 4 2021 survey. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 KVAR DEVELOPMENT CONSENT

Noise Impacts

Construction Hours

2.3 Construction activities associated with the project shall only be undertaken during the following hours:
a) 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;
b) 8:00 am to 1:00 pm on Saturdays; and
c) at no time on Sundays or public holidays.

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

2.5 Construction outside the hours stipulated in condition 2.3 of this approval is permitted in the following circumstances:
a) where construction works do not cause audible noise at any sensitive receiver; or
b) for the delivery of materials required outside these hours by the Police or other authorities for safety reasons; or
c) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

2.6 The hours of construction activities specified under condition 2.3 of this approval may be varied with the prior written approval of the Secretary. Any request to alter the hours of construction specified under condition 2.3 shall be:
a) considered on a case-by-case basis;
b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours; and
c) accompanied by any information necessary for the Secretary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of sensitive receivers in the vicinity of the site.

Construction Noise

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

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

Operational Hours

2.8 Operational activities associated with the project shall only be undertaken from 7.00 am to 10.00 pm Monday to Sunday.

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.

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 lives, 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 for system 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.

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.

Operational Noise

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

This noise criterion applies under the following meteorological conditions:
a) wind speeds up to 3 m/s at 10 metres above ground; and/or
b) temperature inversion conditions of up to 3°C/100 m and source to receiver gradient winds of up to 2 m/s at 10 m above ground level.

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

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

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

2.18 Where noise monitoring (as required by conditions 3.2 or 3.3 of this approval) identifies any non-compliance with the operational noise criterion specified under condition 2.15 of this approval the Proponent shall prepare and submit to the Secretary for approval a report including, but not limited to:
a) an assessment of all reasonable and feasible physical and other mitigation measures for reducing noise at the source including, but not limited to -
   i) construction of a noise barrier along the haulage road,
   ii) alternative ash haulage routes, and
   iii) alternative methods of ash conveyance to the repository; and
b) identification of the preferred measure(s) for reducing noise at the source;
c) feedback from directly affected property owners and the EPA on the proposed noise mitigation measures; and
d) location, type, timing and responsibility for implementation of the noise mitigation measure(s).

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

Additional Noise Mitigation Measures

2.19 If, after the implementation of all reasonable and feasible source controls, as identified in the report required by condition 2.18, the noise generated by the project exceeds the criterion stipulated in condition 2.15 at:
a) any sensitive receiver in existence at the date of this approval; or
b) any residential dwelling for which an approval has been sought or obtained under the *Environmental Planning and Assessment Act 1979* no later than six months after the confirmation of operational noise levels;

upon receiving a written request from an affected landowner (unless that landowner has acquisition rights under condition 2.20 of this approval and has requested acquisition) the Proponent shall implement additional noise mitigation measures such as double glazing, insulation, air conditioning and or other building acoustic treatments at any residence on the land, in consultation with the landowner.

For the purpose of this condition and condition 2.20, confirmation of operational noise levels means:

a) completion of the operational noise review required under condition 3.2 of this approval; and
b) implementation of any source controls, as required under condition 2.18 of this approval, should the operational noise review indicate noise levels in excess of the operational noise criterion specified in condition 2.15; and
c) monitoring of operational noise levels, as required under condition 3.3b) of this approval, following the implementation of any source controls.

The additional mitigation measures must be reasonable and feasible. If within three months of receiving this request from the landowner the Proponent and landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution, whose decision shall be final.

Land Acquisition Criteria

2.20 If, after the implementation of all reasonable and feasible source controls, as identified in the report required by condition 2.18, the noise generated by the project exceeds the criterion stipulated in condition 2.15 by more than 5 dB(A):

a) at a sensitive receiver in existence at the date of this approval; or
b) at any residential dwelling for which an approval has been sought or obtained under the *Environmental Planning and Assessment Act 1979* prior to the landholder receiving written notification that they are entitled to land acquisition rights, as per condition 2.25 of this approval; or
c) over 25% or more of the area of a vacant allotment in existence at the date of this approval, and where a dwelling is permissible under the *Environmental Planning and Assessment Act 1979* at that date, with the exception of land that is currently used for industrial or mining purposes;

the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 2.22 to 2.24 of this approval.

Any landowner that has agreed to, or property that has been the subject of, the application of additional noise mitigation measures under condition 2.19 of this approval waives the right to land acquisition.

2.21 The land acquisition rights under condition 2.20 of this approval do not apply to landowners who have sought approval to subdivide their land after the date of this approval, unless the subdivision is created pursuant to condition 2.24 of this approval.

2.22 Within three months of receiving a written request from a landowner with acquisition rights under condition 2.20 of this approval, the Proponent shall make a binding written offer to the landowner based on:

(a) the current market value of the landowner's interest in the property at the date of this written request, as if the property was unaffected by the project which is the subject of the project application, having regard to the:
    i) existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and
    ii) presence of improvements on the property and/or any approved building or structure which has been physically commenced at the date of the landowner's

written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of condition 2.19 of this approval;

(b) the reasonable costs associated with:
  i) relocating within the Lithgow local government area, or to any other local government area determined by the Secretary;
  ii) obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is required; and

(c) reasonable compensation for any disturbance caused by the land acquisition process.

However, if at the end of this period, the Proponent and landowner cannot agree on the acquisition price of the land, and/or the terms upon which the land is to be acquired, then either party may refer the matter to the Secretary for resolution.

Upon receiving such a request, the Secretary shall request the President of the NSW Division of the Australian Property Institute to appoint a qualified independent valuer or Fellow of the Institute, to consider submissions from both parties, and determine a fair and reasonable acquisition price for the land, and/or terms upon which the land is to be acquired.

Within 14 days of receiving the independent valuer's determination, the Proponent shall make a written offer to purchase the land at a price not less than the independent valuer's determination.

If the landowner refuses to accept this offer within six months of the date of the Proponent's offer, the Proponent's obligations to acquire the land shall cease, unless otherwise agreed by the Secretary.

2.23 The Proponent shall bear the costs of any valuation or survey assessment requested by the independent valuer or the Secretary and the costs of determination referred to above.

2.24 If the Proponent and landowner agree that only part of the land shall be acquired, then the Proponent shall pay all reasonable costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of the plan at the Office of the Registrar-General.

2.25 The Proponent shall provide written notice to all landowners that are entitled to rights under conditions 2.19 and 2.20 within 21 days of determining the landholdings where additional noise mitigation measures or land acquisition apply. For the purpose of condition 2.20b), this condition only applies where operational noise levels have been confirmed in accordance with the definition in condition 2.19.

A.2 ENVIRONMENT PROTECTION LICENCE

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

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

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

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

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

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

L6 Hours of operation

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

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

A.3 NOISE MONITORING PLAN

6.3 Noise and vibration management sub-plan

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

Relevant aspect/impact	Management and mitigation measures	Source of requirement	Frequency	Relevant records	Responsibility
On site truck noise attenuation	▪ Drivers shall obey all existing haul road speed limits (i.e. maximum of 80 km/h) and be instructed to avoid using compression braking where feasible.	OEMP	Daily	Site Inspection checklist	Contractor
	▪ Trucks shall travel on a one-way system to minimise the need for reversing and/or queuing of vehicles.	CoA 2.16	Daily	Site inspection checklist	Contractor
	▪ Noise reduction techniques applied to trucks shall be routinely inspected and maintained to ensure required operational efficiency.	OEMP	As required by manufacturers or following complaints	Site Inspection checklist	Contractor
Monitoring and assessment of noise compliance	▪ A review of the noise performance of the Wallerawang Ash Repositories operations shall be undertaken to assess compliance with the prescribed noise criterion of 40dB(A) $L_{Aeq,\ 15min}$ at the nearest noise sensitive receivers. Note: Refer to the Noise and Vibration Management Plan, Appendix A for further details.	CoA 3.2	Complete	Operational Noise Review report	EnergyAustralia NSW
	▪ Based on the results of the operational noise review (above), a comprehensive noise risk matrix shall be developed to provide key response actions that will proactively avoid or minimise noise impacts at the noise sensitive receivers. Note: Refer to the Noise and Vibration Management Plan, Appendix A.	OEMP	Complete	Noise Risk Matrix	EnergyAustralia NSW / Contractor
	▪ Observed attended noise monitoring throughout the initial 60 day reporting period shall be undertaken at sensitive receivers as outlined in the Operational Noise and Vibration and Management Plan, Appendix A. Note: Refer to the Noise and Vibration Management Plan, Appendix A for further details.	OEMP	For 4 separate days within the initial 60 day reporting period	Report to EPA	EnergyAustralia NSW
	▪ Observed attended noise monitoring and assessment of compliance of operations shall be undertaken at sensitive receivers on a periodic basis, or as a result of a complaint or due to changes in operations. Note: Refer to the Noise and Vibration Management Plan, Appendix A for further details.	CoA 6.3b)	As required in response to complaints or change in operations.	6 monthly noise monitoring reports	Specialist Consultant

Relevant aspect/impact	Management and mitigation measures	Source of requirement	Frequency	Relevant records	Responsibility
Monitoring and assessment of noise compliance	▪ Attended ambient noise monitoring shall take place at a maximum of 5 residential receiver locations (incl. Skelly Road, Neubeck Street, Wolgan Road and Maddox Lane) and shall provide periodic 15-minute ambient noise levels. Note: Refer to the Noise and Vibration Management Plan, Appendix A for further details.	OEMP	During daytime (7am-6pm) and evening time (6pm-10am) for one day	6 monthly noise monitoring reports	EnergyAustralia NSW / Specialist Consultant
	▪ Where non-compliance with the 40 dB(A) $L_{Aeq, 15min}$ noise criterion is identified through noise monitoring a further assessment of feasible noise management and mitigation measures shall be undertaken and implemented. Note: Refer to the Noise and Vibration Management Plan, Appendix A for further details.	CoA 2.18	As required	6 monthly noise monitoring reports	EnergyAustralia NSW / Specialised Consultant
	▪ Any identified non-compliance shall be reported to the Secretary within 14 days of completion of all noise monitoring works.	CoA 3.1	As required	Report to Secretary	EnergyAustralia NSW
	▪ A log of noise related incidents shall be kept at the premises. The log shall record all noise complaints, including location, action carried out and outcomes of investigations and measures implemented.	OEMP	As required	Noise incident log	EnergyAustralia NSW
	▪ The noise management log shall be reviewed on a periodic basis to determine trends.	OEMP	Annually	Noise incident log	EnergyAustralia NSW
	▪ In the event of a noise related complaint associated with the operation of Wallerawang Ash Repositories activities, an assessment of received noise influence and potential mitigation measures shall be undertaken. Note: Refer to the Noise and Vibration Management Plan, Appendix A for further details.	OEMP	As required	Noise incident log	EnergyAustralia NSW / Contractor
	▪ The Noise and Vibration Management Plan shall be reviewed every 5 years.	OEMP	Every 5 years	Noise Management Sub-Plan revision	EnergyAustralia NSW
Reporting	▪ EnergyAustralia shall submit for the approval of the Secretary an Operational Noise Review within 60 days of the Commencement of Stage 2 operations. The review shall be prepared in consultation with the EPA.	CoA 3.2	Complete	Operational Noise Review	EnergyAustralia NSW

Relevant aspect/impact	Management and mitigation measures	Source of requirement	Frequency	Relevant records	Responsibility
Reporting	▪ EnergyAustralia NSW shall prepare in consultation with the EPA, a Noise Monitoring Program to assess compliance against operational noise criterion throughout the life of the Wallerawang Ash Repositories.	CoA 3.3	Throughout Stage 2 works	Noise Monitoring Program	EnergyAustralia NSW
	▪ A report shall be forwarded to the Secretary and the EPA within 14 days of the noise assessment should any non-compliance occur relating to ongoing operational noise monitoring.	CoA 3.3	As required	Report to Secretary and EPA	EnergyAustralia NSW
	▪ In the case of non-compliance, a report shall be provided to the Secretary within 60 days of completion of monitoring works. Feasible noise mitigation measures shall be considered in the report.	CoA 2.18	Within 60 days of completion of monitoring works, where non-compliance of noise criterion is identified	Report to Secretary	EnergyAustralia NSW / Specialist Consultant
	▪ The criterion to limit cumulative operational noise levels to below 40 dB(A) $L_{Aeq\ 15\ min}$ does not apply where EnergyAustralia NSW and the potentially affected landowner have reached a negotiated agreement in regard to noise and a copy of this agreement has been forwarded to the Secretary and the EPA.	CoA 2.15	As required	Noise level agreement between EnergyAustralia NSW and Landowner	EnergyAustralia
	▪ The Annual Review will be submitted to the Secretary complete with noise monitoring data gathered throughout the year.	CoA 7.3	Annually	Annual Review	EnergyAustralia NSW

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C20331

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	01070590
Microphone Serial Number :	08184
Pre-amplifier Serial Number :	52329

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	21.1°C	**Ambient Temperature :**	21.8°C
Relative Humidity :	57.8%	**Relative Humidity :**	56.5%
Barometric Pressure :	101.27kPa	**Barometric Pressure :**	101.17kPa

Calibration Technician : Jeff Yu
Calibration Date : 11 Jun 2020
Secondary Check: Max Moore
Report Issue Date : 15 Jun 2020
Approved Signatory : Ken Williams

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

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13dB*	*Temperature*	*±0.2°C*
1kHz	*±0.13dB*	*Relative Humidity*	*±2.4%*
8kHz	*±0.14dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests	*±0.10dB*		

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

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

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

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

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

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Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C20332

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 74813

Atmospheric Conditions
Ambient Temperature : 21.5°C
Relative Humidity : 56.9%
Barometric Pressure : 101.46kPa

Calibration Technician : Jeff Yu
Calibration Date : 10 Jun 2020
Secondary Check: Max Moore
Report Issue Date : 15 Jun 2020

Approved Signatory : Ken Williams

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

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	93.96	1000.30

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.09%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.09%*	*Barometric Pressure*	*±0.013kPa*

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

* The tests <1000 kHz are not covered by Acoustic Research Labs Pty Ltd NATA accreditation

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

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

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

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PAGE 1 OF 1

Kerosene Vale Ash Repository

Environmental Noise Monitoring

Quarter 1 2022

Prepared for

Generator Property Management Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Kerosene Vale Ash Repository

Environmental Noise Monitoring Quarter 1 2022

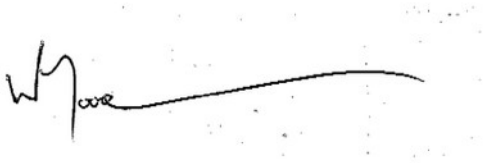
Reference: 22069_R01
Report date: 30 March 2022

Prepared for

Generator Property Management Pty Ltd
PO Box 132
Budgewoi NSW 2262

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Will Moore Consultant	QA Review:	Jesse Tribby Consultant

Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Generator Property Management Pty Ltd to conduct a quarterly noise survey of operations at Kerosene Vale Ash Repository (KVAR). The purpose of the survey was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the day and evening periods of 22 March 2022 at a total of three monitoring locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown in Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: MONITORING LOCATIONS

Site Reference	Description
Location A	Skelly Road, Lidsdale NSW
Location B	Corner Sawyers road and Skelly Road, Lidsdale NSW
Location C	End of Nuebeck Street, Lidsdale NSW

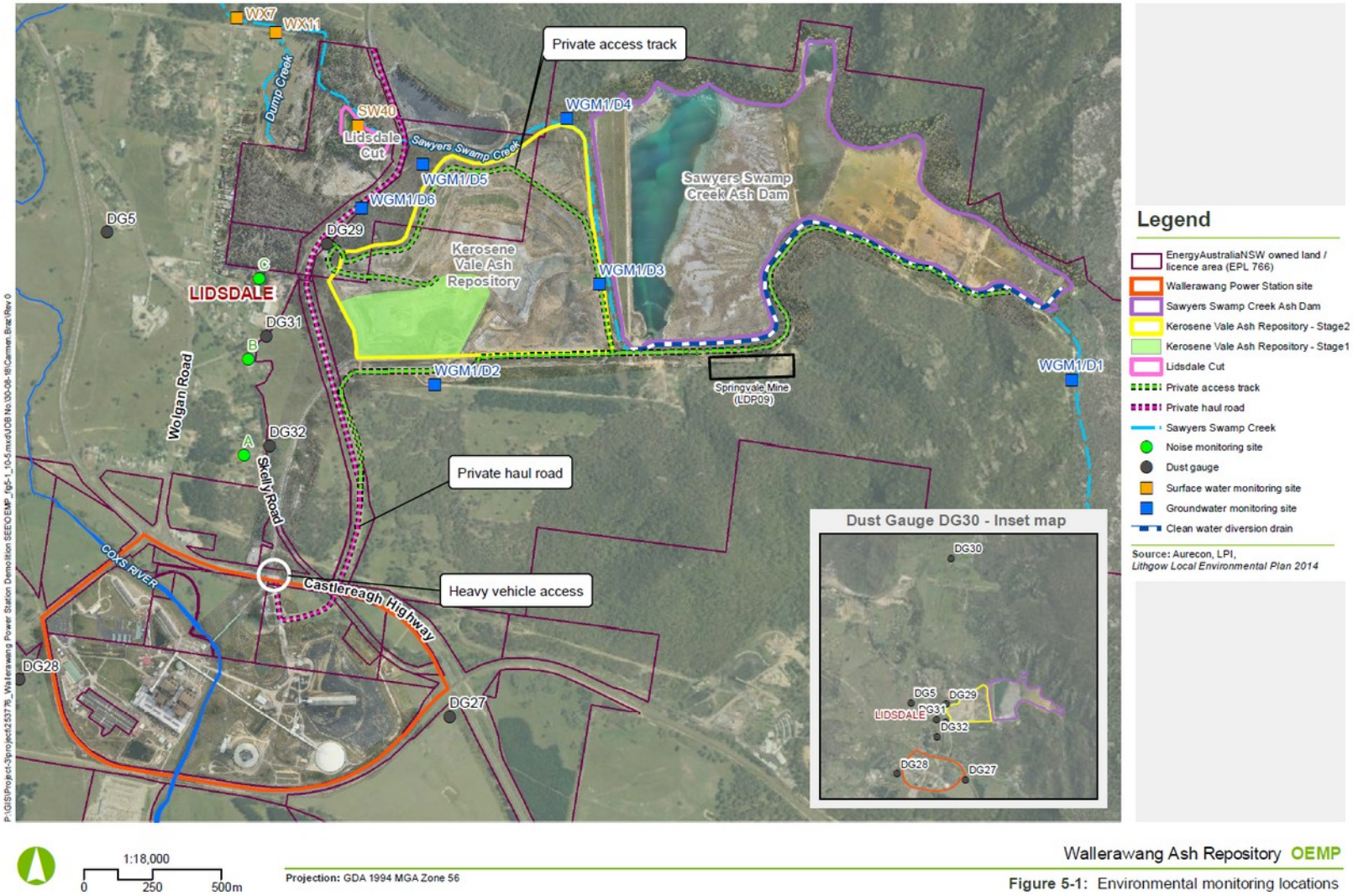


Figure 1: KVAR Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise.
L_{Amax}	The maximum A-weighted noise level over a time period.
L_{A1}	The noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The noise level which is exceeded for 10 percent of the time.
L_{Aeq}	The average noise A-weighted energy during a measurement period.
L_{A50}	The noise level which is exceeded for 50 per cent of the time and the median noise level during a measurement period.
L_{A90}	The level exceeded for 90 percent of the time. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
SC	Stability class (or category) is determined from measured wind speed and either sigma-theta or VTG.
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	This is the period 7:00am to 6:00pm.
Evening	This is the period 6:00pm to 10:00pm.
Night	This is the period 10:00pm to 7:00am.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Development Consent

The current development consent for KVAR is MP07_0005 (MOD 1, August 2018). Section 2 of the KVAR development consent details specific conditions relating to noise generated by KVAR. Relevant sections of the KVAR development consent are reproduced in Appendix A.

2.2 Environment Protection Licence

KVAR holds Environment Protection Licence (EPL) No. 21185 issued by the Environment Protection Authority (EPA) on 27 January 2022. Relevant sections of the EPL are reproduced in Appendix A.

2.3 Noise Management Plan

The KVAR Operational Environmental Management Plan (OEMP) was most recently updated in October 2018. Section 6.3 of the OEMP contains an Operational Noise and Vibration Management Plan as an appendix. Relevant sections of the OEMP are reproduced in Appendix A.

2.4 Noise Criteria

Noise criteria detailed in Table 2.1 have been adopted for each monitoring location based on the EPL.

Table 2.1: KVAR OPERATIONAL NOISE CRITERIA, dB(A)

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$
All residences	40	40

2.5 Meteorological Conditions

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

a) *wind speeds up to 3 m/s at 10 metres height above ground; and/or*

b) *temperature inversion conditions of up to 3C/100m, (or alternatively stability category F temperature inversion conditions) and source to receiver gradient winds of up to 2m/s at 10 metres 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 KVAR operations solely during the day and evening

periods, it has been assumed that temperature inversion conditions were not present during monitoring.

2.6 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017. For assessment of modifying factors, the NPfI immediately superseded the 'Industrial Noise Policy' (INP, 2000), as outlined in the EPA document 'Implementation and transitional arrangements for the Noise Policy for Industry' (2017). Assessment and reporting of modifying factors has been undertaken in accordance with Fact Sheet C of the NPfI.

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', relevant NSW EPA requirements, and the OEMP.

3.2 Attended Noise Monitoring

During this survey, attended monitoring was undertaken during the day and evening period at each location. The duration of each measurement was 15 minutes. Atmospheric condition measurement was also undertaken at each monitoring location.

This survey presents noise levels gathered during attended monitoring that are the result of many sounds reaching the sound level meter microphone during monitoring. Received levels from various noise sources were noted during attended monitoring and particular attention was paid to the extent of KVAR's contribution, if any, to measured levels. At each receptor location, KVAR's $L_{Aeq,15minute}$ (in the absence of any other noise) was measured directly, where possible, or, determined by frequency analysis.

If the exact contribution of the source of interest (in this case KVAR) cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise descriptors in accordance with Section 7.1 of the NPfI. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted as NM in this report are due to one or more of the following reasons:

- Site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- Site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- It was not feasible, nor reasonable to employ methods such as move closer and back calculate. Cases may include, but are not limited to, 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.

Often extraneous noise events (for example, road traffic pass-bys and dogs) interfere with the measurement of site noise levels in the frequency range of interest. Where required, the sound level meter is paused during these occurrences to aid in quantification of the site only noise.

3.3 Modifying Factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable, such that the site-only L_{Aeq} was not "NM" or less than a maximum cut off value (e.g. "<20 dB" or "<30dB").

If applicable, modifying factors have been reported and added to measured site-only L_{Aeq} noise levels when meteorological conditions satisfied requirements for site noise criteria to be applicable. Low-frequency modifying factors have only been applied to site-only L_{Aeq} levels if KVAR was the only contributing low-frequency noise source.

3.4 Attended Noise Monitoring Equipment

Equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are provided in Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	00701424	02/06/2023
Pulsar 106 acoustic calibrator	79631	26/05/2023

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – QUARTER 1 2022 [1]

Location	Start Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A50} dB	L_{A90} dB	L_{Amin} dB
				Day				
A	22/03/2022 14:27	59	49	40	39	37	34	31
B	22/03/2022 13:57	55	47	43	40	39	35	33
C	22/03/2022 13:30	60	51	47	44	43	41	37
				Evening				
A	22/03/2022 19:00	70	70	70	65	61	36	31
B	22/03/2022 18:30	71	58	46	46	37	32	27
C	22/03/2022 18:06	67	55	42	43	34	31	28

Notes:

1. *Levels in this table are not necessarily the result of activity at KVAR.*

4.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.3 Attended Noise Monitoring

Table 4.2 details noise levels from KVAR in the absence of other noise sources. Noise criteria are applicable if weather conditions during the measurement were within parameters outlined in the KVAR development consent and EPL.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY KVAR AGAINST NOISE CRITERIA – QUARTER 1 2022

Location	Start Date and Time	Wind Speed m/s	Criterion $L_{Aeq,15min}$ dB	Criterion Applies? [1,2]	KVAR $L_{Aeq,15min}$ dB [3]	Exceedance [4,5]
			Day			
A	22/03/2022 14:27	0.6	40	Yes	IA	Nil
B	22/03/2022 13:57	1.9	40	Yes	IA	Nil
C	22/03/2022 13:30	0.6	40	Yes	IA	Nil
			Evening			
A	22/03/2022 19:00	0.0	40	Yes	IA	Nil
B	22/03/2022 18:30	0.0	40	Yes	IA	Nil
C	22/03/2022 18:06	0.0	40	Yes	IA	Nil

Notes:

1. *Meteorological conditions required for noise criteria to apply are detailed in Section 2.5;*
2. *Meteorological data required to determine temperature inversion conditions was not available. It has been assumed that temperature inversion conditions were not present during monitoring;*
3. *Site-only $L_{Aeq,15minute}$ attributed to KVAR, including modifying factors if applicable;*
4. *Bold results in red indicate an exceedance of relevant criterion; and*
5. *NA in exceedance column means meteorological conditions outside conditions specified in Section 2.5.*

4.4 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.3. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.3: MEASURED ATMOSPHERIC CONDITIONS – QUARTER 1 2022

Location	Start Date and Time	Temperature ° C	Wind Speed m/s	Wind Direction ° Magnetic North [1]	Cloud Cover 1/8s
		Day			
A	22/03/2022 14:27	28	0.9	30	2
B	22/03/2022 13:57	30	0.7	30	1
C	22/03/2022 13:30	29	1.4	54	1
		Evening			
A	22/03/2022 19:00	23	0.0	-	0
B	22/03/2022 18:30	25	0.0	-	1
C	22/03/2022 18:06	26	0.0	-	1

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the Marrangaroo AWS.

