



Lidsdale Ash Repository
ANNUAL ENVIRONMENTAL
MANAGEMENT REPORT
September 2020–August 2021

Prepared for Generator Property
Management Pty Ltd
November 2021

GPM

 **EMM**
creating opportunities

Annual Environmental Management Report

Lidsdale Ash Repository

Report Number

E210780 RP#1

Client

Generator Property Management Pty Ltd

Date

19 November 2021

Version

v1 Final

Prepared by

Approved by



Nena Lane-Kirwan

Graduate Environmental Scientist

19 November 2021



Amanda Weston

Associate Director

19 November 2021

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

© Reproduction of this report for educational or other non-commercial purposes is authorised without prior written permission from EMM provided the source is fully acknowledged. Reproduction of this report for resale or other commercial purposes is prohibited without EMM's prior written permission.

Table of Contents

1	Summary of Compliance	4
2	Introduction	6
2.1	Background	6
2.2	Site history	6
2.3	Purpose of the AEMR	10
2.4	Project contacts	10
3	Consents, leases and licences	11
3.1	Operational Environmental Management Plan	11
4	Operations during reporting period	12
4.1	Operating hours	12
4.2	Abnormal or emergency operating conditions	12
4.3	Construction activities	13
4.4	Wallerawang DDR Works	13
5	Actions required from previous AEMR review	14
6	Environmental management and performance	15
6.1	Ash delivery and placement	18
6.2	Operational noise monitoring	18
6.3	Ecological monitoring	19
6.4	Air quality monitoring	20
6.5	Waste	25
6.6	Heritage management	25
7	Water management	27
7.1	Environmental management	27
7.2	OEMP updates and future studies	30
7.3	Environmental performance	30
7.4	Reportable incidents	30
7.5	Further improvements	31
8	Landscape and revegetation	32
8.1	Environmental management	32
8.2	Environmental performance	32

8.3	Reportable incidents	35
8.4	Further improvements	35
9	Community	36
9.1	Community engagement	36
9.2	Community contributions	36
9.3	Community complaints	36
9.4	Website information	37
10	Independent audit	38
	References	39
	Abbreviations	40

Appendices

Appendix A Detailed review checklist and recommendations for conditions of approval

Appendix B Noise Report

Appendix C Annual water quality review

Appendix D Lidsdale Ash Repository site Windrose

Tables

Table 1.1	Statement of compliance during the 2020-21 reporting period	4
Table 1.2	Compliance key status	4
Table 3.1	Key consents, leases, licenses and permits	11
Table 4.1	Operations summary	12
Table 6.1	Environmental performance	16
Table 6.2	Noise monitoring locations	18
Table 7.1	OEMP – water monitoring and reporting requirements	29
Table 8.1	Rehabilitation status summary	32
	List of Abbreviations	40

Figures

Figure 2.1	Site location and layout	8
Figure 2.2	Revised ash placement strategy for KVAR – Stages 1, 2A and 2B	9
Figure 6.1	Environmental monitoring location	17

Figure 6.2	Depositional dust summary – Dust Gauge 27	22
Figure 6.3	Depositional dust summary – Dust gauge 28	22
Figure 6.4	Depositional dust summary – Dust gauge 29	23
Figure 6.5	Depositional dust summary – Dust gauge 30	23
Figure 6.6	Depositional dust summary – dust gauge 31	24
Figure 6.7	Depositional dust summary – Dust gauge 32	24
Figure 7.1	Water management features and monitoring locations	28

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 2020-21 reporting period. An extended review of compliance with the Conditions of the Approval (CoA) presented in Appendix A.

Table 1.1 Statement of compliance during the 2020-21 reporting period

Were all conditions of the relevant approval(s) complied with?

Project Approval #07_0005	Yes
Environment Protection Licence #21185	Yes

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: <ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• 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).
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 the Lidsdale Repository site was inaudible at sensitive receivers during the reporting period.
- 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. It is anticipated that the updated OEMP will be implemented during the 2021-2022 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 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 Cocks 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.