5 DISCUSSION

5.1 Noted Noise Sources

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

An example is provided as Figure 2 where it can be seen that frogs and insects are generating noise at frequencies above 1000 Hz while mining noise is at frequencies less than 1000 Hz, which is typical. Adding levels at frequencies that relate to mining only allows separate statistical results to be calculated. This analysis cannot always be performed if there are significant levels of other noise at the same frequencies as mining, such as dogs, cows, or (most commonly) road traffic.

It should be noted that the method of summing statistical values up to a cut-off frequency can overstate the L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

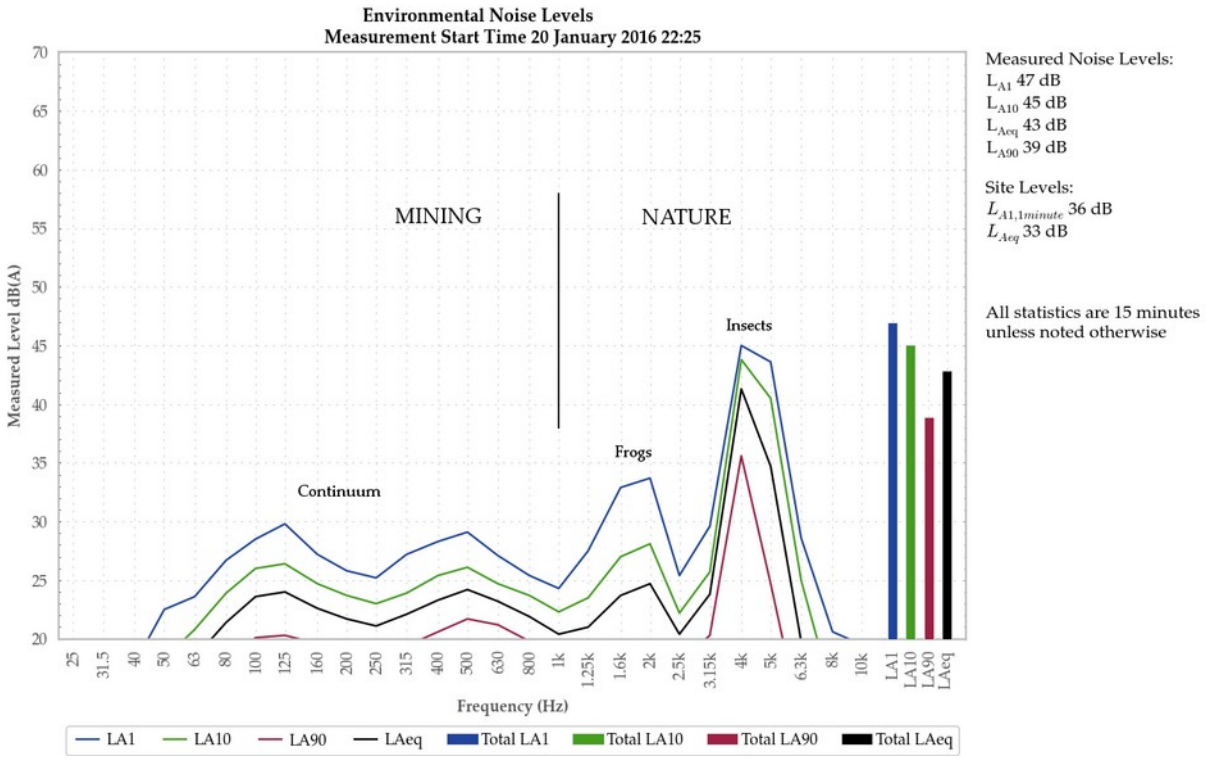


Figure 2: Example Graph (refer to section 5.1 for explanatory note)

5.1.1 Location A – Day

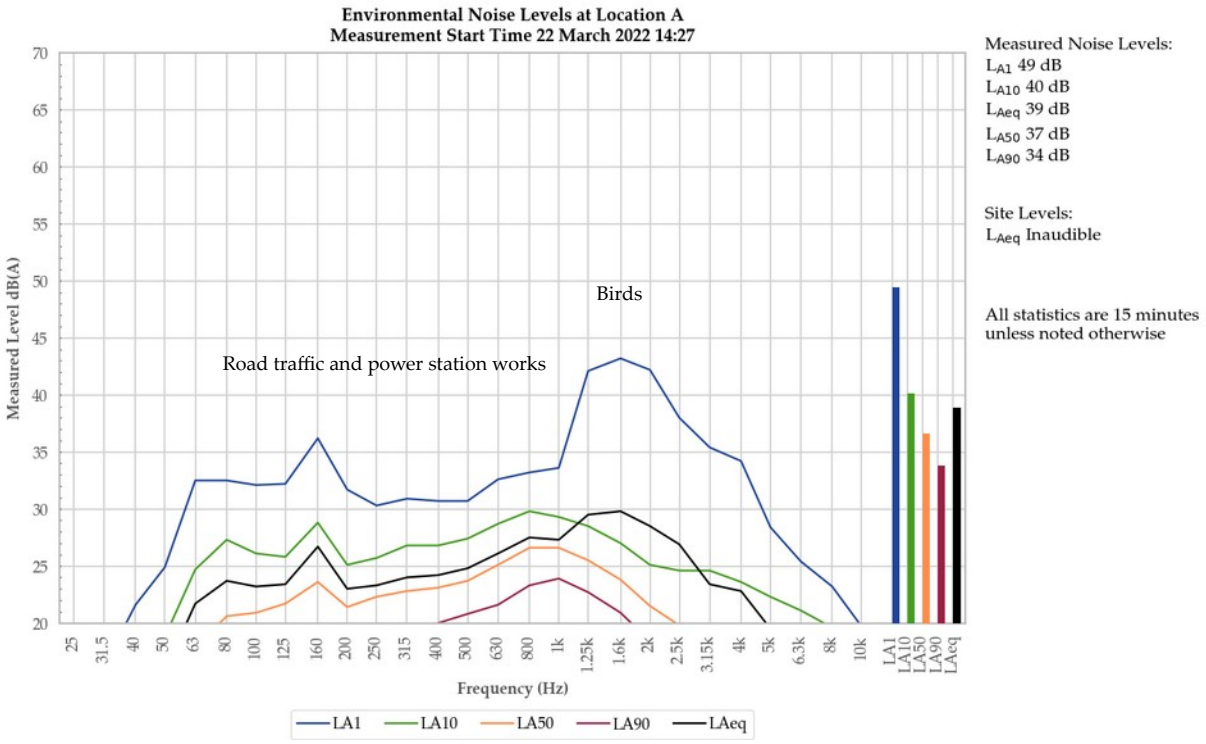


Figure 3: Environmental Noise Levels, Location A

KVAR was inaudible during the measurement.

Birds were responsible for the measured L_{A1}. Birds, power station maintenance, and road traffic generated the measured L_{A10} and L_{Aeq}. Road traffic noise was responsible for the measured L_{A50} and L_{A90}.

Breeze in the foliage was also noted.

5.1.2 Location A – Evening

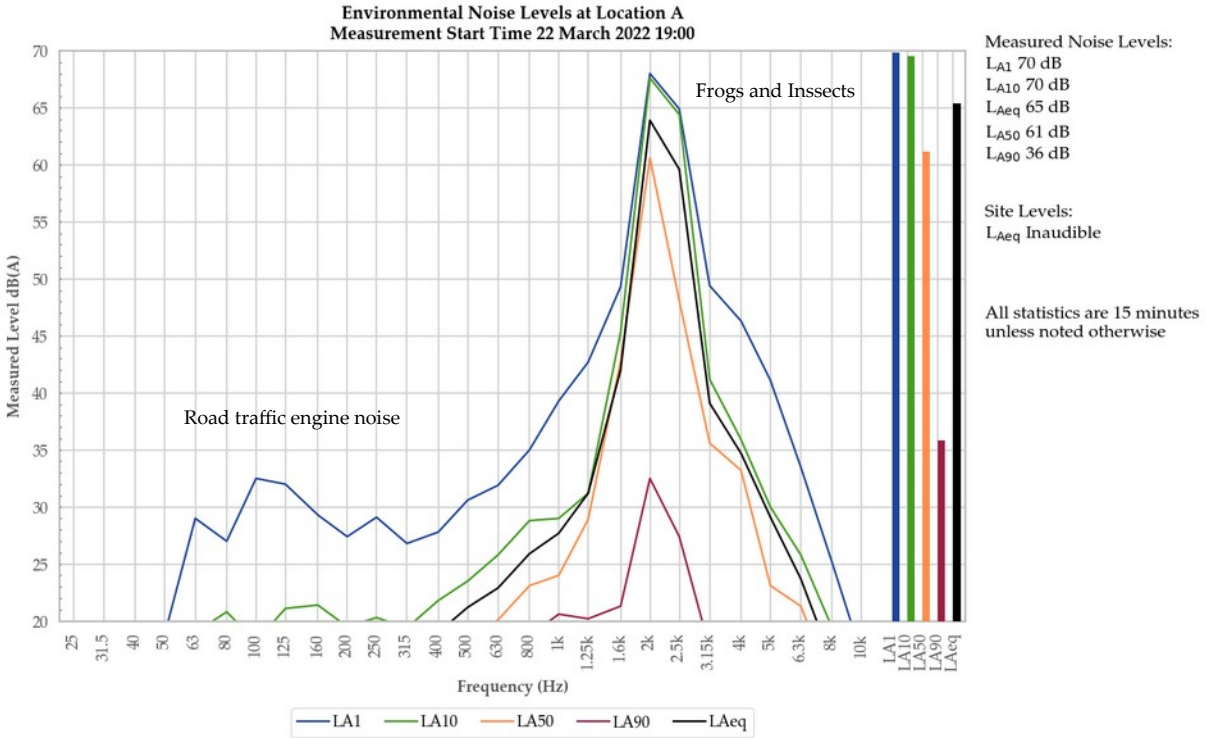


Figure 4: Environmental Noise Levels, Location A

KVAR was inaudible during the measurement.

Frogs and insects were responsible for the measured noise levels.

Road traffic, birds and a dog were also noted.

5.1.3 Location B – Day

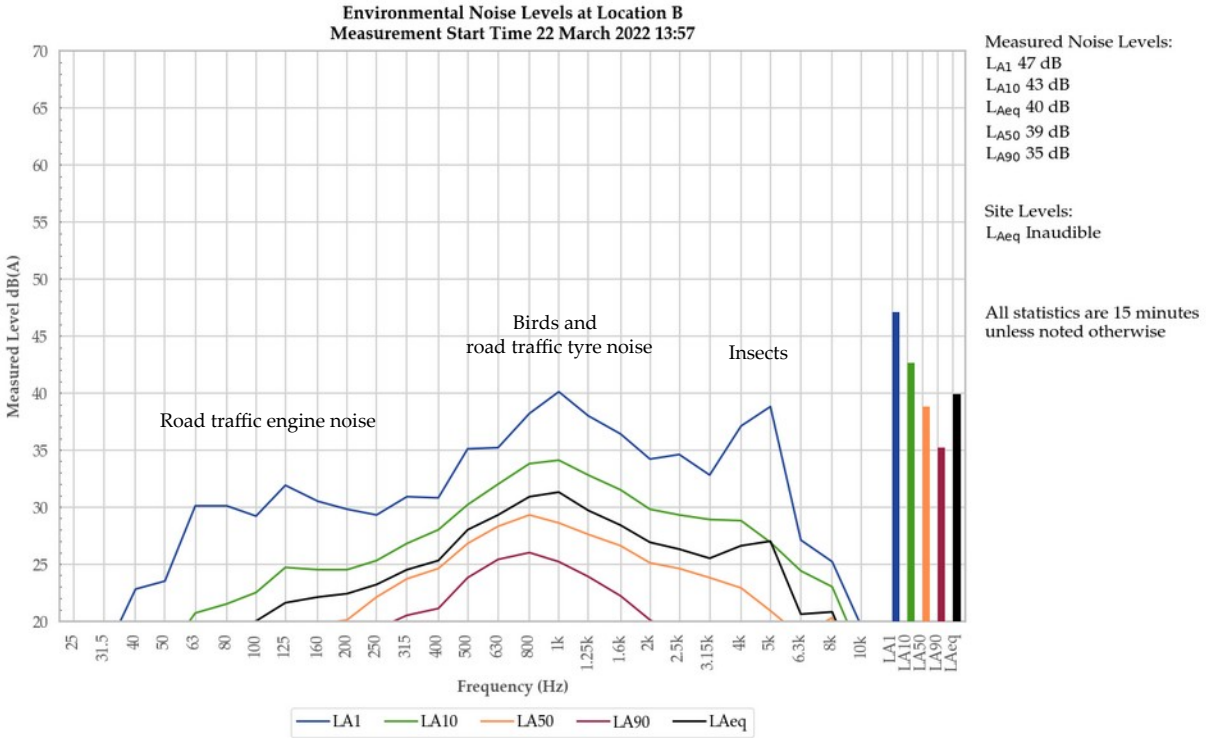


Figure 5: Environmental Noise Levels, Location B

KVAR was inaudible during the measurement.

Birds and insects were responsible for the measured L_{A1} and contributed to the measured L_{A10} and L_{Aeq}. Road traffic also contributed to the measured L_{A10} and L_{Aeq}, and was responsible for the measured L_{A50} and L_{A90}.

Breeze in the foliage, local impacts and a dog were also noted.

5.1.4 Location B – Evening

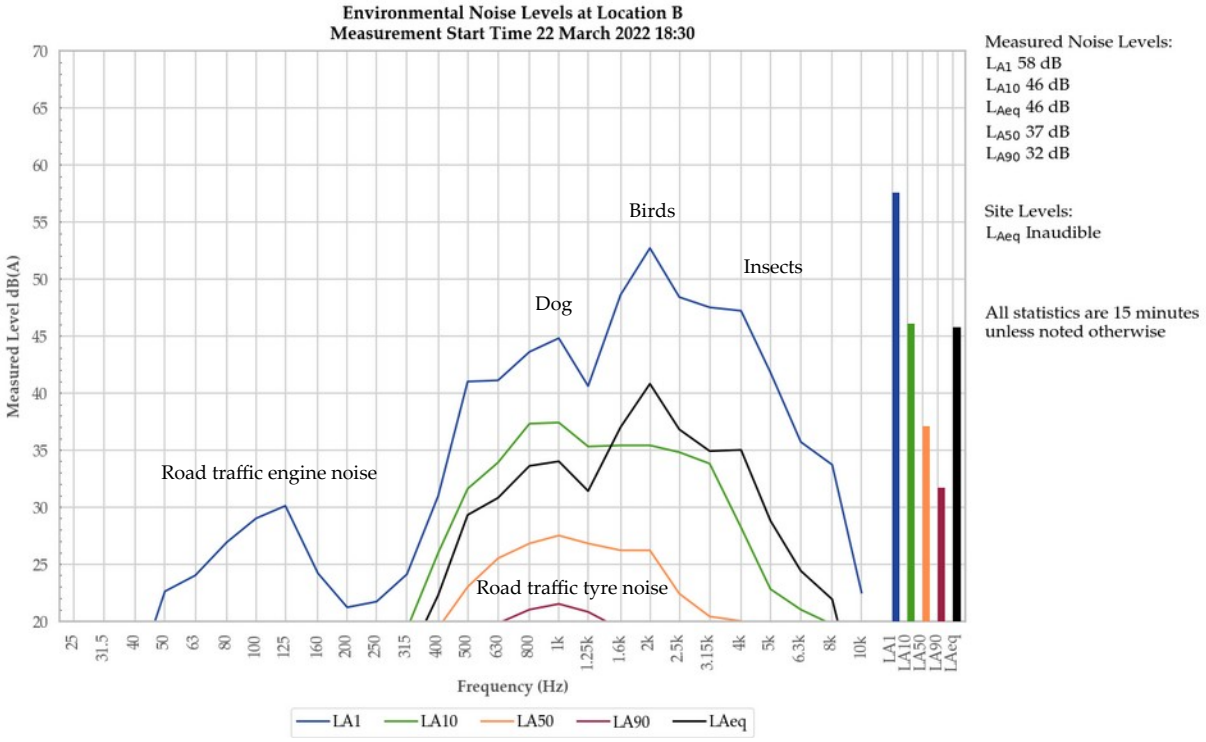


Figure 6: Environmental Noise Levels, Location B

KVAR was inaudible during the measurement.

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

5.1.5 Location C – Day

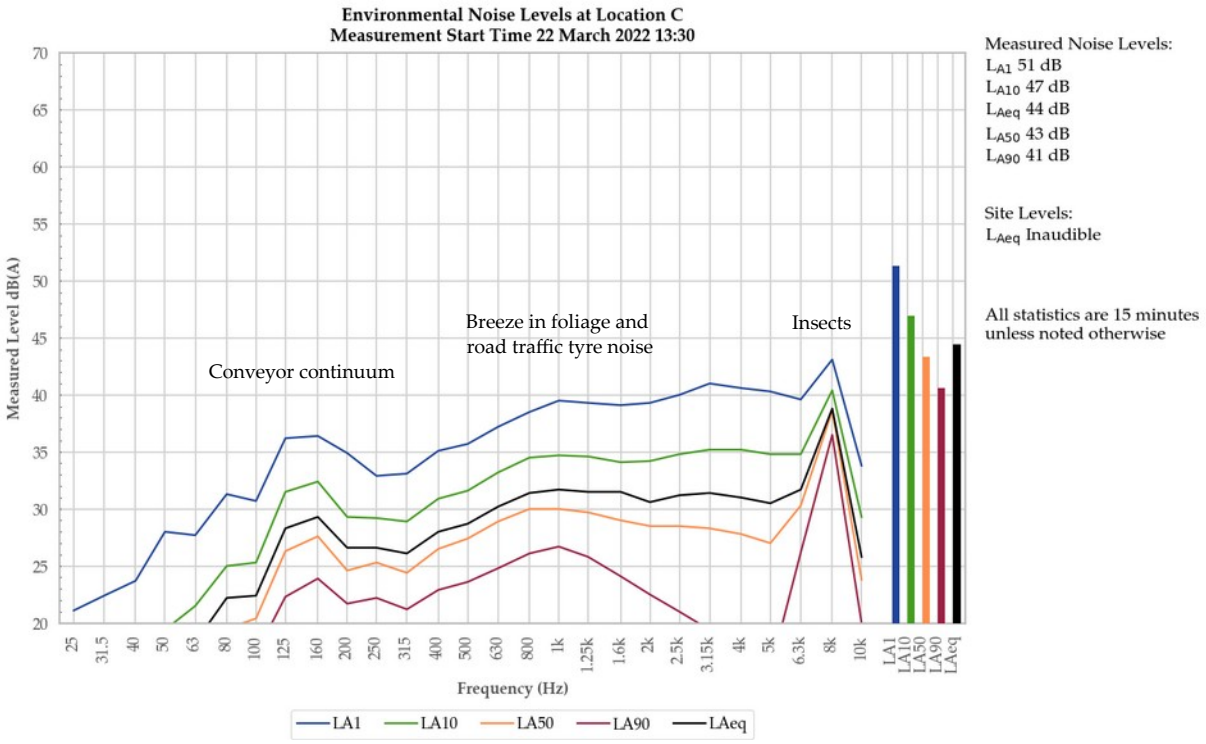


Figure 7: Environmental Noise Levels, Location C

KVAR was inaudible during the measurement.

Insects were primarily responsible for the measured noise levels. Breeze in foliage and road traffic tyre noise contributed to the measured L_{A10}, L_{Aeq}, and L_{A50}.

Continuum from conveyors, aircraft, birds, and dogs were also noted.

5.1.6 Location C – Evening

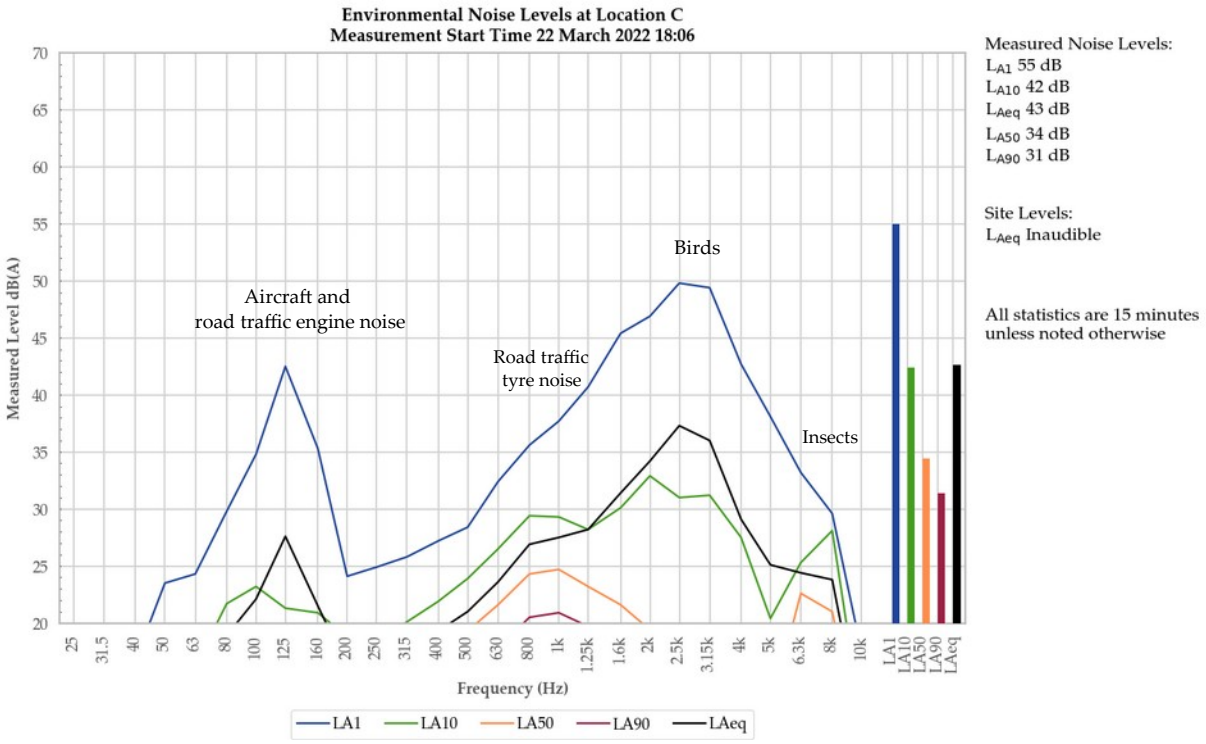


Figure 8: Environmental Noise Levels, Location C

KVAR was inaudible during the measurement.

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

Aircraft and dogs were also noted.

6 SUMMARY

Global Acoustics was engaged by Generator Property Management Pty Ltd to conduct a quarterly noise survey of operations at KVAR. The purpose of the survey was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the day and evening periods of 22 March 2022 at a total of three monitoring locations.

Noise levels from KVAR complied with relevant criteria at all monitoring locations during the Quarter 1 2022 survey. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 KVAR DEVELOPMENT CONSENT

Noise Impacts

Construction Hours

2.3 Construction activities associated with the project shall only be undertaken during the following hours:
- a) 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;
- b) 8:00 am to 1:00 pm on Saturdays; and
- c) at no time on Sundays or public holidays.

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

2.5 Construction outside the hours stipulated in condition 2.3 of this approval is permitted in the following circumstances:
- a) where construction works do not cause audible noise at any sensitive receiver; or
- b) for the delivery of materials required outside these hours by the Police or other authorities for safety reasons; or
- c) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

2.6 The hours of construction activities specified under condition 2.3 of this approval may be varied with the prior written approval of the Secretary. Any request to alter the hours of construction specified under condition 2.3 shall be:
- a) considered on a case-by-case basis;
- b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours; and
- c) accompanied by any information necessary for the Secretary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of sensitive receivers in the vicinity of the site.

Construction Noise

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

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

Operational Noise

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

This noise criterion applies under the following meteorological conditions:

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

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

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

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

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

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

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

3. ENVIRONMENTAL MONITORING

Construction Noise Monitoring

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

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

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

Operational Noise Review

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

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

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

Ongoing Operational Noise Monitoring

3.3 The 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 in consultation 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 of conducting a noise assessment.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, approval, the 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.

A.2 ENVIRONMENT PROTECTION LICENCE

L5 Noise limits

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

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

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

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

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

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

L6 Hours of operation

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

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

A.3 NOISE MONITORING PLAN

5.2 Environmental monitoring program

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

Table 5-1 Environmental monitoring program

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

6.3 Noise and vibration management sub-plan

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

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C21344

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	00701424
Microphone Serial Number :	01916
Pre-amplifier Serial Number :	01463

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	20.6°C	**Ambient Temperature :**	22.4°C
Relative Humidity :	47%	**Relative Humidity :**	44%
Barometric Pressure :	101.05kPa	**Barometric Pressure :**	100.91kPa

Calibration Technician : Jeff Yu
Calibration Date : 2 Jun 2021
Secondary Check: Harrison Kim
Report Issue Date : 2 Jun 2021

Approved Signatory : Ken Williams

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

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.12dB*	*Temperature*	*±0.2°C*
1kHz	*±0.11dB*	*Relative Humidity*	*±2.4%*
8kHz	*±0.13dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests	*±0.10dB*		

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

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

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

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

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

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Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C21341

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 79631

Atmospheric Conditions
Ambient Temperature : 22.7°C
Relative Humidity : 47.5%
Barometric Pressure : 100.64kPa

Calibration Technician : Jeff Yu
Calibration Date : 26 May 2021
Secondary Check: Harrison Kim
Report Issue Date : 26 May 2021
Approved Signatory : Ken Williams

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

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.02	1000.40

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.09%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.09%*	*Barometric Pressure*	*±0.015kPa*

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

* The tests <1000 kHz are not covered by Acoustic Research Labs Pty Ltd NATA accreditation.

NATA
WORLD RECOGNISED ACCREDITATION

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

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
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Global Acoustics

NOW PART OF EMM

creating opportunities

Kerosene Vale Ash Repository

Environmental Noise Monitoring

Quarter 2 2022

Prepared for Generator Property Management Pty Ltd

Kerosene Vale Ash Repository

Environmental Noise Monitoring

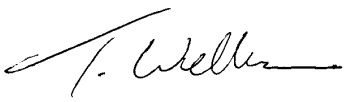
Quarter 2 2022

Generator Property Management Pty Ltd

E220482 RP1

Version	Date	Prepared by	Approved by	Comments
1.0	27/06/2022	Will Moore	Tony Welbourn	Final

Approved by



Tony Welbourn
Associate Director
27 June 2022

Level 3 175 Scott Street
Newcastle NSW 2300

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Appendices

Tables

Figures

1 Introduction

1.1 Background

Global Acoustics was engaged by Generator Property Management Pty Ltd to conduct a quarterly noise survey of operations at Kerosene Vale Ash Repository (KVAR). The purpose of the survey was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the day and evening periods of 19/20 May 2022 at a total of three monitoring locations.

1.2 Monitoring locations

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

Table 1.1 Monitoring Locations

Site Reference	Discription
Location A	Skelly Road, Lidsdale NSW
Location B	Corner Sawyers Road and Skelly Road, Lidsdale NSW
Location C	End of Nuebeck Street, Lidsdale NSW

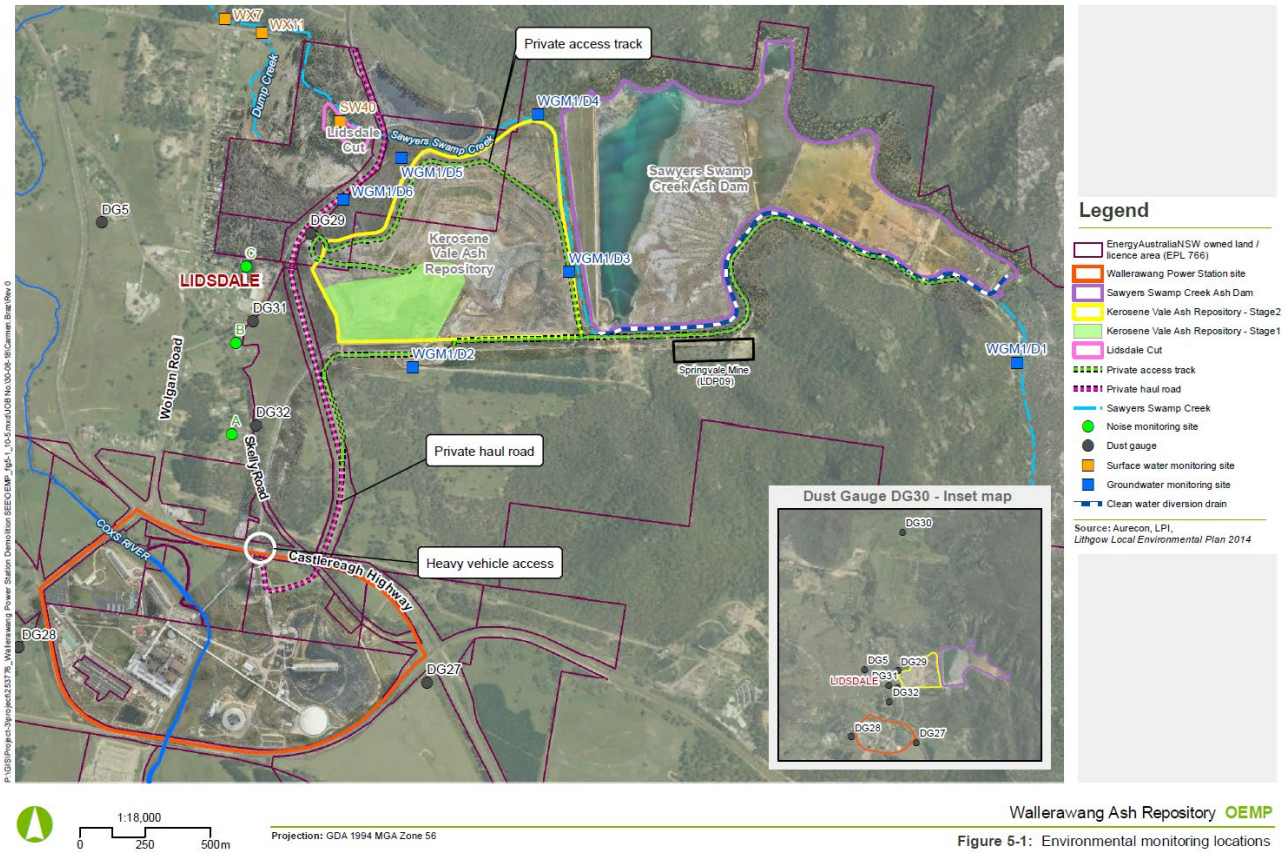

Figure 1.1 Kerosene Vale Ash Repository - Environmental noise monitoring locations

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 describe human response to noise.
L_{Amax}	The maximum A-weighted noise level over a time period.
L_{A1}	The noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The noise level which is exceeded for 10 percent of the time.
L_{Aeq}	The average noise A-weighted energy during a measurement period.
L_{A50}	The noise level which is exceeded for 50 per cent of the time and the median noise level during a measurement period.
L_{A90}	The level exceeded for 90 percent of the time. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
SC	Stability class (or category) is determined from measured wind speed and either sigma-theta or VTG.
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	This is the period 7:00am to 6:00pm.
Evening	This is the period 6:00pm to 10:00pm.
Night	This is the period 10:00pm to 7:00am.

2 Regulatory requirements and noise criteria

2.1 Development consents

The current development consent for KVAR is MP07_0005 (MOD 1, August 2018). Section 2 of the consent details specific conditions relating to noise generated by KVAR. Relevant sections of that document are reproduced in Appendix A.

2.2 Environment protection licence

KVAR holds Environment Protection Licence (EPL) No. 21185 issued by the Environment Protection Authority (EPA) on 27 January 2022. Relevant sections of the EPL are reproduced in Appendix A.

2.3 Noise Management Plan

The KVAR Operational Environmental Management Plan (OEMP) was most recently updated in October 2018. Section 6.3 of the OEMP contains an Operational Noise and Vibration Management Plan as an appendix. Relevant sections of the OEMP are reproduced in Appendix A.

2.4 Noise Criteria

Noise criteria detailed in Table 2.1 have been adopted for each monitoring location based on the EPL.

Table 2.1 KVAR operational noise criteria, dB(A)

Location	Day LAeq,15minute	Evening LAeq,15minute
All residences	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 3C/100m, (or alternatively stability category F temperature inversion conditions) and source to receiver gradient winds of up to 2 m/s at 10 metres height above ground.*

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

2.6 Modifying factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017. For assessment of modifying factors, the NPfI immediately superseded the 'Industrial Noise Policy' (INP, 2000), as outlined in the EPA document 'Implementation and transitional arrangements for the Noise Policy for Industry' (2017). Assessment and reporting of modifying factors has been undertaken in accordance with Fact Sheet C of the NPfI.

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', relevant NSW EPA requirements, and the OEMP.

3.2 Attended noise monitoring

During this survey, attended monitoring was done during the day and evening period at each location. The duration of each measurement was 15 minutes. Atmospheric condition measurements were also made at each monitoring location.

This survey presents noise levels measured during attended monitoring that are the result of many sounds reaching the sound level meter microphone during monitoring. Received levels from various noise sources were noted during attended monitoring and particular attention was paid to the extent of KVAR's contribution, if any, to measured levels. At each receptor location, KVAR's LAeq,15minute (in the absence of any other noise) was measured directly, where possible, or, determined by frequency analysis.

If the exact contribution of the source of interest (in this case KVAR) cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise descriptors in accordance with Section 7.1 of the NPfI. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted as NM in this report are due to one or more of the following reasons:

- Site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- Site noise levels were masked by another relatively loud noise source that is characteristic of the environment (eg breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; or
- It was not feasible, nor reasonable to employ methods such as move closer and back calculate. Cases may include, but are not limited to, 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.

Often extraneous noise events (for example, road traffic pass-bys and dogs) interfere with the measurement of site noise levels in the frequency range of interest. Where required, the sound level meter is paused during these occurrences to aid in quantification of the site only noise.

3.3 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable, such that the site only L_{Aeq} was not “NM” or less than a maximum cut off value (eg “<20 dB” or “<30dB”).

If applicable, modifying factors have been reported and added to measured site-only LAeq noise levels when meteorological conditions satisfied requirements for site noise criteria to be applicable. Low-frequency modifying factors have only been applied to site-only LAeq levels if KVAR was the only contributing low-frequency noise source.

3.4 Attended noise monitoring equipment

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

Table 3.1 Attended noise monitoring equipment

Model	Serial number	Calibration due date
Rion NA-28 sound level meter	00370304	24/11/2022
Pulsar 105 acoustic calibrator	81334	29/11/2023

4 Results

4.1 Total measured noise levels

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

Table 4.1 Measured noise levels – Quarter 2 2022 [1]

Location	Start Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A50} dB	L_{A90} dB	L_{Amin} dB
				Day				
A	20/05/2022 8:31	68	58	52	50	49	46	43
B	20/05/2022 8:10	57	52	49	46	46	43	41
C	20/05/2022 7:48	63	51	47	45	44	42	39
				Evening				
A	19/05/2022 19:30	51	47	44	41	40	38	37
B	19/05/2022 19:50	59	49	43	41	39	37	36
C	19/05/2022 20:10	49	45	42	40	39	38	35

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

4.2 Modifying factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.3 Attended noise monitoring results

Table 4.3, details noise levels from KVAR in the absence of other noise sources. Noise criteria are applicable if weather conditions during the measurement were within parameters outlined in the KVAR development consent and EPL.

Table 4.2 $L_{Aeq,15minute}$ generated by KVAR against noise criteria – Quarter 2 2022

Location	Start Date and Time	Wind Speed m/s	Criterion $L_{Aeq,15min}$ dB	Criterion Applies[1,2]	KVAR $L_{Aeq,15min}$ dB [3]	Exceedance [4, 5]
			Day			
A	20/05/2022 8:31	0.0	40	Yes	IA	Nil
B	20/05/2022 8:10	0.0	40	Yes	NM	Nil
C	20/05/2022 7:48	0.0	40	Yes	NM	Nil
			Evening			
A	19/05/2022 19:30	0.0	40	Yes	IA	Nil
B	19/05/2022 19:50	0.0	40	Yes	IA	Nil
C	19/05/2022 20:10	0.6	40	Yes	IA	Nil

Notes:
1. Meteorological conditions required for noise criteria to apply are detailed in Section 2.5;
2. Meteorological data required to determine temperature inversion conditions was not available. It has been assumed that temperature inversion conditions were not present during monitoring;
3. Site-only $L_{Aeq,15minute}$ attributed to KVAR, including modifying factors if applicable;
4. Bold results in red indicate exceedance of criterion; and
5. NA in exceedance column means atmospheric conditions outside conditions specified in Section 2.5.

4.4 Atmospheric conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.4. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.3 Measured atmospheric conditions – Quarter 2 2022

Location	Start Date and Time	Temperature ° C	Wind Speed m/s	Wind Direction ° Magnetic North [1]	Cloud Cover 1/8s
			Day		
A	20/05/2022 8:31	6	0.0	-	7
B	20/05/2022 8:10	5	0.0	-	6
C	20/05/2022 7:48	5	0.0	-	6
			Evening		
A	19/05/2022 19:30	10	0.0	-	1
B	19/05/2022 19:50	5	0.0	-	1
C	19/05/2022 20:10	5	0.5	85	1

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

Meteorological data used for compliance assessment is sourced from the Marrangaroo AWS.

5 Discussion

5.1 Noted noise sources

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

An example is provided as Figure 5.1 where it can be seen that frogs and insects are generating noise at frequencies above 1000 Hz while mining noise, the source of interest in this example, is at frequencies less than 1000 Hz, which is typical. Adding levels at frequencies that relate to the source of interest only allows separate statistical results to be calculated. This analysis cannot always be performed if there are significant levels of other noise at the same frequencies as the source of interest, such as dogs, cows, or (most commonly) road traffic.

It should be noted that the method of summing statistical values up to a cut-off frequency can overstate the L_{A1} result by a small margin but is entirely accurate for LAeq.

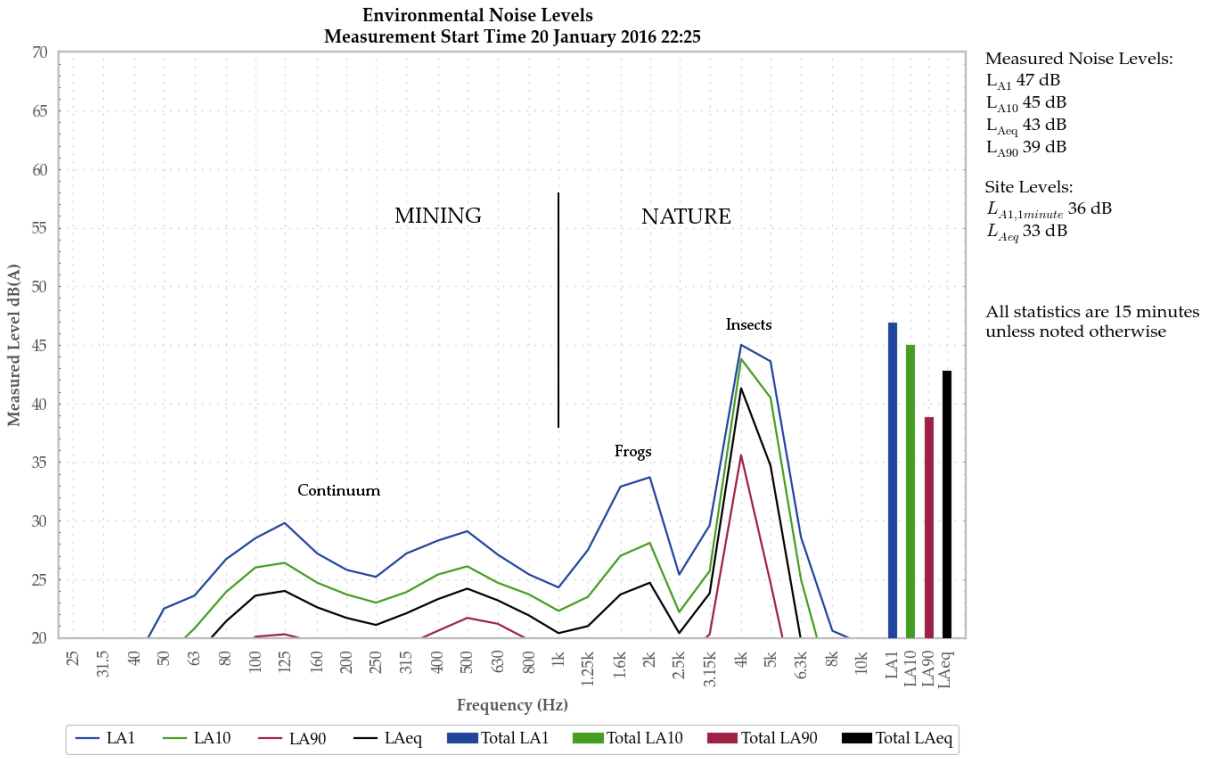

Figure 5.1 Example graph (refer to Section 5.1 for explanatory note)

5.1.1 Location A - Day

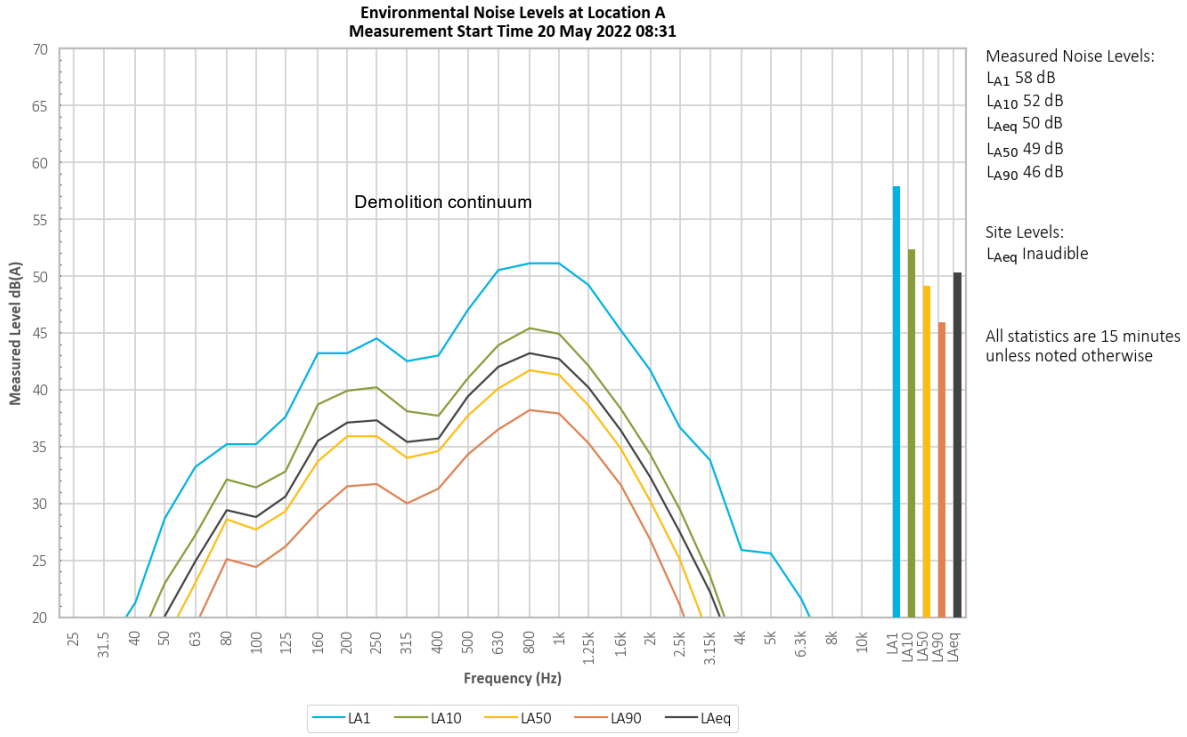

Figure 5.2 Environmental noise levels, Location A

KVAR was inaudible during the measurement.

A demolition continuum was responsible for all measured noise levels.

Noise, from road traffic, and birds, was also noted.

5.1.2 Location A - Evening

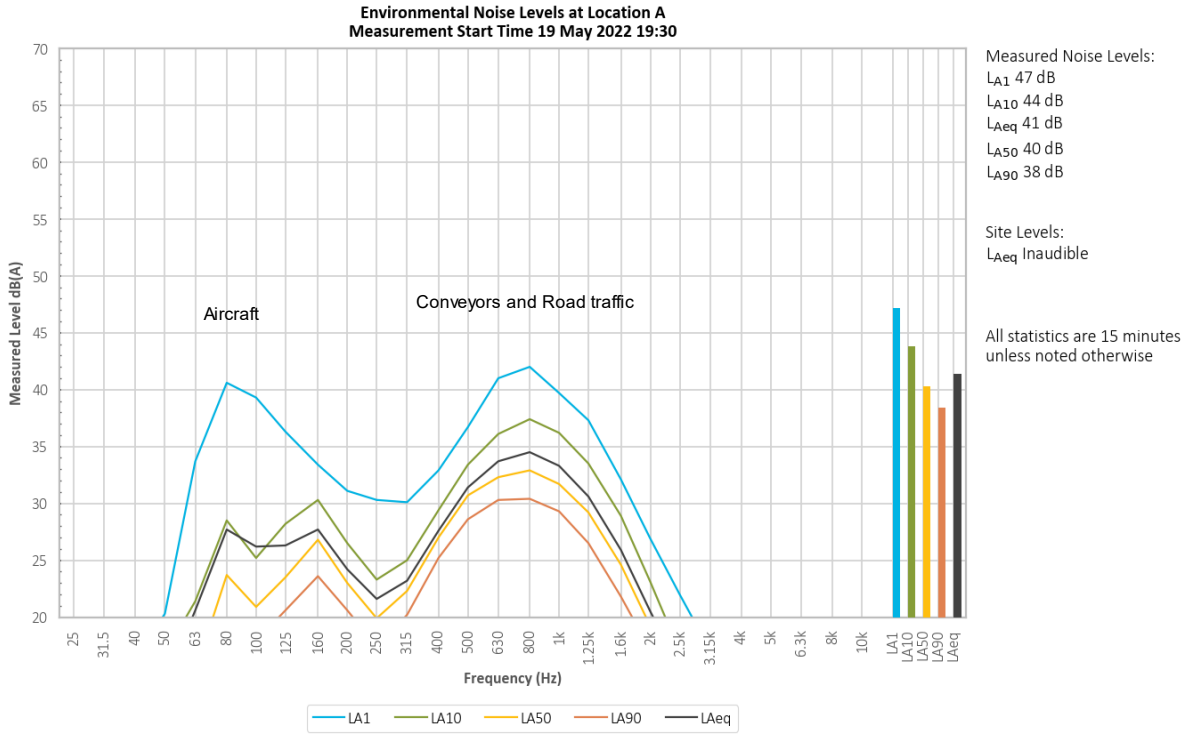

Figure 5.2 Environmental noise levels, Location A

KVAR was inaudible during the measurement.

An aeroplane contributed to the measured L_{A1}. Road traffic was responsible for both the measured L_{A1} and L_{A10} and contributed to the L_{Aeq}. Continuum from conveyors contributed to the measured L_{Aeq} and was responsible for the measured L_{A50} and L_{A90}.

5.1.3 Location B - Day

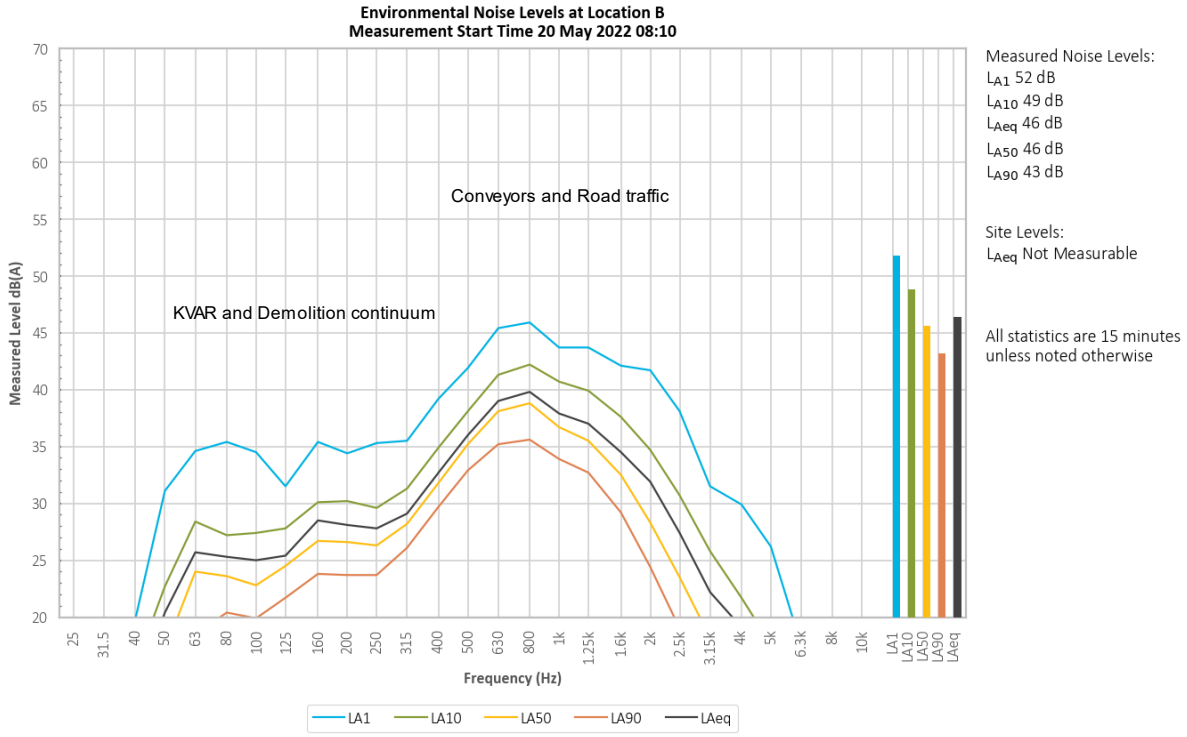

Figure 5.3 Environmental noise levels, Location B

KVAR was not measurable during the measurement, however,engine surges and reverse quackers were noted.

Impacts from demolition, road traffic and birds all contributed to the measured L_{A1} and L_{A10}. Road traffic and conveyors were responsible for the measured L_{Aeq} and L_{A50}. Continuum from conveyers was responsible for the measured L_{A90}.

5.1.4 Location B - Evening

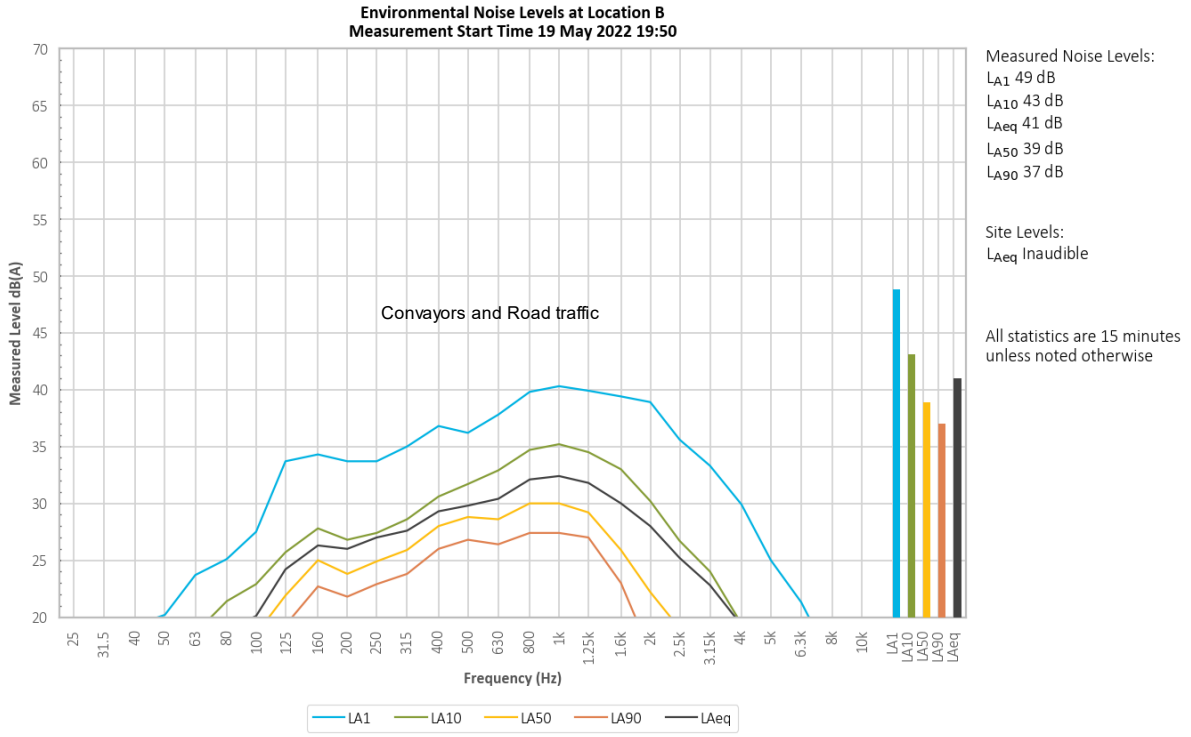

Figure 5.4 Environmental noise levels, Location B

KVAR was inaudible during the measurement.

Road traffic and a delivery truck were responsible for the measured L_{A1} and L_{A10}. Road traffic and continuum from conveyors were responsible for the measured L_{Aeq}, L_{A50}, and L_{A90}.

Noise from people was also noted.

5.1.5 Location C - Day

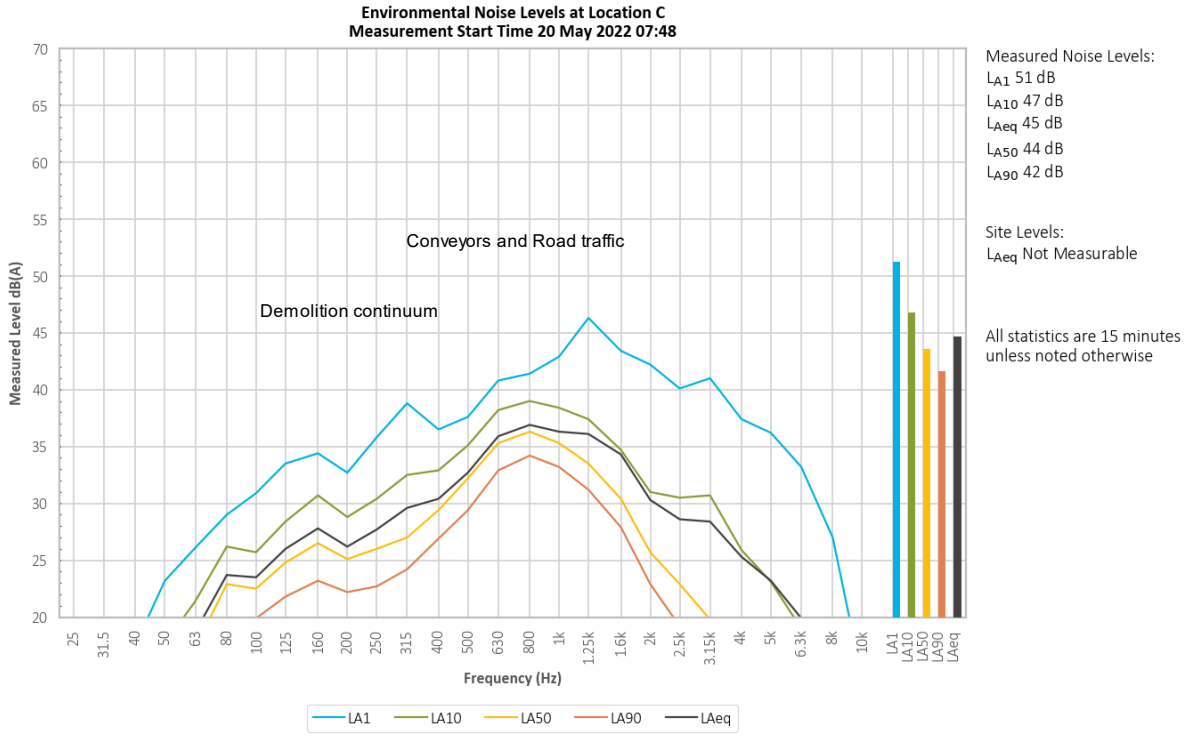

Figure 5.5 Environmental noise levels, Location C

KVAR was not measurable during the measurement, however, reverse quackers were noted.

Impacts from demolition, road traffic and birds were responsible for the measured L_{A1}. Road traffic was responsible for the measured L_{A10} and contributed to the L_{Aeq} with conveyors. Continuum from conveyors was responsible for the measured L_{A50}, and L_{A90}.

5.1.6 Location C - Evening

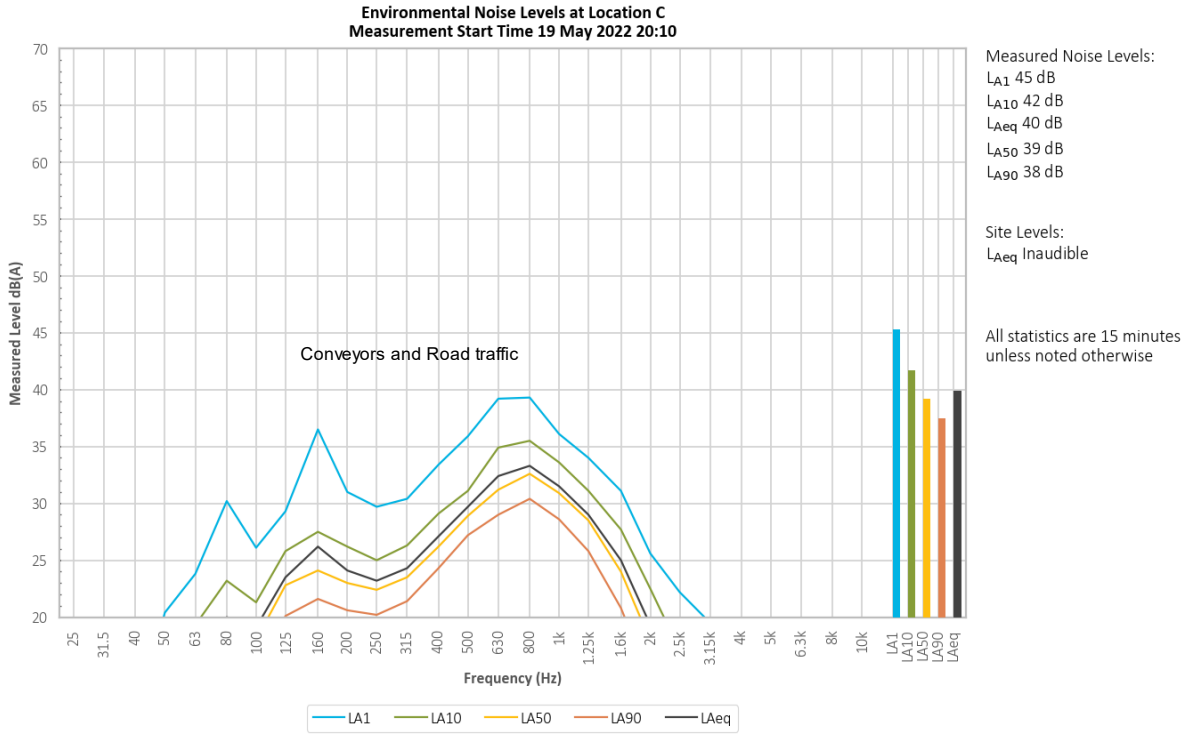

Figure 5.6 Environmental noise levels, Location C

KRAV was inaudible during the measurement.

Road traffic was responsible for the measured L_{A1} and L_{A10}, and contributed to the L_{Aeq}, and L_{A50}. Continuum from conveyors contributed to the measured L_{Aeq}, and L_{A50}, and generated the L_{A90}.

6 Summary

Global Acoustics (now part of EMM) was engaged by Generator Property Management Pty Ltd to conduct a quarterly noise survey of operations at KVAR. The purpose of the survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was done at the three monitoring locations during the day period of 20 May 2022 and evening period of 19 May 2022.

Noise levels from KVAR were lower than relevant criteria at all monitoring locations during the Quarter 2 2022 survey.

Appendix A
Regulatory documents

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A.1 KVAR Development Consent

Noise Impacts

Construction Hours

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

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

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

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

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

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

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

Construction Noise

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

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

Operational Noise

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

This noise criterion applies under the following meteorological conditions:

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

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

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

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

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

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

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

3. ENVIRONMENTAL MONITORING

Construction Noise Monitoring

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

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

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

Operational Noise Review

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

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

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

Ongoing Operational Noise Monitoring

3.3 The 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 in consultation 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 of conducting a noise assessment.

Where monitoring indicates noise levels in excess of the operational noise criterion specified in condition 2.15 of this approval, approval, the 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.

A.2 Environment Protection Licence

L5 Noise limits

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

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

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

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

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

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

L6 Hours of operation

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

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

A.3 Noise Monitoring Plan

5.2 Environmental monitoring program

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

Table 5-1 Environmental monitoring program

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

6.3 Noise and vibration management sub-plan

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

Appendix B
Calibration certificates

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B.1 Calibration Certificates

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C20674

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	00370304
Microphone Serial Number :	10421
Pre-amplifier Serial Number :	60313

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	22°C	**Ambient Temperature :**	21.9°C
Relative Humidity :	50.6%	**Relative Humidity :**	50.1%
Barometric Pressure :	100.08kPa	**Barometric Pressure :**	100.09kPa

Calibration Technician :	Lucky Jaiswal	**Secondary Check:**	Max Moore
Calibration Date :	24 Nov 2020	**Report Issue Date :**	25 Nov 2020

Approved Signatory : Ken Williams

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

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.12dB*	*Temperature*	*±0.2°C*
1kHz	*±0.11dB*	*Relative Humidity*	*±2.4%*
8kHz	*±0.13dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests	*±0.10dB*		

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

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

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

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

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

PAGE 1 OF 1

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Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C21832

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	Pulsar Model 105
Instrument Serial Number :	81334

Atmospheric Conditions

Ambient Temperature :	25°C
Relative Humidity :	49.6%
Barometric Pressure :	100.8kPa

Calibration Technician :	Lucky Jaiswal	**Secondary Check:**	Harrison Kim
Calibration Date :	29 Nov 2021	**Report Issue Date :**	2 Dec 2021

Approved Signatory : Ken Williams

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

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.19	1000.30

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.1°C*
Frequency	*±0.07%*	*Relative Humidity*	*±1.9%*
Distortion	*±0.50%*	*Barometric Pressure*	*±0.014kPa*

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

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

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Appendix D
Annual water quality review

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Annual Water Quality Review

Kerosene Vale Ash Dam Areas

Prepared for Generator Property Management Pty Ltd

November 2022

Annual Water Quality Review

Kerosene Vale Ash Dam Areas

Generator Property Management Pty Ltd

E220952 RP#5

November 2022

Version	Date	Prepared by	Reviewed by	Comments
V1	8/11/2022	Harrison Callen & Chris Kuczera	Amanda Weston	Draft for client review
V2	24/11/2022	Harrison Callen & Chris Kuczera	Amanda Weston	Final for inclusion in AEMR

Approved by

Chris Kuczera
Associate Water Resource Engineer
24/11/2022
Level 3 175 Scott Street
Newcastle NSW 2300

Executive Summary

ES1 Report context

This Annual Water Quality Review (AWQR) addresses the surface and groundwater monitoring and reporting requirements established in the Wallerawang Ash Repository: Operation Environment Management Plan (OEMP) prepared by Energy Australia in 2018. It forms part of the overarching annual environmental management report (AEMR) for the Site. The AEMR considers the period from 1 September 2021 – 31 August 2022 (the AEMR Period).

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 Sawyer 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.

- The water quality in Sawyers Swamp Creek and Dump Creek has improved during the current AEMR period and relative to previous AEMR periods (ie 2018 to the current period). This may be due to significant works implemented by GPM to improve the capture and containment of seepage from the Kerosene Vale Ash Dam that were implemented in the 2nd half of 2021 and /or the wet conditions that occurred over the period.

- The water quality in Sawyers Swamp Creek downstream of the site has characteristics consistent with clean water.

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 were either underway or proposed. The plan included a description of each improvement, expected outcome once implemented and an estimated completion timeframe. GPM propose to continue to progressively improve the water management system through implementing the Action Plan commitments.

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); and

- groundwater at monitoring bores D3 (located between SSCAD and the KVAD) and D5 (located to the west of the KVAD) is degraded.

GPM has commissioned detailed groundwater studies that are due to be completed in 2023. These studies will result in an improved understanding of groundwater flow and water quality characteristics within the Site and will inform the design of future remediation works.

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Appendices

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Figures

1 Introduction

1.1 Site background

Generator Property Management Pty Ltd (GPM) own and operate the Kerosene Vale Ash Repositories and surrounds, located at Skelly Road, Lidsdale NSW (the Site). The Site comprises an area of approximately 528 hectares (ha) that has been used for a range of purposes including ash placement from the Wallerawang Power Station (the Power Station) that operated between 1957 to 2014. Prior the 1957, the site was used for open cut coal mining and some of the voids were subsequently used as landfills.

The Site includes:

- the Kerosene Vale Dry Ash Repository (KVAR) and underlying former Kerosene Vale Ash Dam (KVAD);
- Sawyers Swamp Creek Ash Dam (SSCAD);
- Lidsdale Cut and adjacent landfills; and
- demolition landfill south of the SSCAD.

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).

GPM commenced ownership and responsibility for the Site in September 2020, taking over from EnergyAustralia 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.

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 provided the EPA with a Voluntary Management Proposal to investigate and address the contamination.

Figure 1.1 (overleaf) shows the Site layout, noting the abovementioned features.

1.2 Report scope

This report is an annual water quality review (AWQR) that addresses the surface and groundwater monitoring and reporting requirements established 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 AWQR report forms part of the overarching annual environmental management report (AEMR) for the Site. The AEMR considers the period from 1 September 2021 – 31 August 2022 (the AEMR Period).

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
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 Other studies and OEMP update

1.3.1 Varied EPL

The NSW Environment Protection Authority (EPA) varied EPL 21185 on 18 July 2022. The variations included (among other things):

- revised surface and groundwater monitoring requirements;
- revised reporting requirements;
- a Pollution Reduction Study (PRS) that requires a groundwater characterisation study to be completed by 30 September 2023;
- a PRS focusing on water management system improvements; and
- a Special Condition that requires a comprehensive water sampling program to be completed by August 2023.

During the AEMR Period GPM issued a Water Management Assessment to the EPA to address the PRS focused on water management system improvements. 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.

As the purpose of this AWQR is to address OEMP requirements, data from the EPL monitoring programs is not reported unless relevant to the OEMP requirements.

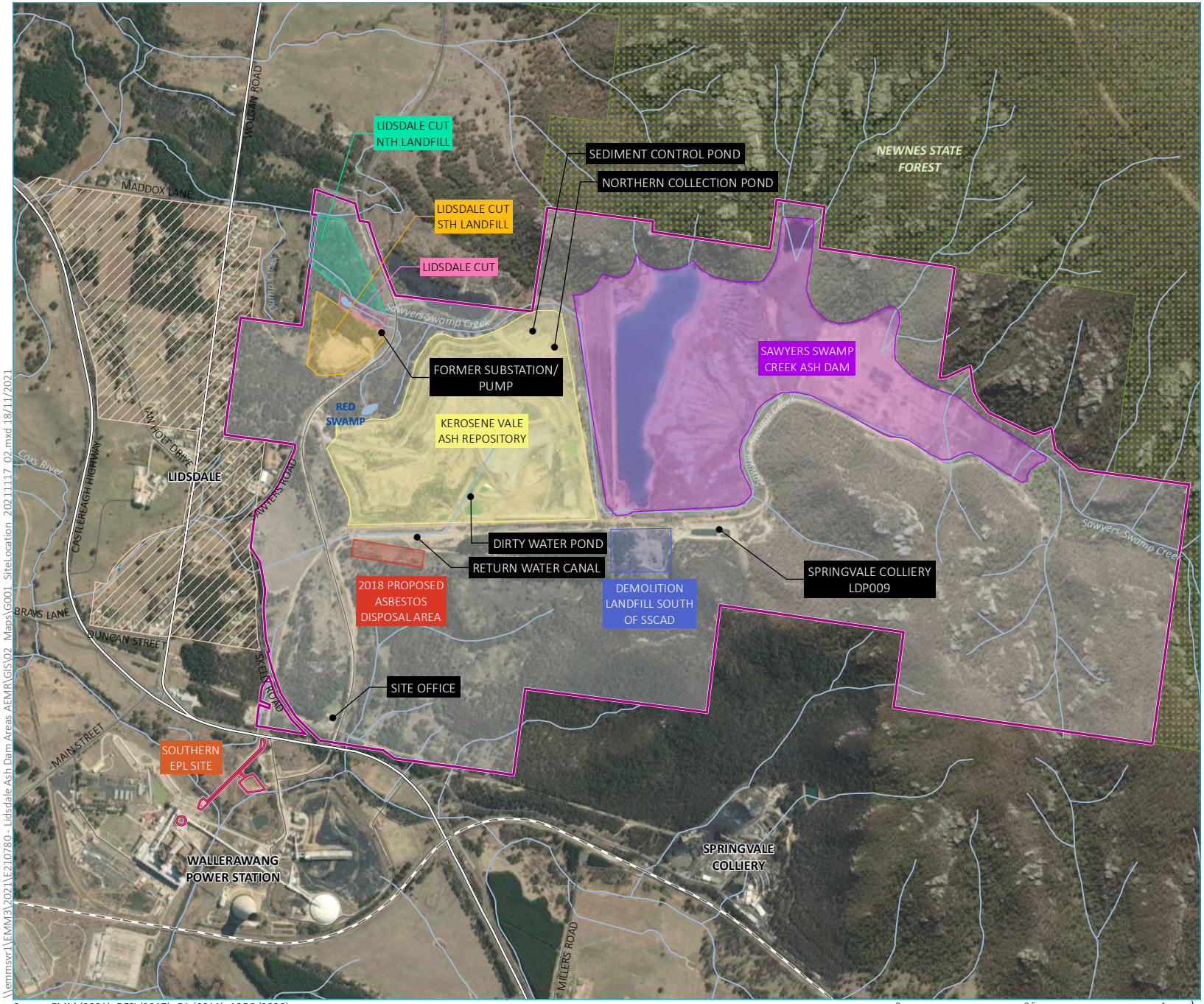
1.3.2 OEMP update

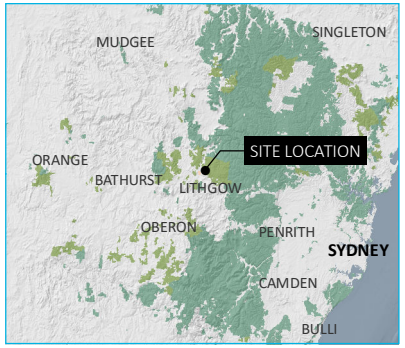
GPM are currently updating the OEMP which will include a revised water monitoring and analysis approach, which where possible, will align with the EPL requirements. It is anticipated that the updated OEMP will be implemented during the 2022-2023 AEMR period.

1.4 Report structure

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 surface water quality.





KEY

- Site boundary
- Rail line
- Major road
- Minor road
- Named waterbody
- Watercourse/drainage line
- State forest
- Nearest sensitive (residential) receivers
- 2018 proposed asbestos disposal area
- Demolition landfill south of SSCAD
- Kerosene Vale ash repository
- Lidsdale cut northern landfill
- Lidsdale cut southern landfill
- Lidsdale cut
- Sawyers Swamp Creek ash dam
- Southern EPL site

INSET KEY

- Major road
- NPWS reserve
- State forest

Site location

Lidsdale Ash Repository
Annual Water Quality Assessment
Figure 1.1

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Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006)

\\emmsvr1\EMM3\2021\E210780 - Lidsdale Ash Dam Areas AEMR\GIS\02 Maps\G001 SiteLocation 20211117 02.mxd 18/11/2021

2 Water management system

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. Sections 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 potentially 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. The 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 to adjusts pH and reduces metal concentrations. Controlled discharges at LDP3 are regulated by EPL no. 21185, which has restrictions on when discharge can occur.

  - **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 the 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.

  - **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 (as shown on Figure 2.1):
  - **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 separate contaminated land investigations.

  - **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.

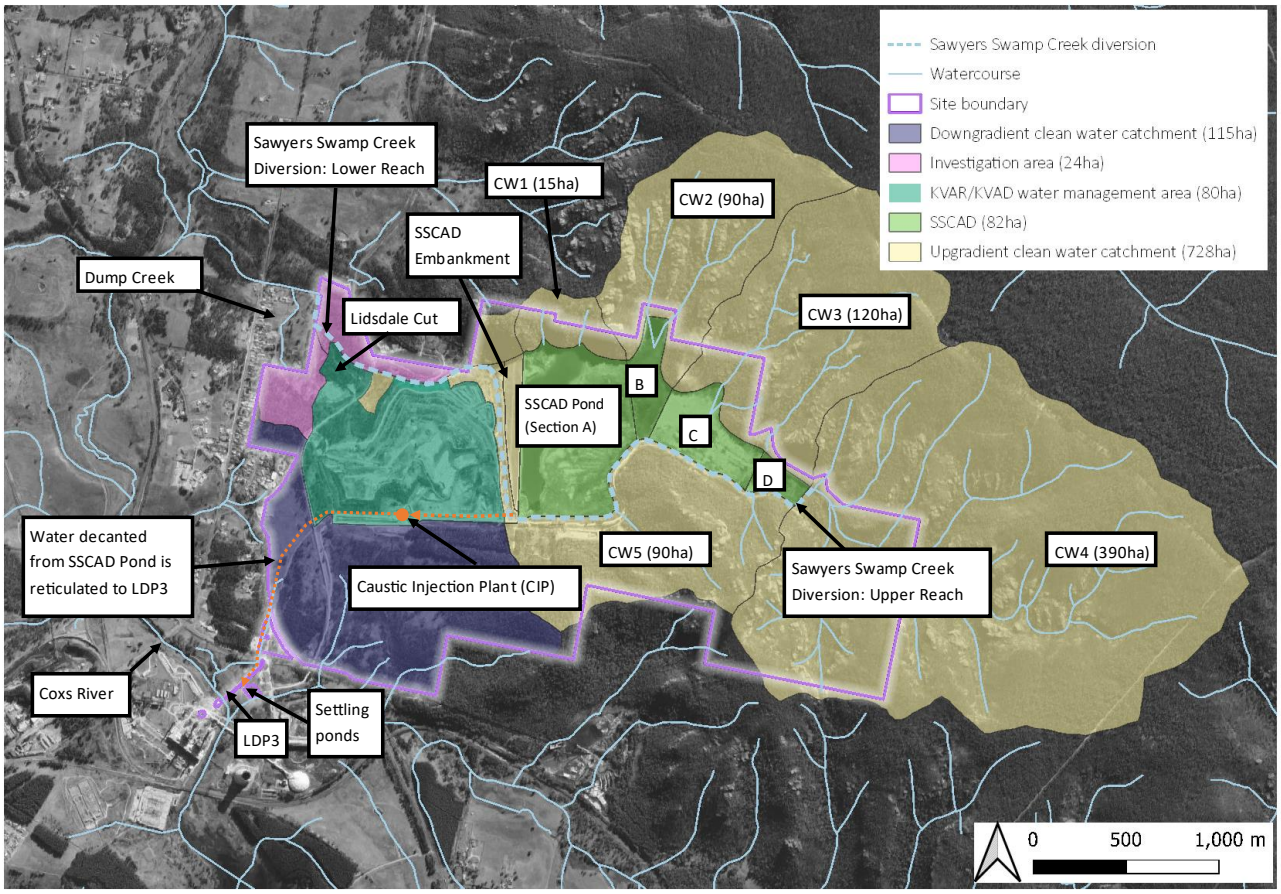

Figure 2.1 Water management areas

3 AEMR Period

This chapter describes the weather and key water management actions undertaken by GPM over the AEMR Period.

3.1 Weather

The AEMR Period experienced above average rainfall with 1129 mm recorded 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 monthly rainfall calculated from the 60-year gauge record. As shown in Figure 3.1, the AEMR period represents an above average year of rainfall where several monthly rainfall totals far exceed the monthly median from the 60-year gauge record. The highest monthly rainfall occurred in March 2022, with 175.4 mm recorded.

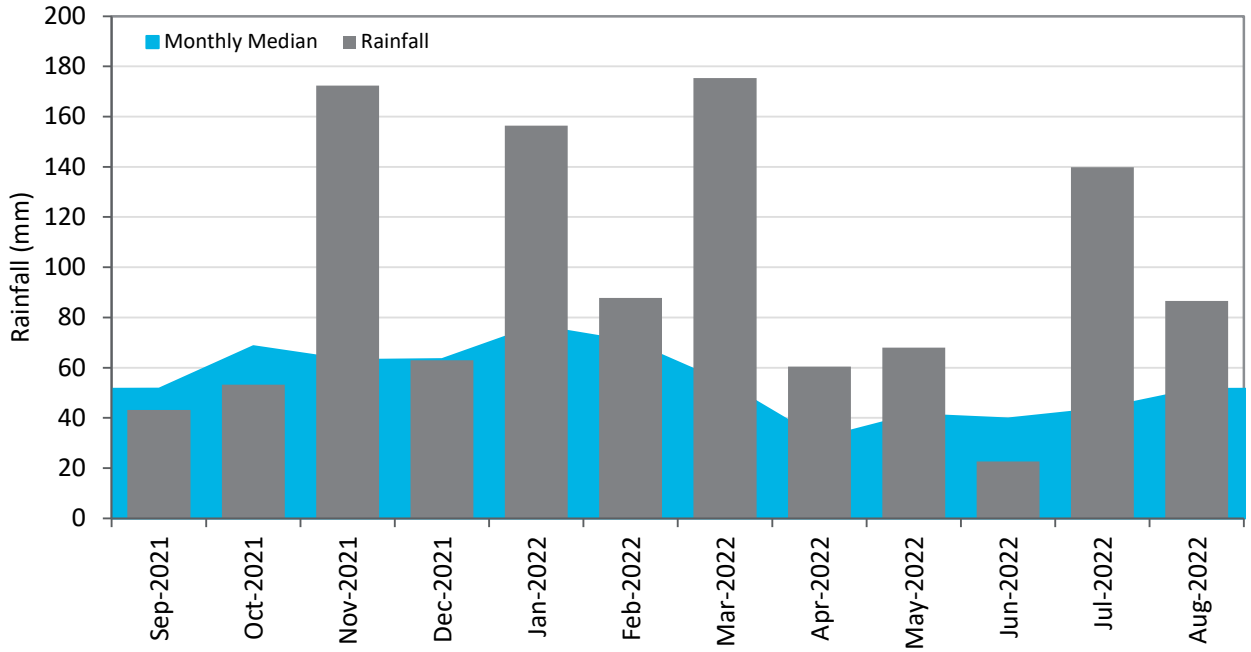

Figure 3.1 Monthly rainfall over the AEMR Period

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 Pond was near full and was about to overflow;
- the treatment system that was used to treat water removed from SSCAD Pond was inoperable; and
- poor separation of clean water, stormwater and contaminated water at many locations.

The challenges have been compounded by:

- significant wet weather that has occurred since September 2020 that has resulted in high inflow volumes and reduced opportunities to manage water via irrigation / evaporation;
- geotechnical stability concerns at the KVAR / KVAD which have required urgent actions; and

- the COVID-19 pandemic and associated supply chain issues which have 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; and
- reduce the volume of contaminated water that requires 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, GPM provided the EPA with 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.

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
SW40 – Lidsdale Cut	Lidsdale cut is one of the storages in the KVAR water management system (see Chapter 2). It receives runoff and seepage from the western portion of the KVAR water management area. Lidsdale Cut is dewatered to SSCAD Pond on an as needed basis.	Monthly monitoring	See Table 4.2
WX11 – Dump Creek	Dump Creek is a 1st order watercourse located to the west (down gradient) of the KVAR water management area and the Investigation 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
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

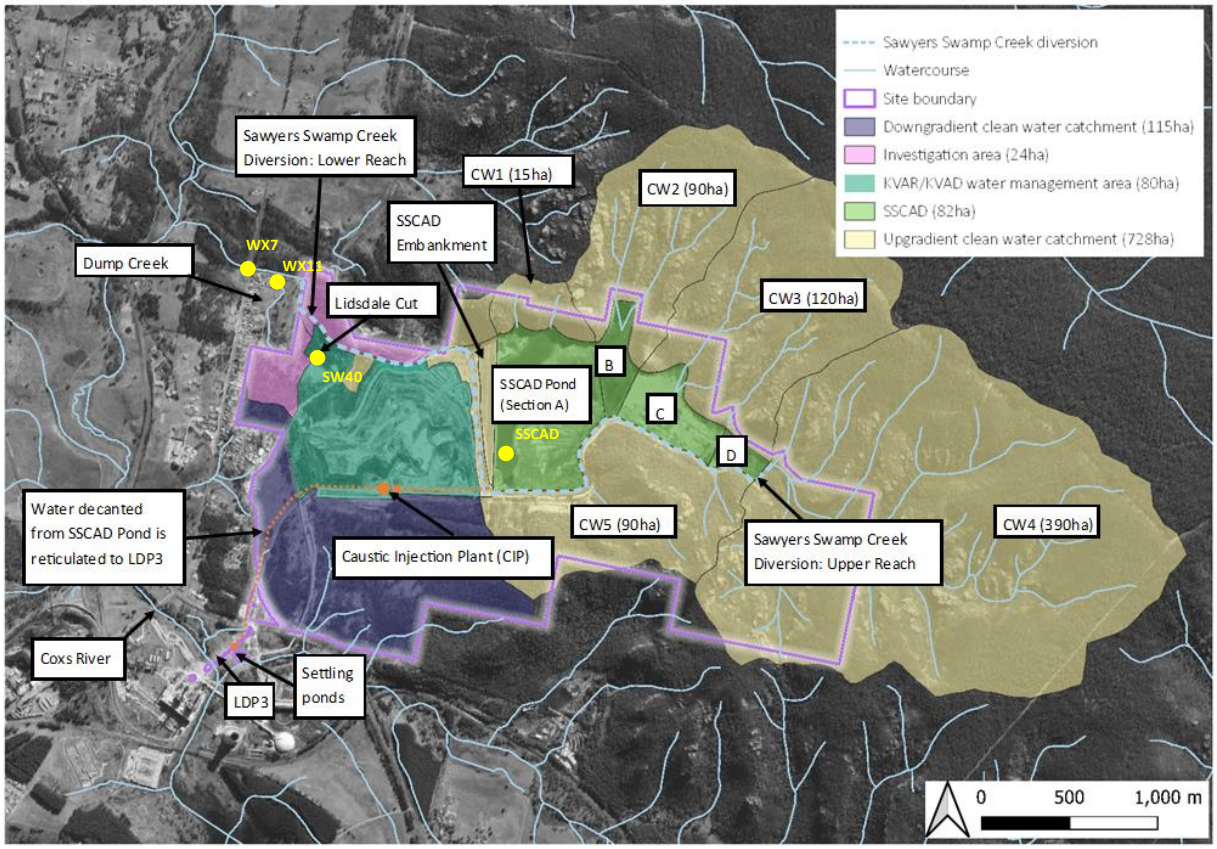

Figure 4.1 Surface water monitoring locations

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 WX5	SSCAD
Physico-chemical parameters						
pH	-	6.5–8.0	6.1 - 6.6	4.0 - 5.9	5.1 - 6.5	4.0 - 5.6

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 WX5	SSCAD
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
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

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 WX5	SSCAD
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 from 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 (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 (upstream of the SSCAD embankment) between 2013 and July 2019. The discharge rate was approximately 18 ML/day which is well above the natural streamflow rate in Sawyers Swamp Creek. Hence, the water quality of Sawyers Swamp Creek during the discharge period was governed by the quality of water discharged from Springvale Colliery. There was a marked change in water quality when the streamflow in Sawyers Swamp Creek reverted to its natural intermittent flow regime, following the cessation of discharges in 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 – SW40

Lidsdale Cut is one of the storages in the KVAD/KVAR water management system (see Figure 2.1). It receives runoff and seepage from the western portion of the KVAD/KVAR water management area. Captured water is dewatered via pumping to SSCAD Pond.

40 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 a low pH and elevated salinity and metal concentrations. These characteristics are consistent with ash affected water at the Site and are expected given that Lidsdale Cut receives intercepted seepage from the KVAD/KVAR water management area.

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 WX5 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	5.1 - 6.5	40	3.0	3.2	4.4
EC	µS/cm	350	207 - 919	40	**600**	**1,760**	**2,620**
Total dissolved solids	mg/L	-	180 - 620	40	410	1,215	2,010
DO	mg/L	-	NM	40	4.8	7.7	11.6
turbidity	NTU	25	NM	37	<1	3	**31**
Total nitrogen	mg/L	0.25	NM	40	**0.5**	**1.4**	**2.4**
Total phosphorus	mg/L	0.02	NM	40	<0.01	<0.01	**0.36**
Anions							
Chloride	mg/L		6 - 28	40	6.8	21.5	29.4
Fluoride	mg/L		0.3 - 3.2	40	0.6	3.6	8.3
Sulfate	mg/L		57 - 490	40	238	748	1400
Cations							
Sodium	mg/L	-	13 - 71	40	33.9	95.5	145.0
Potassium	mg/L	-	9 - 50	40	24.5	67.1	104.0
Calcium	mg/L	-	15 - 52	40	28.3	80.1	132.0
Magnesium	mg/L	-	4 - 25	40	13.6	40.3	61.0
Metals[1]							
Aluminium	mg/L	0.055	NM	40	**3.340**	**11.450**	**24.000**
Arsenic	mg/L	0.013	0.025	40	<0.001	0.002	0.004
Silver	mg/L	0.00005	0.005	40	<0.001	<0.001	<0.001
Barium	mg/L	-	0.03 - 0.08	40	0.009	0.020	0.055
Boron	mg/L	0.94	0.24 - 1.60	40	**1.08**	**3.00**	**4.92**
Cadmium	mg/L	0.0002	0.0010	40	**0.0013**	**0.0024**	**0.0069**
Chromium	mg/L	0.001	0.005	40	<0.001	<0.001	**0.002**
Copper	mg/L	0.0014	0.005	40	0.0010	**0.0040**	**0.0190**

Table 4.4 Lidsdale Cut WX5 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Iron	mg/L	-	0.03 - 4.00	40	0.44	8.45	19.20
Mercury	mg/L	0.00006	0.0001	40	<0.00004	0.00002	**0.00044**
Manganese	mg/L	1.9	0.4 - 3.4	40	1.8	**4.8**	**8.3**
Molybdenum	mg/L	0.034	NM	40	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	NM	40	**0.188**	**0.419**	**0.752**
Lead	mg/L	0.0034	0.0050	40	0.0020	**0.0110**	**0.0250**
Selenium	mg/L	0.005	0.003 - 0.003	40	<0.01	**0.010**	**0.030**
Zinc	mg/L	0.008	0.030 - 0.130	40	**0.572**	**1.020**	**1.790**

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

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. See Chapter 2 for further information.

Three samples were collected from SSCAD Pond over 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 three samples have consistent water quality, which is characterised as having low pH and elevated salinity and metal concentrations. The pH, salinity and metal concentrations are typically lower than the baseline range, which relates to the period shortly after wet ash placement in SSCAD had ceased.

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 EPL no. 21185. 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 EPL annual return and on GPM's website.

Table 4.5 SSCAD Pond – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	4.0 - 5.6	3	**4.3**	**4.6**	**4.6**
EC	µS/cm	350	1,966 - 2,453	3	**950**	**1,690**	**1,700**
Total dissolved solids	mg/L	-	1,640 – 1,950	1	658	658	658
DO	mg/L	-	NM	2	10.4	10.5	10.5

Table 4.5 SSCAD Pond – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Turbidity	NTU	25	NM	1	1.5	1.5	1.5
Total nitrogen	mg/L	0.25	NM	1	<0.1	<0.1	<0.1
Total phosphorus	mg/L	0.02	NM	1	<0.01	<0.01	<0.01
Anions							
Chloride	mg/L		23 - 29	3	13.8	19.9	21.6
Fluoride	mg/L		5.5 - 10.0	3	1.3	2.8	3.8
Sulfate	mg/L		1100 - 1800	3	428	807	856
Cations							
Sodium	mg/L	-	290 - 370	3	74.9	138.0	148.0
Potassium	mg/L	-	71 - 93	3	36.7	65.6	68.7
Calcium	mg/L	-	110 - 140	3	52.7	105.0	112.0
Magnesium	mg/L	-	15 - 18	3	16.9	29.6	31.8
Metals[1]							
Aluminium	mg/L	0.055	NM	3	**7.450**	**15.900**	**16.700**
Arsenic	mg/L	0.013	0.025	3	0.002	0.003	0.007
Silver	mg/L	0.00005	0.005	3	<0.001	<0.001	<0.001
Barium	mg/L	-	0.08 - 0.09	3	0.034	0.034	0.035
Boron	mg/L	0.94	4.80 - 7.30	3	**1.74**	**3.54**	**3.87**
Cadmium	mg/L	0.0002	0.0010 - 0.0070	3	**0.0029**	**0.0058**	**0.0059**
Chromium	mg/L	0.001	0.005 - 0.010	3	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	0.005 - 0.040	3	**0.0040**	**0.0080**	**0.0090**
Iron	mg/L	-	0.03 - 0.69	3	0.34	0.57	0.57
Mercury	mg/L	0.00006	0.0001	3	<0.00004	<0.00004	<0.00004
Manganese	mg/L	1.9	1.1 - 1.4	3	**2.2**	**4.0**	**4.1**
Molybdenum	mg/L	0.034	NM	3	0.010	0.021	0.022
Nickel	mg/L	0.011	NM	3	**0.143**	**0.241**	**0.258**
Lead	mg/L	0.0034	0.0050	3	<0.001	<0.001	0.0010
Selenium	mg/L	0.005	0.053 - 0.110	3	**0.010**	**0.020**	**0.040**
Zinc	mg/L	0.008	0.220 - 0.400	3	**0.366**	**0.624**	**0.642**

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 both the KVAR/KVAD water management area and the Investigation Area. It flows to the north and joins Sawyers Swamp Creek upstream of WX7 (see Figure 2.1).

Twelve 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 the 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 has improved during the current AEMR period and relative to previous AEMR periods (ie 2018 to the current period). 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.

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	12	**3.8**	**6.1**	7.8
EC	µS/cm	350	407 - 620	12	72	**594**	**1,090**
Total dissolved solids	mg/L	-	300 - 430	12	270	412	777
DO	mg/L	-	NM	12	1.1	3.0	5.3
Turbidity	NTU	25	NM	12	14	**59**	**173**
Total nitrogen	mg/L	0.25	NM	12	**0.6**	**1.1**	**3.1**
Total phosphorus	mg/L	0.02	NM	12	<0.05	**0.29**	**1.18**
Anions							
Chloride	mg/L	-	19 - 22	12	12.4	22.2	40.7
Fluoride	mg/L	-	0.3 - 0.8	12	<0.05	0.2	1.3
Sulfate	mg/L	-	150 - 300	12	140.0	215.5	490.0
Cations							
Sodium	mg/L	-	42 - 58	12	15.3	50.1	81.9
Potassium	mg/L	-	13 - 16	12	6.8	12.7	18.9
Calcium	mg/L	-	13 - 19	12	3.2	28.2	45.6
Magnesium	mg/L	-	12 - 20	12	2.3	20.1	36.9

Table 4.6 Dump Creek WX11 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Metals							
Aluminium	mg/L	0.055	NM	12	0.005	0.045	**1.660**
Arsenic	mg/L	0.013	0.025	12	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	0.005	12	<0.001	<0.001	<0.001
Barium	mg/L	-	0.02	12	0.014	0.019	0.030
Boron	mg/L	0.94	0.63 - 1.20	12	0.22	0.70	**1.64**
Cadmium	mg/L	0.0002	0.0010	12	<0.0001	<0.0001	**0.0003**
Chromium	mg/L	0.001	0.005	12	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	0.005	12	0.0005	0.0005	**0.0060**
Iron	mg/L	-	0.06 - 0.83	12	0.04	1.04	13.60
Mercury	mg/L	0.00006	0.0001	12	<0.00004	<0.00004	<0.00004
Manganese	mg/L	1.9	1.0 - 2.0	12	0.04	0.9	**3.3**
Molybdenum	mg/L	0.034	NM	12	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	NM	12	**0.015**	**0.040**	**0.180**
Lead	mg/L	0.0034	0.0050	12	<0.001	<0.001	0.0020
Selenium	mg/L	0.005	0.003	12	<0.01	<0.01	<0.01
Zinc	mg/L	0.008	0.140 - 0.340	12	<0.005	**0.046**	**0.441**

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. Six 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 near neutral pH, 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 has improved during the current AEMR period and relative to previous AEMR periods (ie 2018 to the current period). 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.

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	6	**6.0**	6.7	7.0
EC	µS/cm	350	614 - 1,426	6	89	108	143
Total dissolved solids	mg/L	-	440 - 1060	3	65	66	96
DO	mg/L	-	NM	6	7.3	8.6	12.8
Turbidity	NTU	25	NM	6	3	19	**29**
Total nitrogen	mg/L	0.25	NM	6	0.1	0.2	**0.4**
Total phosphorus	mg/L	0.02	NM	6	<0.01	<0.01	**0.03**
Anions							
Chloride	mg/L	-	18 - 35	6	8.0	8.8	12.1
Fluoride	mg/L	-	0.7 - 1.1	6	<0.1	<0.1	<0.1
Sulfate	mg/L	-	250 - 710	6	16.0	22.0	36.0
Cations							
Sodium	mg/L	-	62 - 150	6	8.6	12.0	19.0
Potassium	mg/L	-	14 - 30	6	2.0	2.9	4.5
Calcium	mg/L	-	29 - 82	6	2.0	3.0	4.4
Magnesium	mg/L	-	17 - 48	6	2.0	2.1	3.6
Metals							
Aluminium	mg/L	0.055	NM	6	0.010	0.025	**0.080**
Arsenic	mg/L	0.013	0.025	6	<0.001	<0.001	<0.001
Silver	mg/L	0.00005	0.005	6	<0.001	<0.001	**0.002**
Barium	mg/L	-	0.02 - 0.03	6	0.030	0.031	0.034
Boron	mg/L	0.94	1.10 - 3.40	6	0.03	0.06	0.13
Cadmium	mg/L	0.0002	0.0010	6	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	0.005	6	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	0.005	6	<0.001	<0.001	<0.001
Iron	mg/L	-	0.03 - 0.16	6	0.03	0.06	0.16
Mercury	mg/L	0.00006	0.0001	6	<0.00004	<0.00004	<0.00004
Manganese	mg/L	1.9	0.3 - 1.0	6	0.0	0.1	0.2
Molybdenum	mg/L	0.034	NM	6	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	NM	6	0.002	0.004	0.005

Table 4.7 Sawyers Swamp Creek WX7 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Lead	mg/L	0.0034	0.005	6	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	0.003	6	<0.01	<0.01	<0.01
Zinc	mg/L	0.008	0.040 - 0.180	6	0.008	**0.010**	**0.016**

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 Sawyers Swamp Creek and Dump Creek has improved during the current AEMR period and relative to previous AEMR periods (ie 2018 to the current period). 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 water quality in Sawyers Swamp Creek downstream of the site (WX7) has characteristics consistent with clean water.

GPM propose to 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 a description of the monitoring requirements and assessment criteria established in the OEMP and presents and discusses the groundwater quality data.

5.1 Hydrogeological context

The hydrogeology of the Site is complex and is being reviewed as part of the future studies (see Section 1.3). Figure 5.1 is reproduced from the Water Quality Assessment from the previous 2019-2020 AEMR Period (Aurecon 2020a) and shows interpreted groundwater levels and flow directions. The OEMP groundwater monitoring sites are also shown.

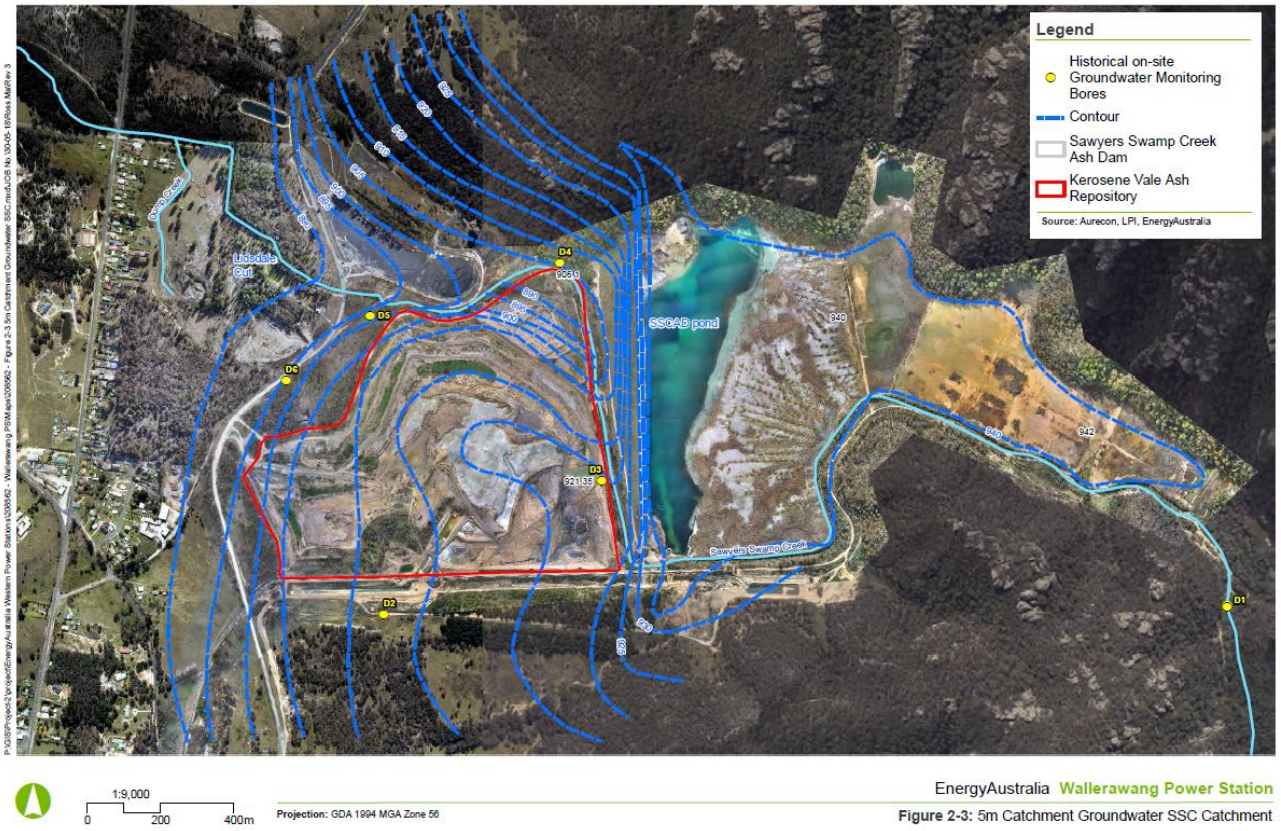

Figure 5.1 Indicative groundwater levels

Source: Aurecon 2020a

5.2 OEMP monitoring requirements

5.2.1 Monitoring locations and approach

The environmental monitoring plan established in the OEMP identifies six groundwater monitoring locations. Table 5.1 describes each of these monitoring locations and associated monitoring requirements.

Table 5.1 Groundwater monitoring requirements

Monitoring location	Description	Monitoring frequency	Monitoring analytes
D1	Groundwater monitoring bore located to the south-east of SSCAD.	Monthly monitoring	See Table 4.2
D2	Groundwater monitoring bore located to the south of KVAR.	Monthly monitoring	See Table 4.2
D3	Groundwater monitoring bore located between SSCAD and KVAR.	Monthly monitoring	See Table 4.2
D4	Groundwater monitoring bore located to the north of KVAR and immediately to the west of the northern side of the SSCAD embankment.	Monthly monitoring	See Table 4.2
D5	Groundwater monitoring bore located to the northwest of KVAR.	Monthly monitoring	See Table 4.2
D6	Groundwater monitoring bore located to the west of KVAR.	Monthly monitoring	See Table 4.2

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

5.2.2 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 surface water 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). The discharge rate was generally constant at approximately 18 ML/day which is well above the natural streamflow rate in Sawyers Swamp Creek. The constant presence of water in Sawyers Swamp Creek may have locally increased groundwater levels and changed groundwater quality. Hence, changes to both groundwater levels and quality may have occurred at some locations following the cessation of discharges from Springvale Colliery in 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.

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 2.1). The bore is screened in the Upper Illawarra Coal measures (Aurecon 2020b). The groundwater flow direction at this bore is not described in Figure 5.1, but is interpreted to be to the north-west, towards SSCAD. As a result of the groundwater flow direction, it is unlikely that groundwater at this location would not be impacted by SSCAD or any other part of the Site.

Three samples were collected from D1 over the period. 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 is mildly acidic and has low salinity, which indicates surface water influences. Median concentrations of aluminium 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	**5.2**	**5.3**	**5.4**
EC	µS/cm	350	90 - 170	3	105	112	133
Total dissolved solids	mg/L	-	60 - 302	3	56	83	104
Anions							
Chloride	mg/L		12 - 37	3	15	17	19
Fluoride	mg/L		0.0 - 0.1	3	0.0	0.1	0.1
Sulfate	mg/L		3 - 8	3	10	13	21
Cations							
Sodium	mg/L	-	8 - 19	3	14	15	19
Potassium	mg/L	-	2 - 10	3	4	5	6
Calcium	mg/L	-	2 - 9	3	1	1	3
Magnesium	mg/L	-	1 - 5	3	2	2	4
Metals[1]							
Aluminium	mg/L	0.055	NM	3	0.050	**0.060**	**0.090**
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	3	<0.001	<0.001	<0.001
Barium	mg/L	-	0.04 - 0.06	3	0.037	0.038	0.055
Boron	mg/L	0.94	0.02 - 0.05	3	<0.05	<0.05	0.41
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	<0.001	0.0010	**0.0030**
Iron (filtered)	mg/L	-	0.02 - 4.50	3	<0.05	0.080	0.090
Mercury	mg/L	0.00006	0.0000 - 0.0002	3	<0.00004	<0.00004	<0.00004
Manganese	mg/L	1.9	0.0 - 0.2	3	0.02	0.04	0.04
Molybdenum	mg/L	0.034	NM	3	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	NM	3	<0.001	0.002	0.009
Lead	mg/L	0.0034	0.0005 - 0.0160	3	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	0.001 - 0.001	3	<0.01	<0.01	<0.01
Zinc	mg/L	0.008	0.030 - 0.240	3	**0.027**	**0.047**	**0.128**

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 2.1). The bore is screened in the Upper Illawarra Coal measures, cross gradient from the KVAR and downgradient from the SSCAD (Aurecon 2020b). The groundwater flow direction at this bore is interpreted to be to the west (see Figure 5.1). 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. 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 being mildly acidic and having low salinity. Median concentrations of aluminium, nickel 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	**4.6**	**4.7**	**5.1**
EC	µS/cm	350	278 - 502	3	314	316	344
Total dissolved solids	mg/L	-	120 - 315	3	184	231	246
Anions							
Chloride	mg/L		12 - 104	3	16	17	19
Fluoride	mg/L		0.0 - 0.1	3	<0.01	<0.01	0.023
Sulfate	mg/L		57 - 180	3	97	103	105
Cations							
Sodium	mg/L	-	17 - 58	3	35	35	36
Potassium	mg/L	-	0 - 5	3	5	5	5
Calcium	mg/L	-	1 - 5	3	1	1	1
Magnesium	mg/L	-	7 - 22	3	13	14	16
Metals[1]							
Aluminium	mg/L	0.055	NM	3	**0.100**	**0.130**	**0.140**
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	<0.001	<0.001
Barium	mg/L	-	0.04 - 0.13	3	0.025	0.02600	0.03000
Boron	mg/L	0.94	0.01 - 0.15	3	<0.05	<0.05	0.13

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	<0.0001	0.0001	0.0002
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	<0.001	<0.001
Iron (filtered)	mg/L	-	0.03 - 5.70	3	<0.05	<0.05	<0.05
Mercury	mg/L	0.00006	0.0000 - 0.0002	3	<0.00004	<0.00004	**0.00034**
Manganese	mg/L	1.9	0.3 - 0.7	3	0.34	0.35	0.44
Molybdenum	mg/L	0.034	NM	3	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	NM	3	**0.034**	**0.036**	**0.046**
Lead	mg/L	0.0034	0.0020 - 0.0080	3	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	0.001 - 0.003	3	<0.01	<0.01	<0.01
Zinc	mg/L	0.008	0.048 - 0.130	3	**0.042**	**0.043**	**0.050**

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 2.1). The bore is screened in the Upper Illawarra Coal measures (Aurecon 2020). The groundwater flow direction at this bore is interpreted to be to the north (see Figure 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 being mildly acidic and having salinity (as indicated by EC) that is elevated relative to both the DGV and baseline range.

Median concentrations of most metals sampled exceed both the DGV and baseline range and were significantly higher than concentrations at monitoring bore D1 (which is located upgradient of SSCAD). Accordingly, groundwater at D3 appears to 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	**4.6**	**4.8**	**5.1**
EC	µS/cm	350	332 - 773	3	**930**	**970**	**1,000**

Table 5.6 Groundwater monitoring location D3 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Total dissolved solids	mg/L	-	238 - 538	3	610	734	802
Anions							
Chloride	mg/L		32 - 140	3	21	24	33
Fluoride	mg/L		0.1 - 0.2	3	0.1	0.1	0.6
Sulfate	mg/L		54 - 130	3	359	390	441
Cations							
Sodium	mg/L	-	35 - 96	3	70	70	73
Potassium	mg/L	-	5 - 12	3	18	23	36
Calcium	mg/L	-	11 - 27	3	40	44	50
Magnesium	mg/L	-	11 - 30	3	37	38	39
Metals[1]							
Aluminium	mg/L	0.055	NM	3	**1.440**	**1.710**	**5.450**
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	<0.001	<0.001
Barium	mg/L	-	0.05 - 0.13	3	0.016	0.01700	0.01700
Boron	mg/L	0.94	0.01 - 0.06	3	0.46	0.79	**1.43**
Cadmium	mg/L	0.0002	0.0001 - 0.0010	3	**0.0017**	**0.0037**	**0.0210**
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	**0.003**	**0.0050**	**0.0060**
Iron (filtered)	mg/L	-	0.01 - 6.50	3	8.17	11.40	12.80
Mercury	mg/L	0.00006	0.0000 - 0.0002	3	<0.00004	<0.00004	<0.00004
Manganese	mg/L	1.9	0.2 - 1.1	3	1.47	1.50	**2.07**
Molybdenum	mg/L	0.034	NM	3	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	NM	3	**0.195**	**0.214**	**0.330**
Lead	mg/L	0.0034	0.0005 - 0.0080	3	<0.001	0.0020	0.0020
Selenium	mg/L	0.005	0.001 - 0.003	3	<0.01	<0.01	<0.01
Zinc	mg/L	0.008	0.030 - 0.061	3	**0.172**	**0.242**	**0.408**

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 KVAR, to the west of the northern end of the SSCAD embankment and near the Sawyers Swamp Creek Diversion (see Figure 2.1). The bore is shallow and is screened in the regolith (Aurecon 2020b). The groundwater flow direction at this bore is interpreted to be to the south-west, towards Swayers Swamp Creek (see Figure 5.1). There is potential for groundwater quality impacts at this location due to its proximity to the SSCAD embankment.

Three samples were collected from D4 over the AEMR Period. 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 being slightly acidic and having salinity (as indicated by EC) that is elevated relative to both the DGV and baseline range.

Median concentrations of manganese, nickel and zinc exceeded DGVs, but were generally within the baseline range. The time-series charts provided in Appendix B indicate that the water quality over the AEMR Period was generally consistent with water quality in recent AEMR periods (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	3	**6.0**	**6.0**	7.0
EC	µS/cm	350	492 - 1,331	3	1,900	2,360	2,640
Total dissolved solids	mg/L	-	270 - 1210	3	1,390	2,100	2,360
Anions							
Chloride	mg/L		16 - 86	3	47	70	81
Fluoride	mg/L		0.0 - 0.1	3	<0.5	<0.5	<0.5
Sulfate	mg/L		77 - 770	3	838	1,240	1,310
Cations							
Sodium	mg/L	-	27 - 91	3	163	201	242
Potassium	mg/L	-	5 -10	3	10	11	12
Calcium	mg/L	-	38 - 100	3	108	146	214
Magnesium	mg/L	-	21 - 73	3	70	89	97
Metals[1]							
Aluminium	mg/L	0.055	NM	3	<0.01	<0.01	<0.01
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	<0.001	<0.001
Barium	mg/L	-	0.03 - 0.13	3	0.013	0.015	0.040
Boron	mg/L	0.94	0.23 - 1.30	3	0.62	0.72	0.78
Cadmium	mg/L	0.0002	0.0001 - 0.0010	3	<0.0001	<0.0001	**0.0004**
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	<0.001	<0.001
Iron (filtered)	mg/L	-	22.0 - 71.0	3	15.8	55.7	75.4
Mercury	mg/L	0.00006	0.0000 - 0.0002	3	<0.00004	<0.00004	<0.00004
Manganese	mg/L	1.9	6.0 - 20.0	3	**2.38**	**5.66**	**8.44**
Molybdenum	mg/L	0.034	NM	3	<0.001	<0.001	0.001
Nickel	mg/L	0.011	NM	3	**0.014**	**0.036**	**0.041**
Lead	mg/L	0.0034	0.0005 - 0.0100	3	<0.001	<0.001	<0.001
Selenium	mg/L	0.005	0.001 - 0.003	3	<0.01	<0.01	<0.01
Zinc	mg/L	0.008	0.020 - 0.090	3	**0.04**	**0.061**	**0.074**

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 KVAR and near the Sawyers Swamp Creek Diversion (see Figure 2.1). The bore is screened in the Illawarra and Lidsdale Coal Measures downgradient of the KVAR and SSCAD, but upgradient from Lidsdale Cut (Aurecon 2020b). The groundwater flow direction at this bore is interpreted to be to the north-west, away from the KVAR (see Figure 5.1). There is potential for groundwater quality impacts at this location due to its proximity to the KVAD and KVAR.

A single groundwater sample was collected within the AEMR Period on the 16th of December 2021, Table 5.8 provides the result from this sampling round for each analyte and compares the results to DGVs and the baseline water quality range. The bore was dry during other sampling rounds. Aurecon 2020a notes that this bore has been regularly dry since July 2019, which is when controlled discharges for Springvale Colliery to Sawyers Swamp Creek ceased.

From the single available sample, the groundwater quality is characterised as being mildly acidic and having low salinity. Median concentrations of aluminium, cadmium, nickel and zinc exceeded DGVs, but were generally within the baseline range. Overall, the groundwater quality is characterised as being similar to the bore D2.

Table 5.8 Groundwater monitoring location D5 – results summary

	Units	DGV	Baseline range	No. samples	Result
Physico-chemical parameters					
pH	-	6.5–8.0	3.7 - 4.7	1	**4.0**
EC	µS/cm	350	229 - 634	1	228
Total dissolved solids	mg/L	-	170 - 1913	1	186
Anions					

Table 5.8 Groundwater monitoring location D5 – results summary

	Units	DGV	Baseline range	No. samples	Result
Chloride	mg/L		3 - 26	1	3
Fluoride	mg/L		0.2 - 0.4	1	0.044
Sulfate	mg/L		86 - 274	1	80
Cations					
Sodium	mg/L	-	6 - 55	1	7
potassium	mg/L	-	4 - 23	1	9
calcium	mg/L	-	12 - 21	1	10
magnesium	mg/L	-	5 - 24	1	5
Metals					
aluminium	mg/L	0.055	NM	1	**1.780**
arsenic	mg/L	0.013	0.001 - 0.025	1	<0.001
silver	mg/L	0.00005	0.00100 - 0.00500	1	<0.001
barium	mg/L	-	0.02 - 0.07	1	0.035
boron	mg/L	0.94	0.08 - 1.10	1	0.24
cadmium	mg/L	0.0002	0.0010 - 0.0430	1	**0.0004**
chromium	mg/L	0.001	0.005 - 0.010	1	<0.001
copper	mg/L	0.0014	0.005 - 0.072	1	<0.001
iron (filtered)	mg/L	-	0.06 - 5.32	1	1.47
mercury	mg/L	0.00006	0.0001 - 0.0002	1	<0.00004
manganese	mg/L	1.9	0.8 - 2.1	1	0.78
molybdenum	mg/L	0.034	NM	1	<0.001
nickel	mg/L	0.011	NM	1	**0.096**
lead	mg/L	0.0034	0.0050 - 0.0760	1	<0.001
selenium	mg/L	0.005	0.001 - 0.003	1	<0.01
zinc	mg/L	0.008	0.240 - 2.630	1	**0.247**

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

5.3.6 Groundwater monitoring location D6

Groundwater monitoring bore D6 is located to the west of the KVAR (see Figure 2.1). The bore is screened in the Illawarra and Lidsdale Coal Measures downgradient of the KVAR and SSCAD, but upgradient from Lidsdale Cut (Aurecon 2020b). The groundwater flow direction at this bore is interpreted to be to the west, away from the

KVAR (see Figure 5.1). There is potential for groundwater quality impacts at this location due to its proximity to the KVAR.

Three samples were collected from D6 over the AEMR Period. 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 being mildly acidic and having salinity (as indicated by EC) that is elevated relative to both the DGV and baseline range.

Median concentrations of most metals sampled exceed both the DGV and baseline range and were significantly higher than concentrations at monitoring bore D1 (which is located upgradient of SSCAD). Accordingly, groundwater at D6 appears to be degraded relative to baseline water quality. The Water Quality Assessment for the 2019-2020 AEMR Period (Aurecon 2020a) noted that while the KVAR is a possible source of poor water quality, local chitter deposits and other disturbances could be contributing factors.

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**	**3.8**	**3.8**
EC	µS/cm	350	283 - 1,013	3	1,130	1,320	1,500
Total dissolved solids	mg/L	-	200 - 902	3	775	1,110	1,260
Anions							
Chloride	mg/L		14 - 118	3	17	19	28
Fluoride	mg/L		0.0 - 0.2	3	<0.5	<0.5	<0.5
Sulfate	mg/L		89 - 360	3	493	664	804
Cations							
Sodium	mg/L	-	25 - 58	3	98	118	126
Potassium	mg/L	-	4 - 9	3	7	11	11
Calcium	mg/L	-	4 - 24	3	8	9	9
Magnesium	mg/L	-	12 - 29	3	63	79	87
Metals[1]							
Aluminium	mg/L	0.055	NM	3	**8.680**	**10.700**	**11.100**
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	3	<0.001	<0.001	<0.001
Barium	mg/L	-	0.02 - 0.07	3	0.014	0.01500	0.01600
Boron	mg/L	0.94	0.12 - 0.82	3	0.49	0.71	0.77
Cadmium	mg/L	0.0002	0.0010 - 0.0010	3	**0.0010**	**0.0010**	**0.0012**
Chromium	mg/L	0.001	0.002 - 0.010	3	<0.001	<0.001	<0.001

Table 5.9 Groundwater monitoring location D6 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Copper	mg/L	0.0014	0.002 - 0.010	3	**0.003**	**0.0050**	**0.0070**
Iron (filtered)	mg/L	-	13 - 104	3	0.05	1.23	1.58
Mercury	mg/L	0.00006	0.0001 - 0.0002	3	<0.00004	<0.00004	<0.00004
Manganese	mg/L	1.9	0.6 - 4.3	3	0.53	0.56	0.87
Molybdenum	mg/L	0.034	NM	3	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	NM	3	**0.452**	**0.525**	**0.526**
Lead	mg/L	0.0034	0.0020 - 0.0110	3	**0.006**	**0.0060**	**0.0070**
Selenium	mg/L	0.005	0.001 - 0.003	3	<0.01	<0.01	<0.01
Zinc	mg/L	0.008	0.050 - 0.566	3	**0.88**	**1.180**	**1.180**

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); and
- groundwater at monitoring bores D3 (located between SSCAD and the KVAR) and D5 (located to the west of the KVAR) is degraded, relative to baseline water quality trends.

GPM has commissioned detailed groundwater studies that are due to be completed in 2023. These studies will result in an improved understanding of groundwater flow and water quality characteristics within the Site and will inform the design of future remediation works.

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

Aurecon 2020b, Wallerawang Closure Plan, Kerosene Vale Groundwater Assessment

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

Appendix A
Surface water quality charts

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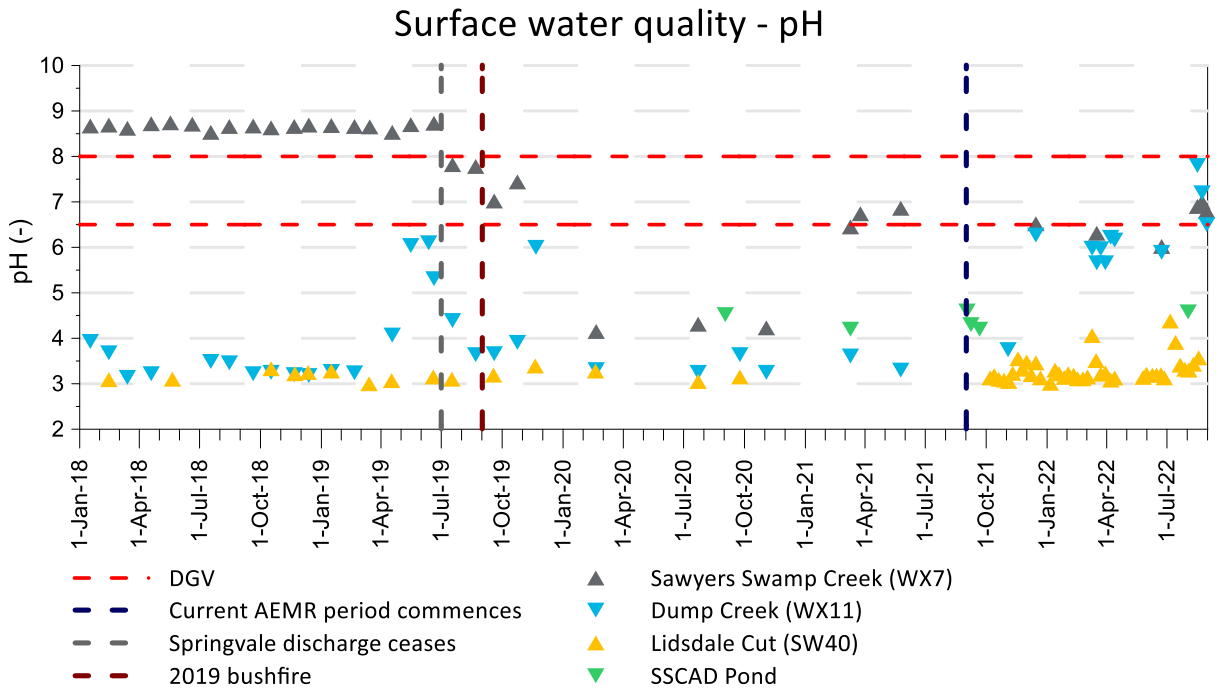
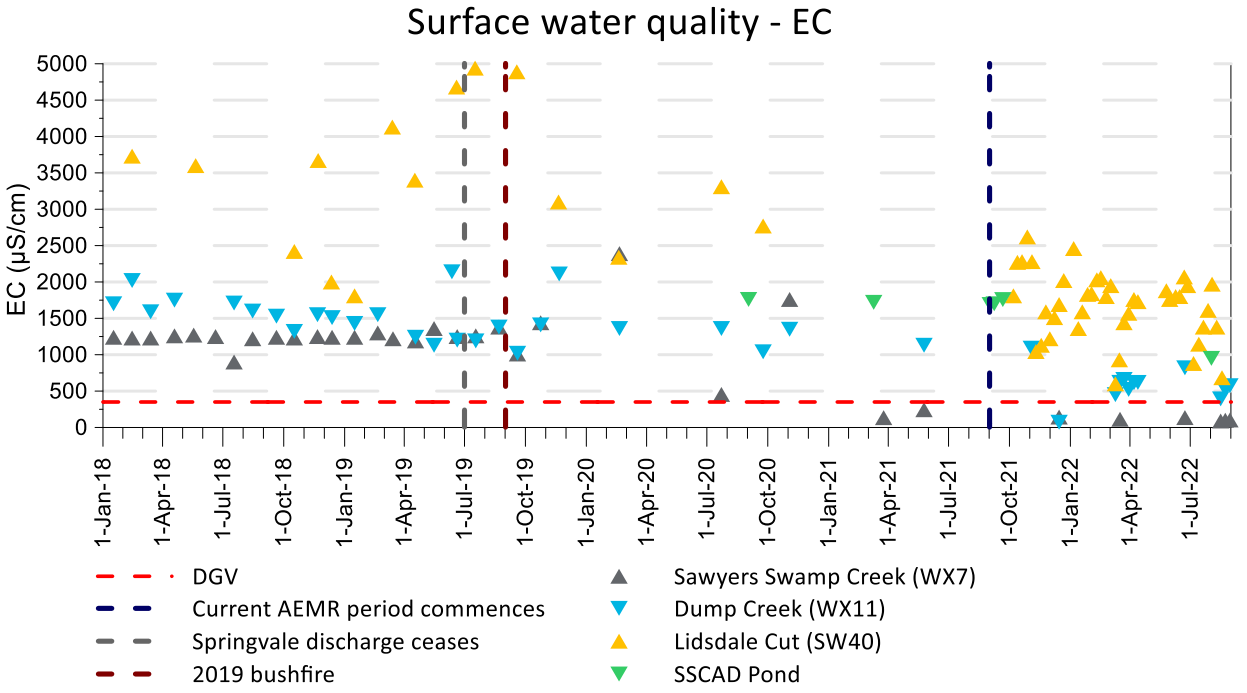
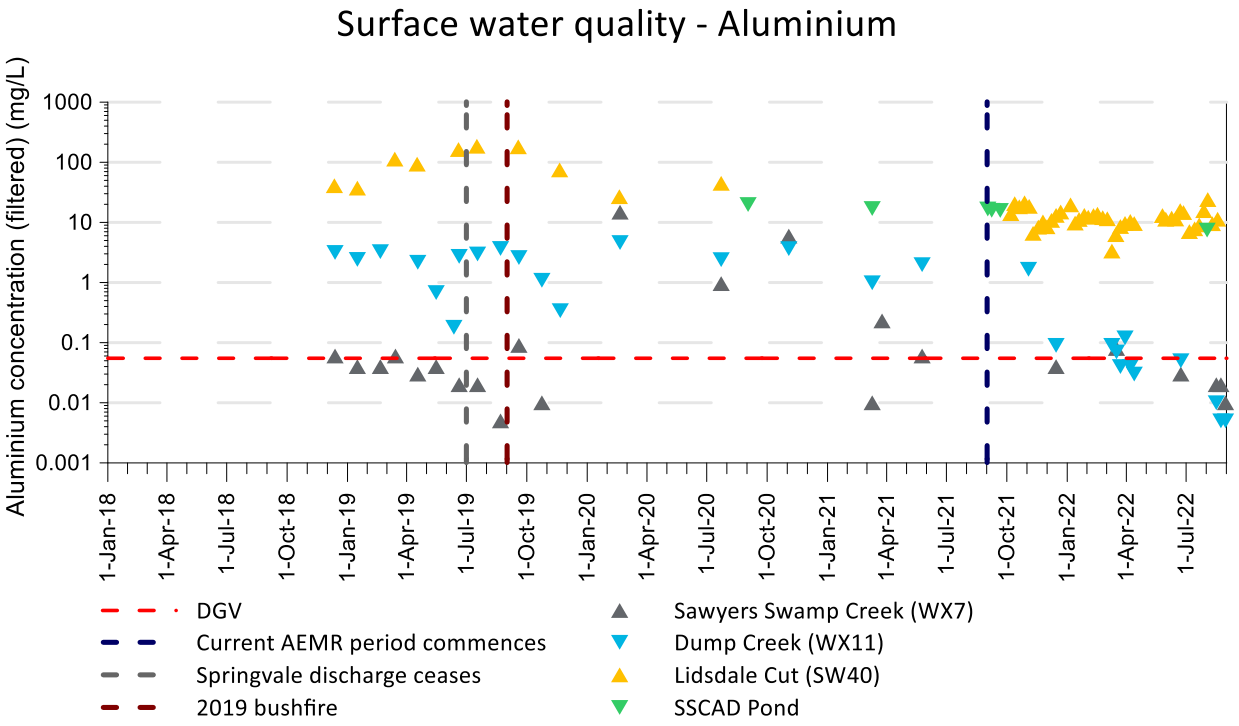
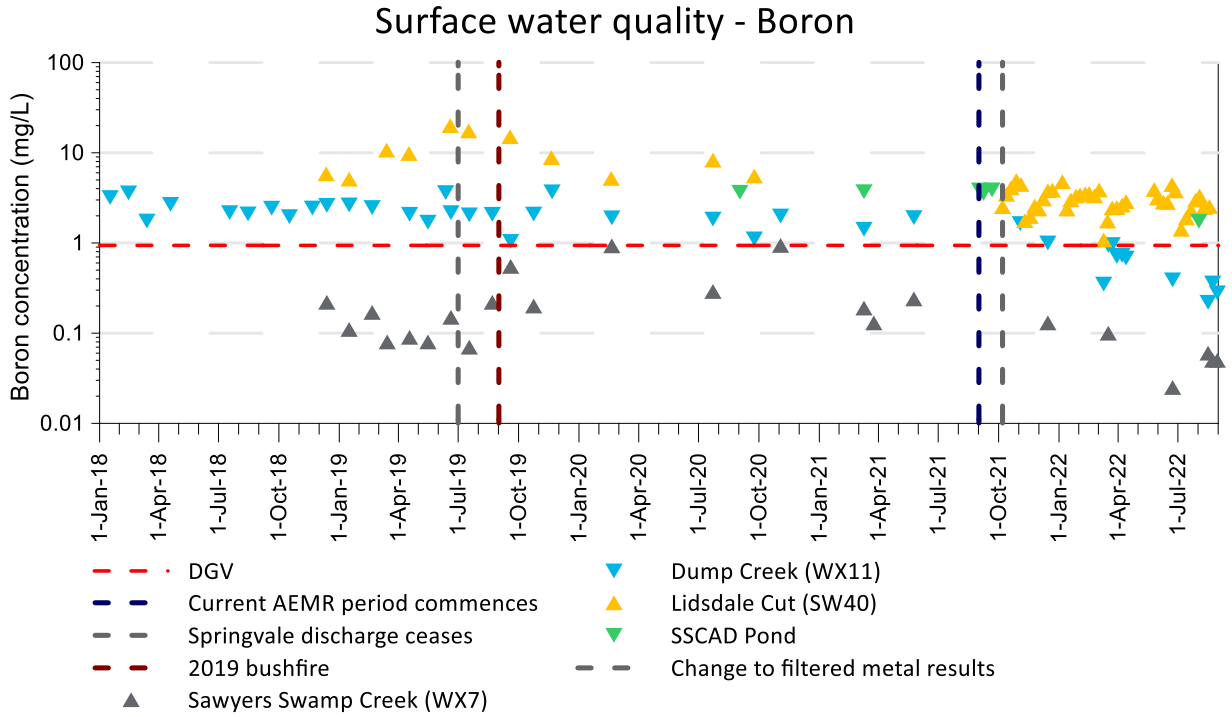
A.1 Physico-chemical parameter charts

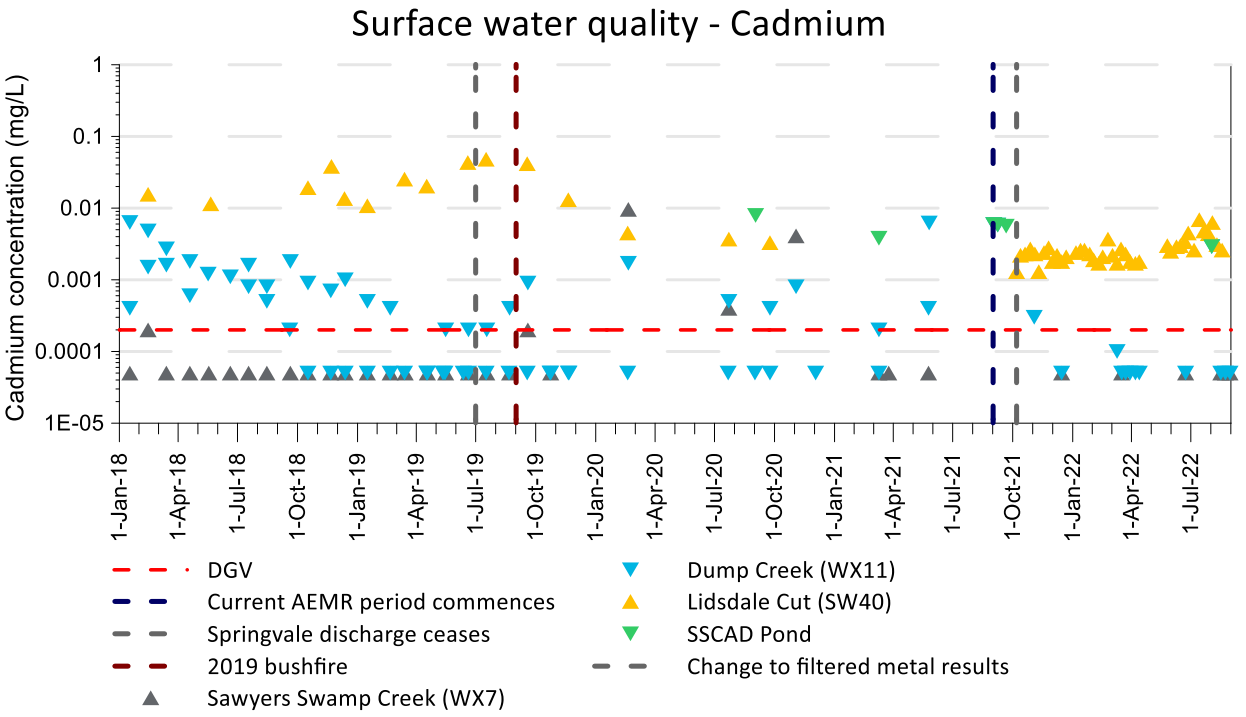


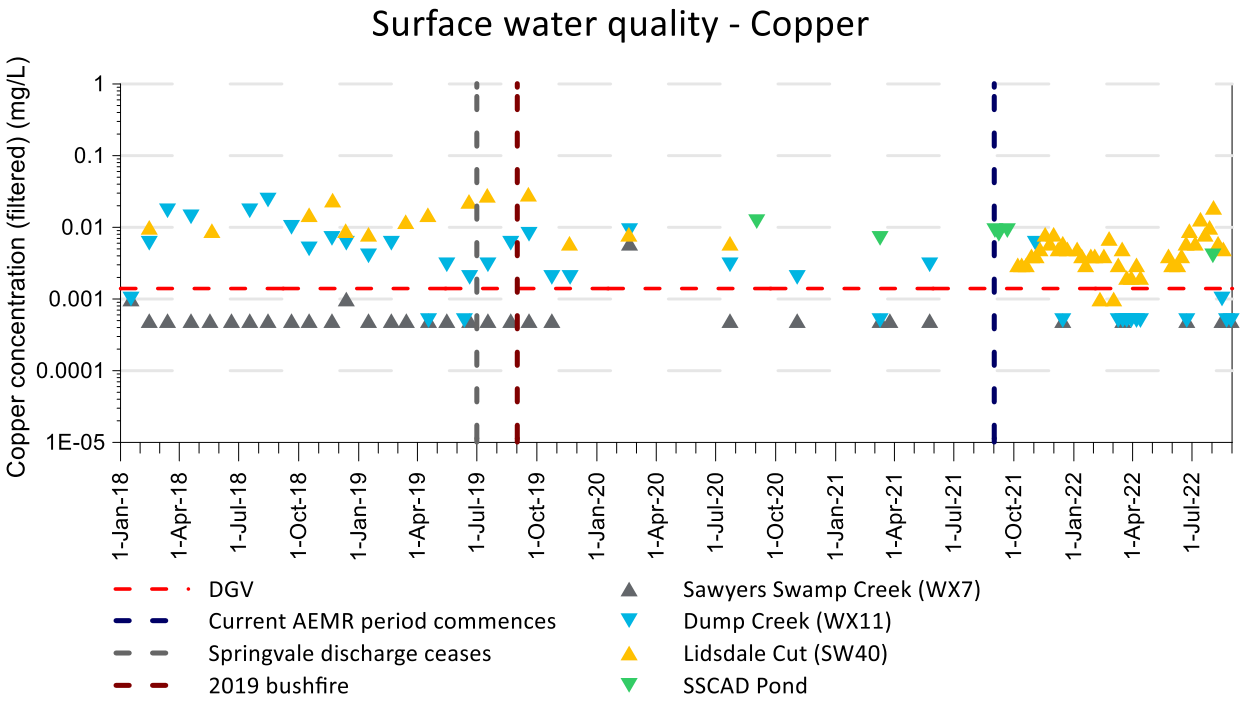


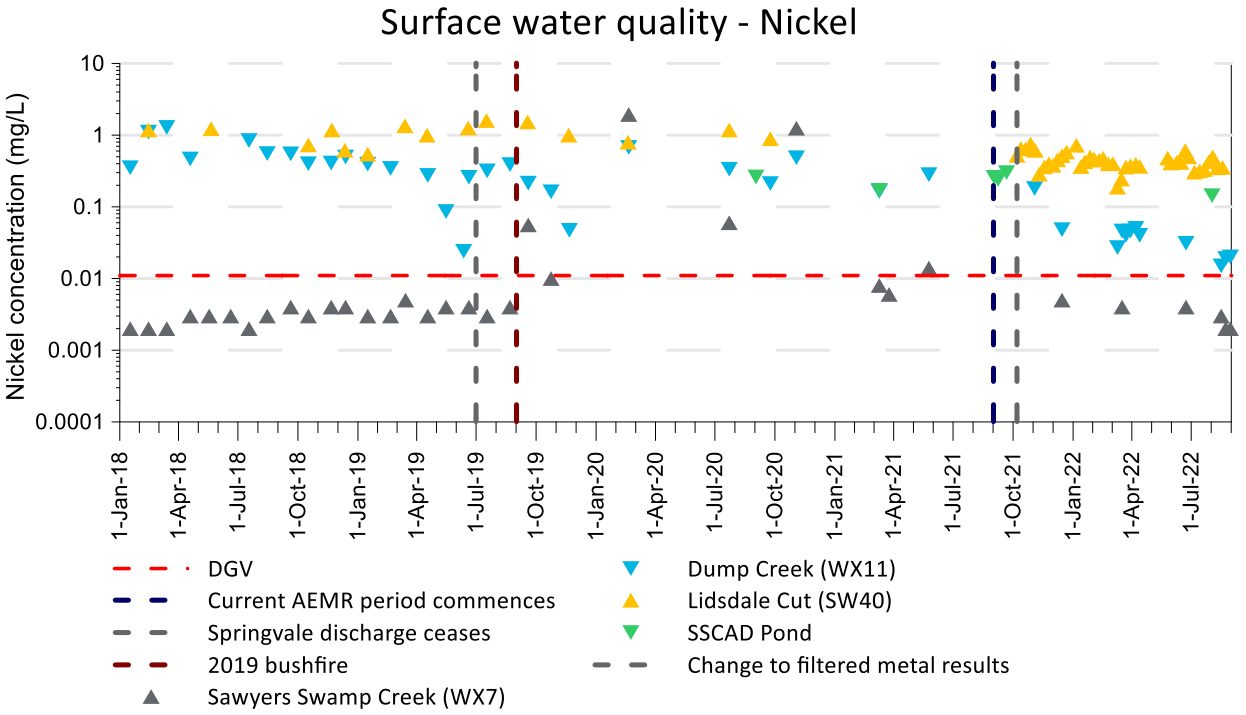
A.2 Metals charts

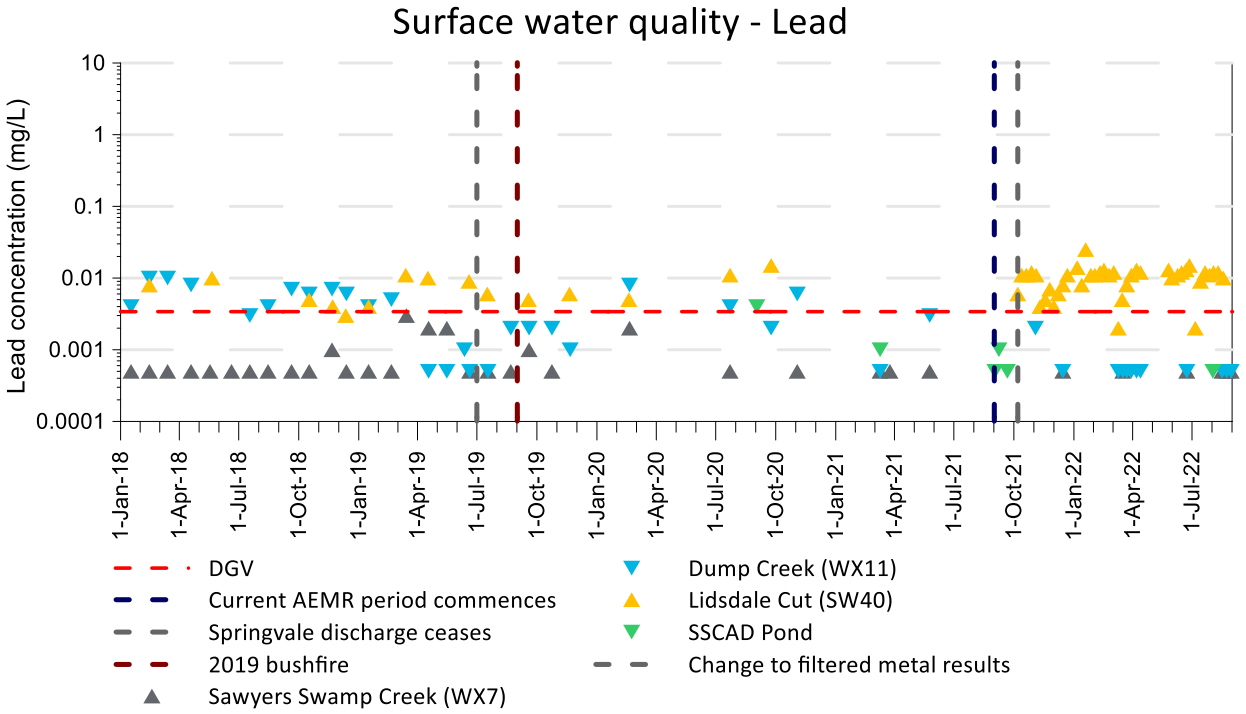


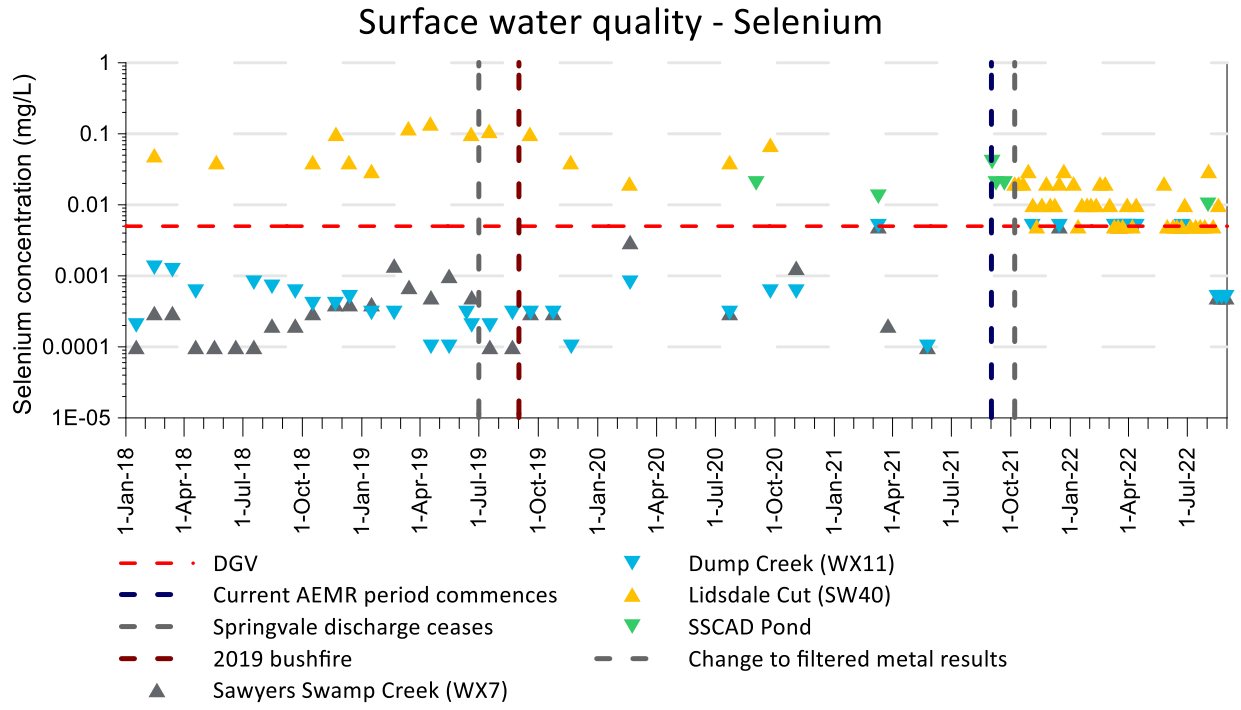


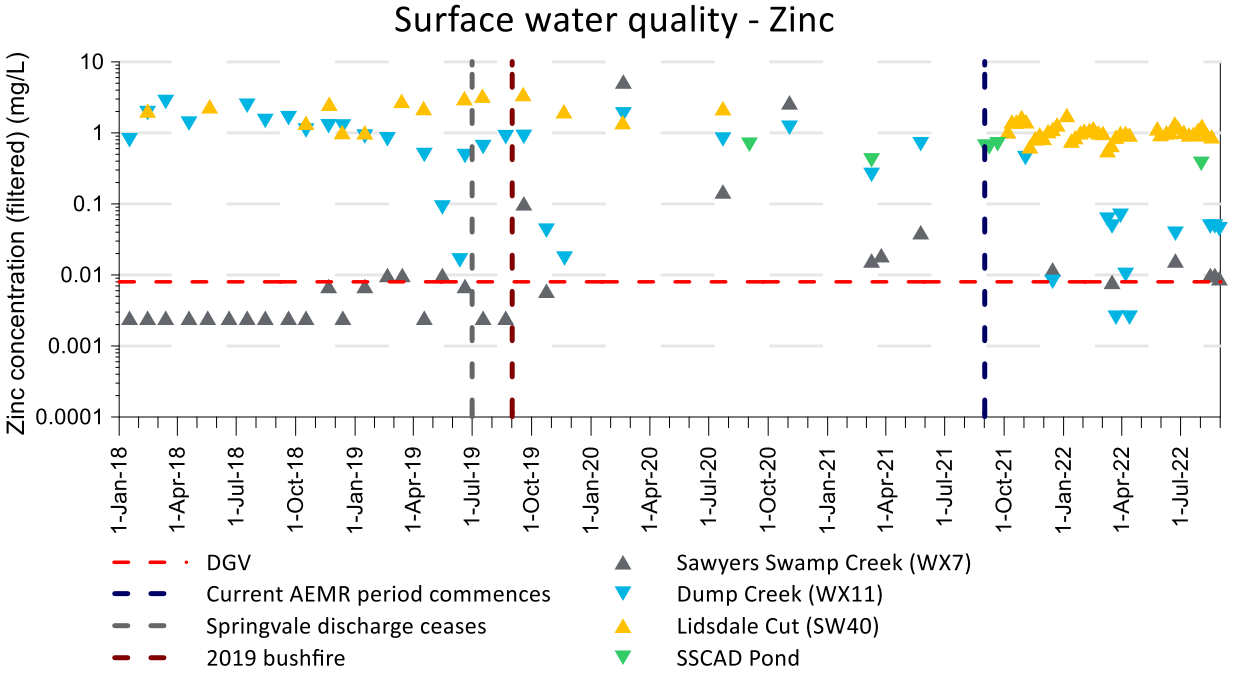

Surface water quality - Cadmium
Cadmium concentration (mg/L)
1
0.1
0.01
0.001
0.0001
1E-05
1-Jan-18
1-Apr-18
1-Jul-18
1-Oct-18
1-Jan-19
1-Apr-19
1-Jul-19
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
1-Jan-21
1-Apr-21
1-Jul-21
1-Oct-21
1-Jan-22
1-Apr-22
1-Jul-22
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek (WX7)
Dump Creek (WX11)
Lidsdale Cut (SW40)
SSCAD Pond
Change to filtered metal results


Surface water quality - Copper
Copper concentration (filtered) (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
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek (WX7)
Dump Creek (WX11)
Lidsdale Cut (SW40)
SSCAD Pond


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
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek (WX7)
Dump Creek (WX11)
Lidsdale Cut (SW40)
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
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek (WX7)
Dump Creek (WX11)
Lidsdale Cut (SW40)
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
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek (WX7)
Dump Creek (WX11)
Lidsdale Cut (SW40)
SSCAD Pond
Change to filtered metal results


Surface water quality - Zinc
Zinc concentration (filtered) (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
DGV
Current AEMR period commences
Springvale discharge ceases
2019 bushfire
Sawyers Swamp Creek (WX7)
Dump Creek (WX11)
Lidsdale Cut (SW40)
SSCAD Pond

Appendix B
Groundwater quality charts

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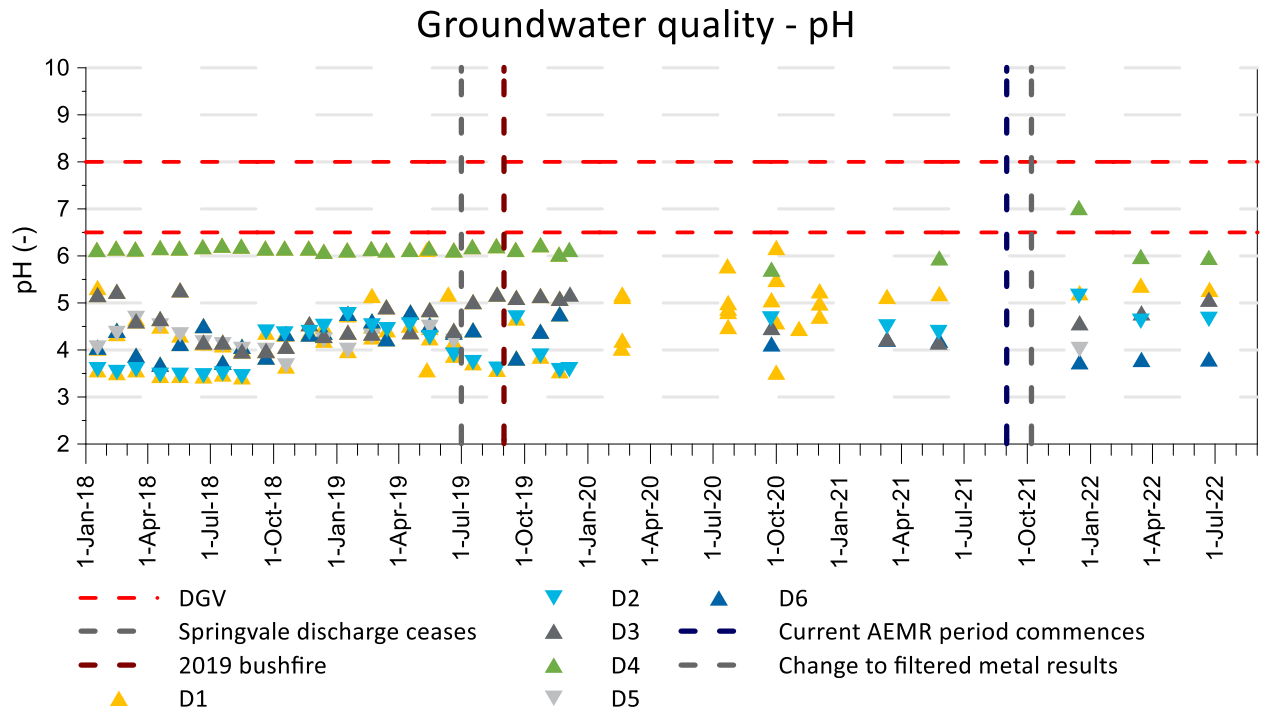
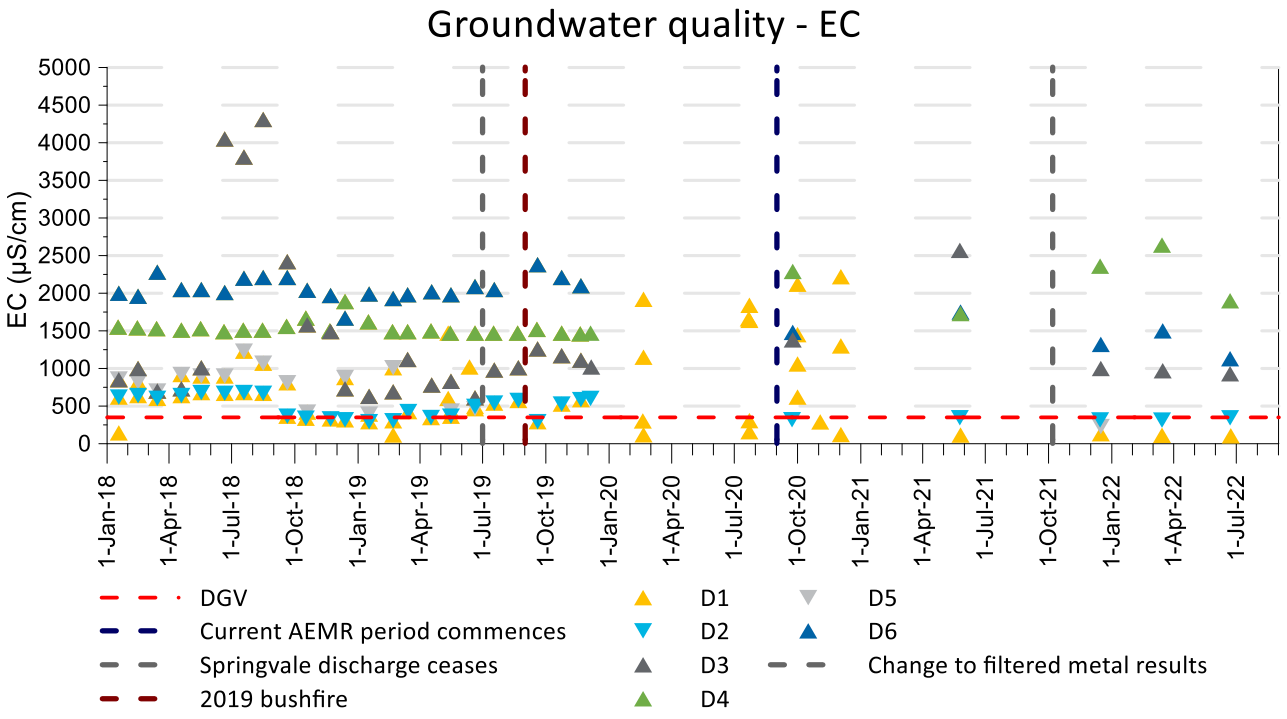
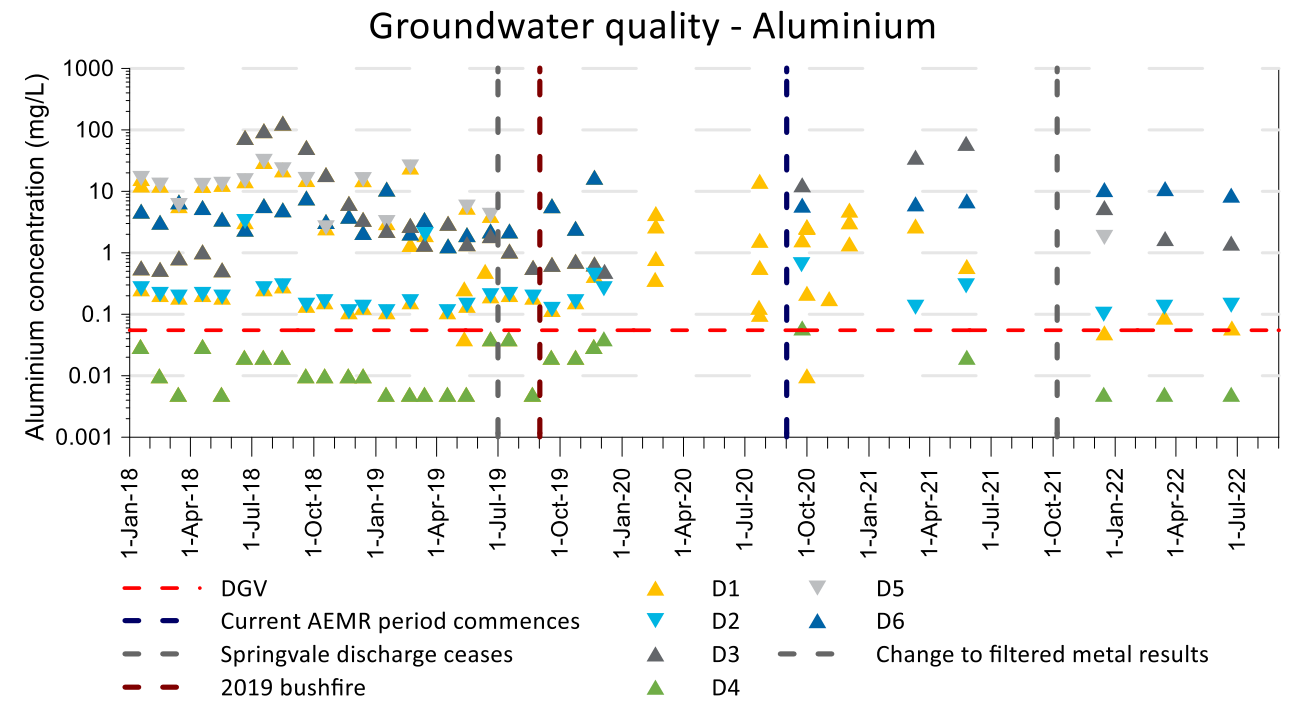
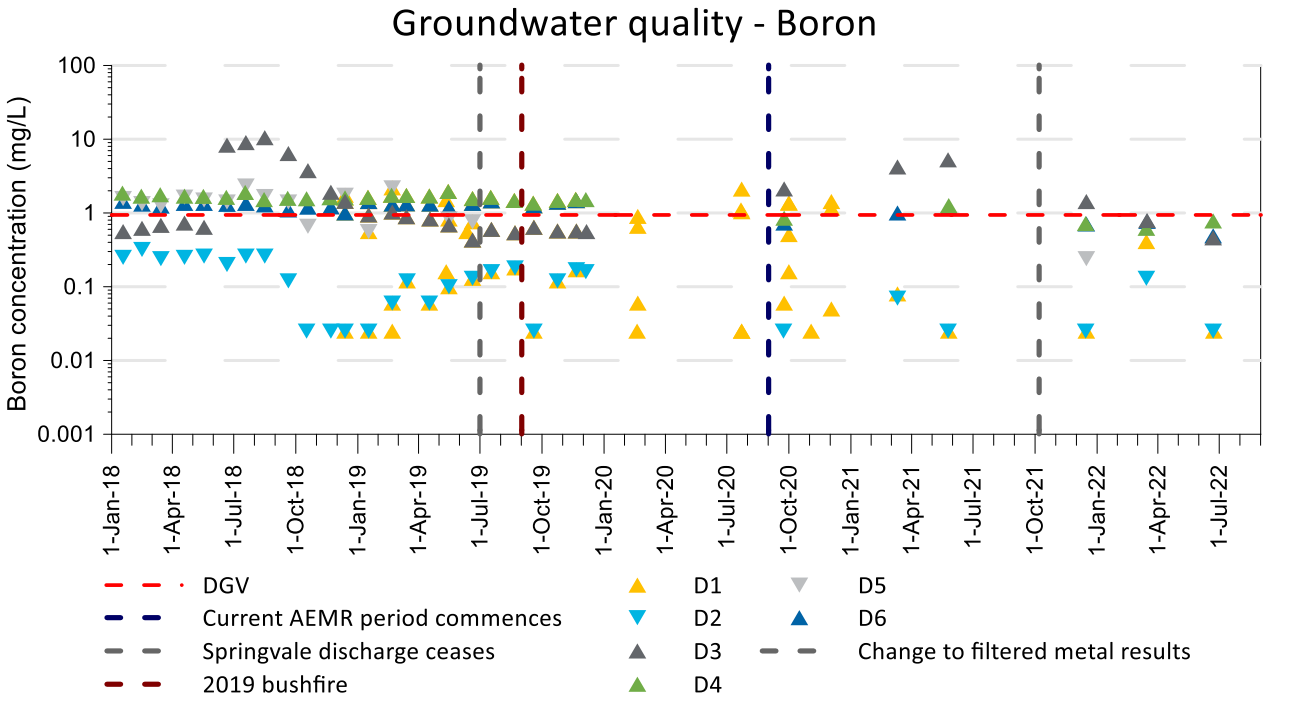
B.1 Physico-chemical parameter charts



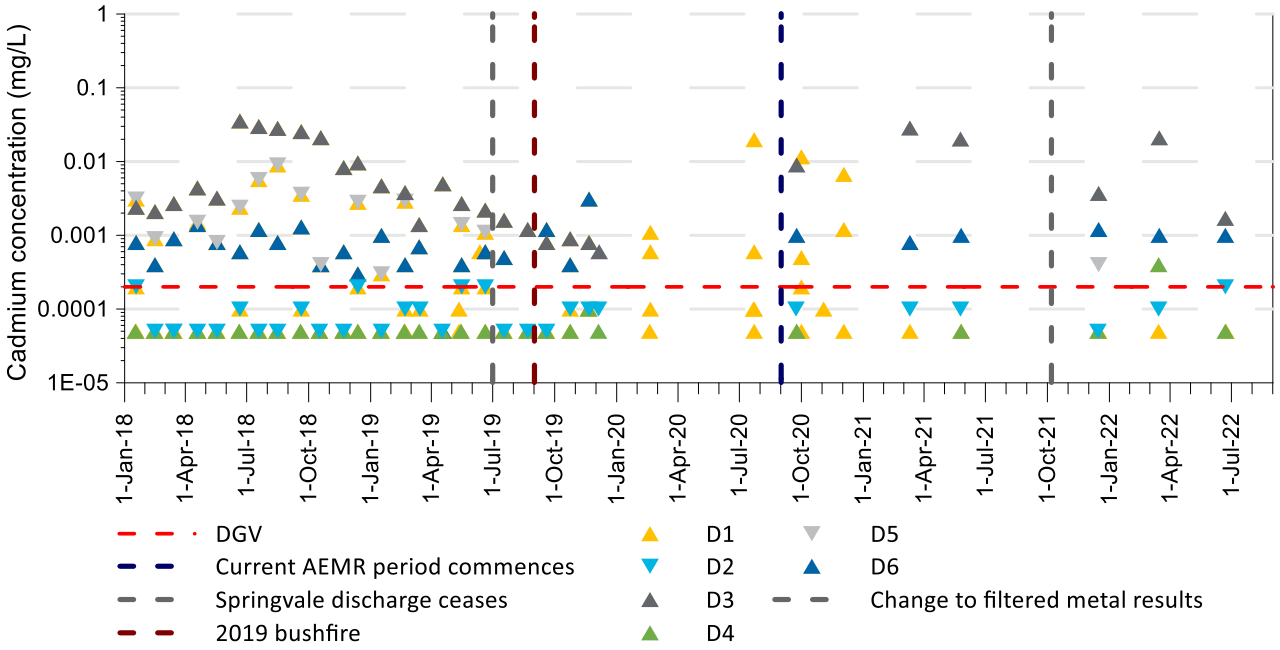


B.2 Metals charts

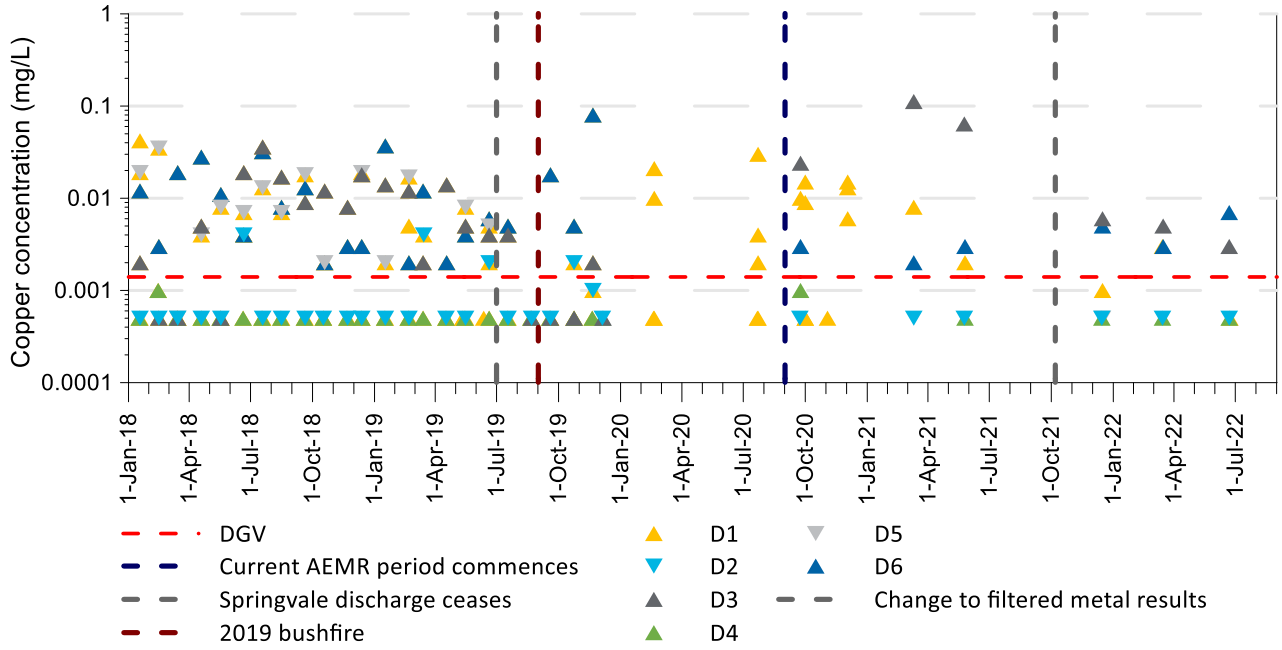


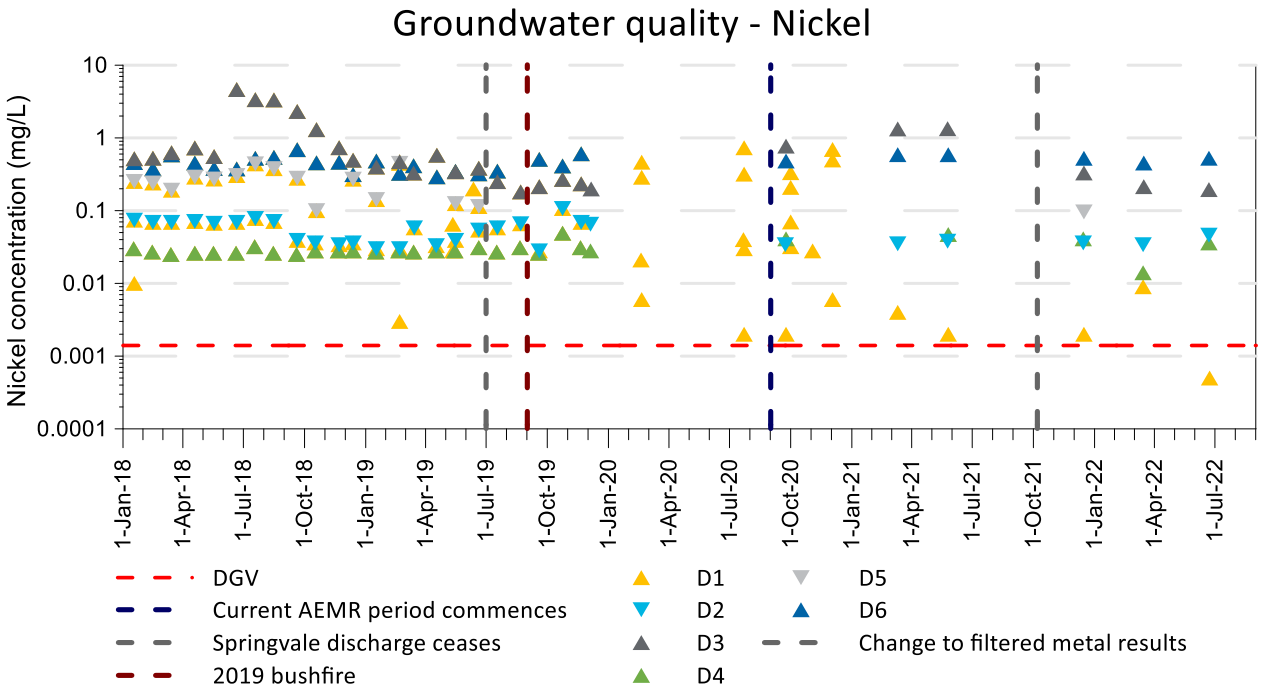


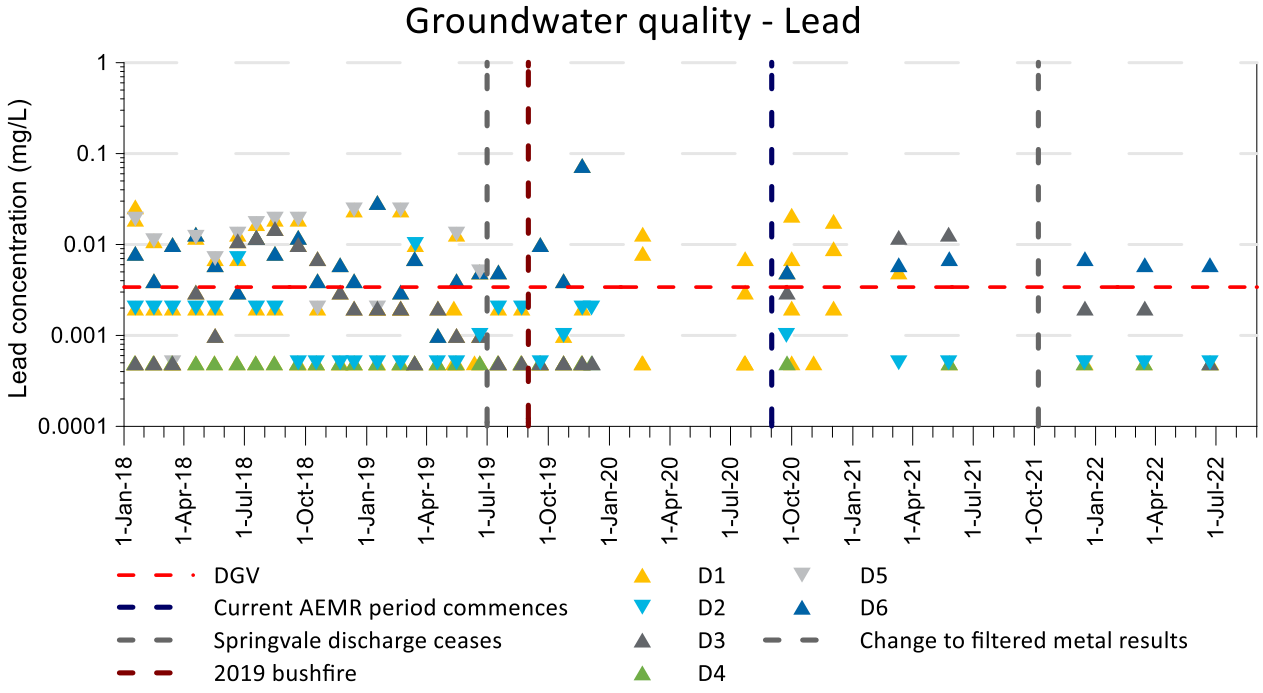
Groundwater quality - Cadmium



Groundwater quality - Copper




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
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
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)
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
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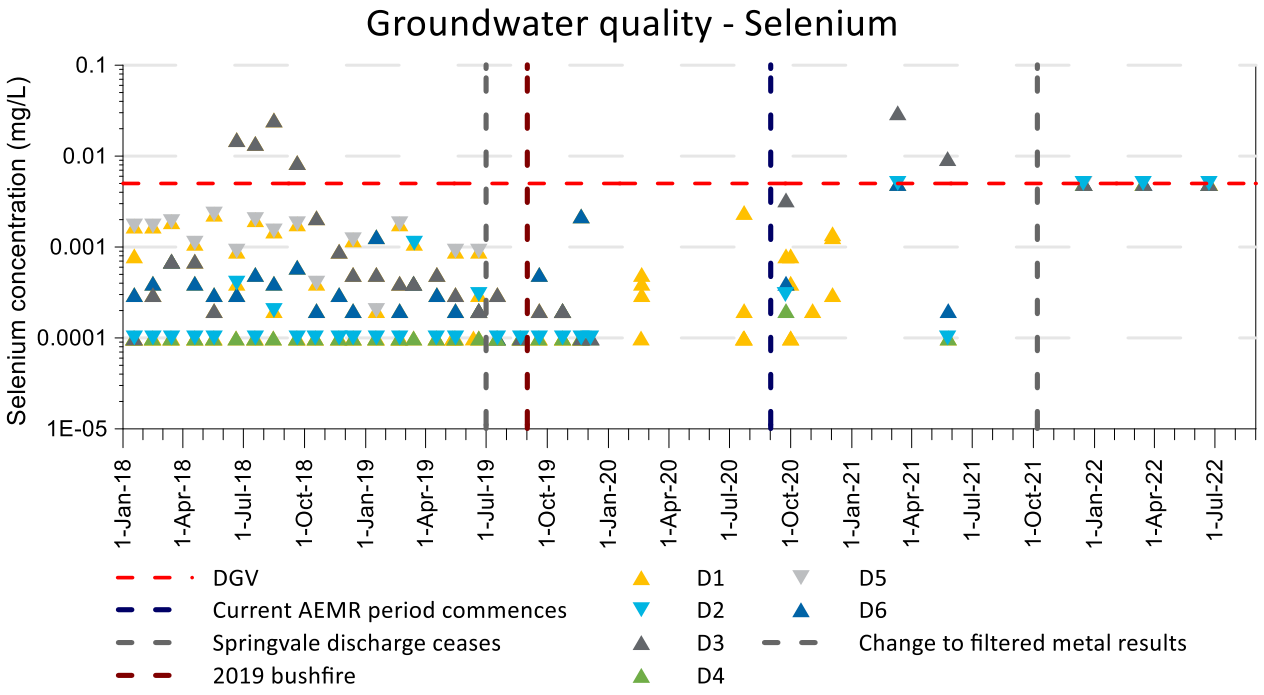
D2
D3
D4
D5
D6
Change to filtered metal results


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
1-Oct-19
1-Jan-20
1-Apr-20
1-Jul-20
1-Oct-20
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DGV
Current AEMR period commences
Springvale discharge ceases
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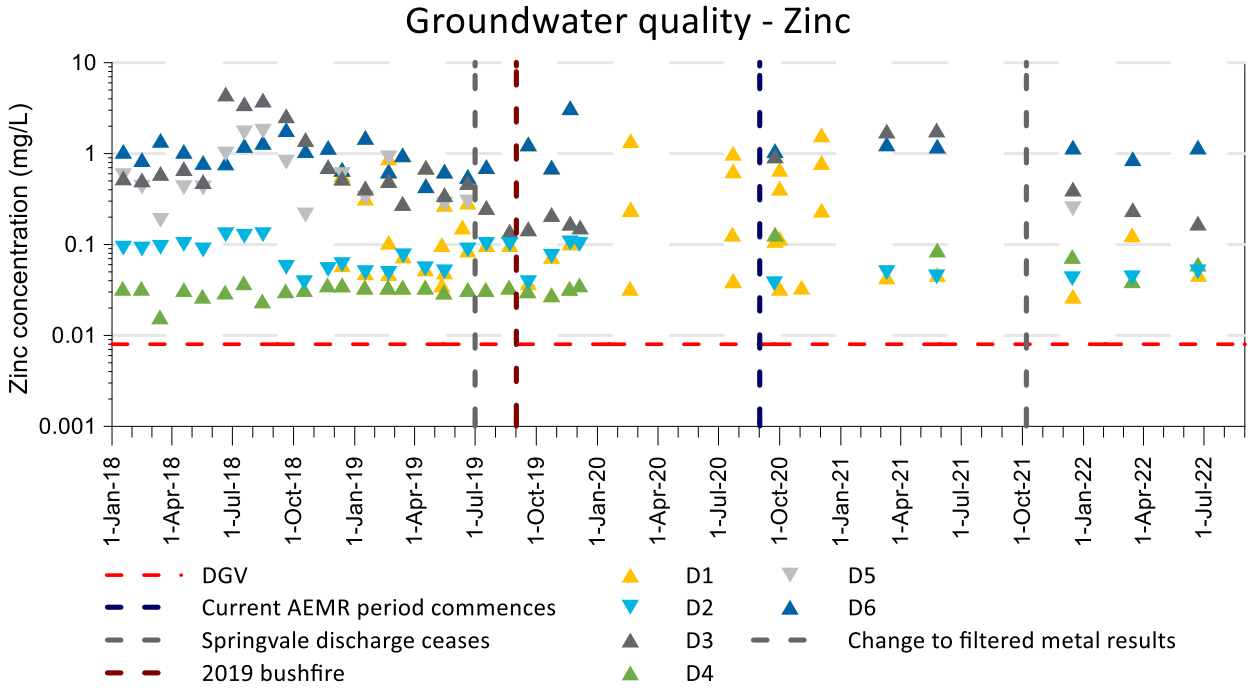
D2
D3
D4
D5
D6
Change to filtered metal results


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

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St Leonards NSW 2065
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NEWCASTLE
Level 3 175 Scott Street
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Level 1 87 Wickham Terrace
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Canberra City ACT 2601

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Abbreviations

List of Abbreviations

Term	Definition
AEMR	Annual Environmental Management Report
ANZECC	Australian and New Zealand Environmental Conservation Council
BoM	Bureau of Meteorology
CEMP	Construction Environmental Management Report
CoA	Conditions of Approval
DDR	Decommissioning, Deconstructing & Rehabilitation
DGV	Default guideline values
DoP	Department of Planning, Industry and Environment
EMM	EMM Consulting Pty Ltd
ENM	Excavated natural material
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPL	Environment Protection Licence
GPM	Generator Property Management Pty Ltd
KVAD	Kerosene Vale Ash Dam
KVAR	Kerosene Vale Ash Repository
LDP	Licence Discharge Point
LGA	Local Government Area
NEMMCO	National Electricity Market Management Company
NSW	New South Wales
OEH	Office of Environment and Heritage
OEMP	Operation Environmental Management Plan
RL	Relative Level
SoC	Statement of Commitments
SSCAD	Sawyers Swamp Creek Ash Dam
VENM	Virgin excavated natural material
WPS	Wallerawang Power Station


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