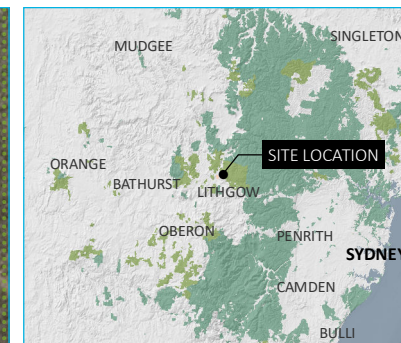
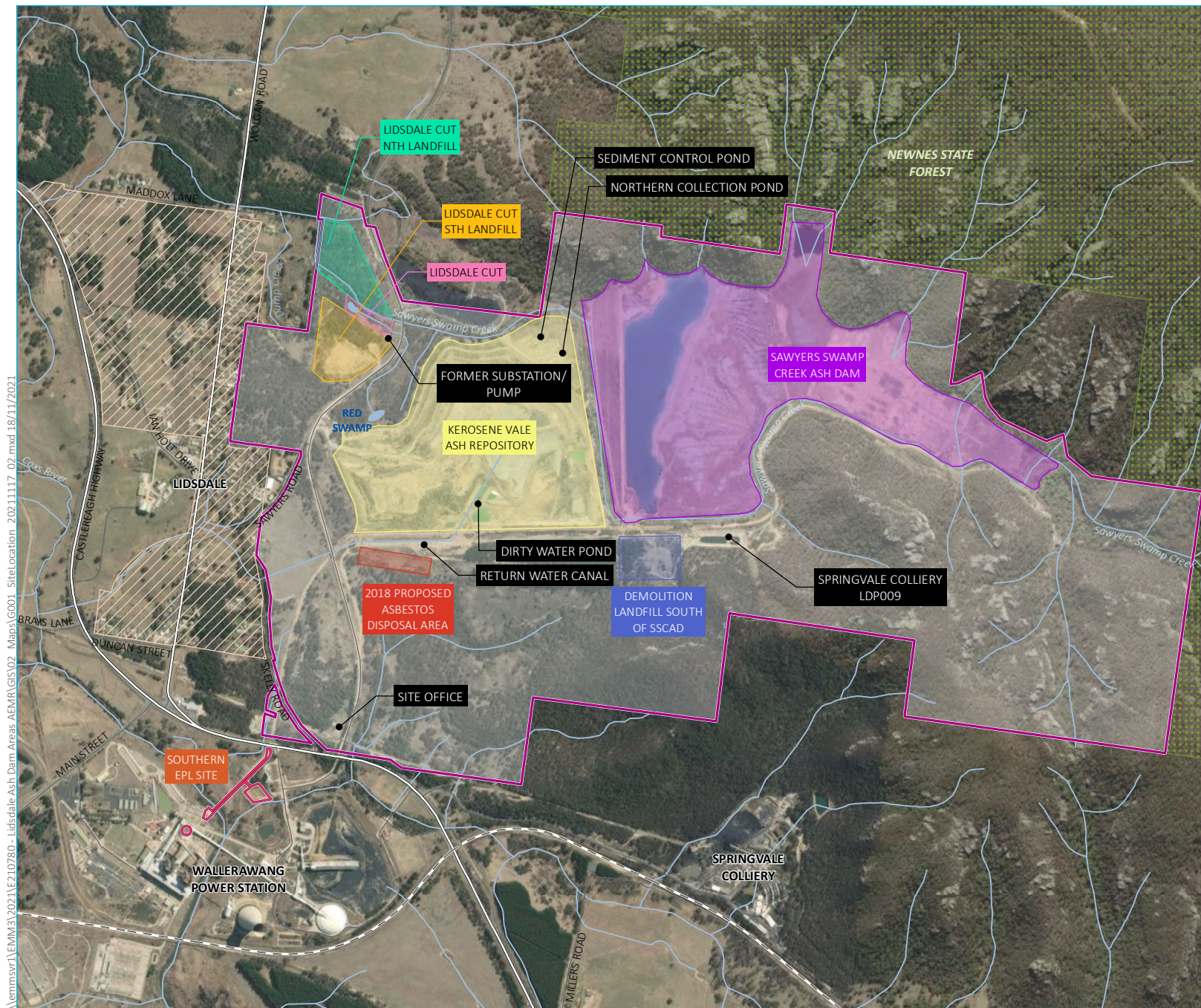
The original ash placement strategy, as outlined within the Operation Environmental Management Plan (OEMP) (EnergyAustralia NSW, 2018), was as follows:

- 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 and is currently being decommissioned and dismantled.

The bulk transport and disposal of ash to the KVAD subsequently ceased following the closure of the WPS. The KVAD is currently being managed in a care and maintenance arrangement. 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.



- 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 Environmental Management Report
Figure 2.1

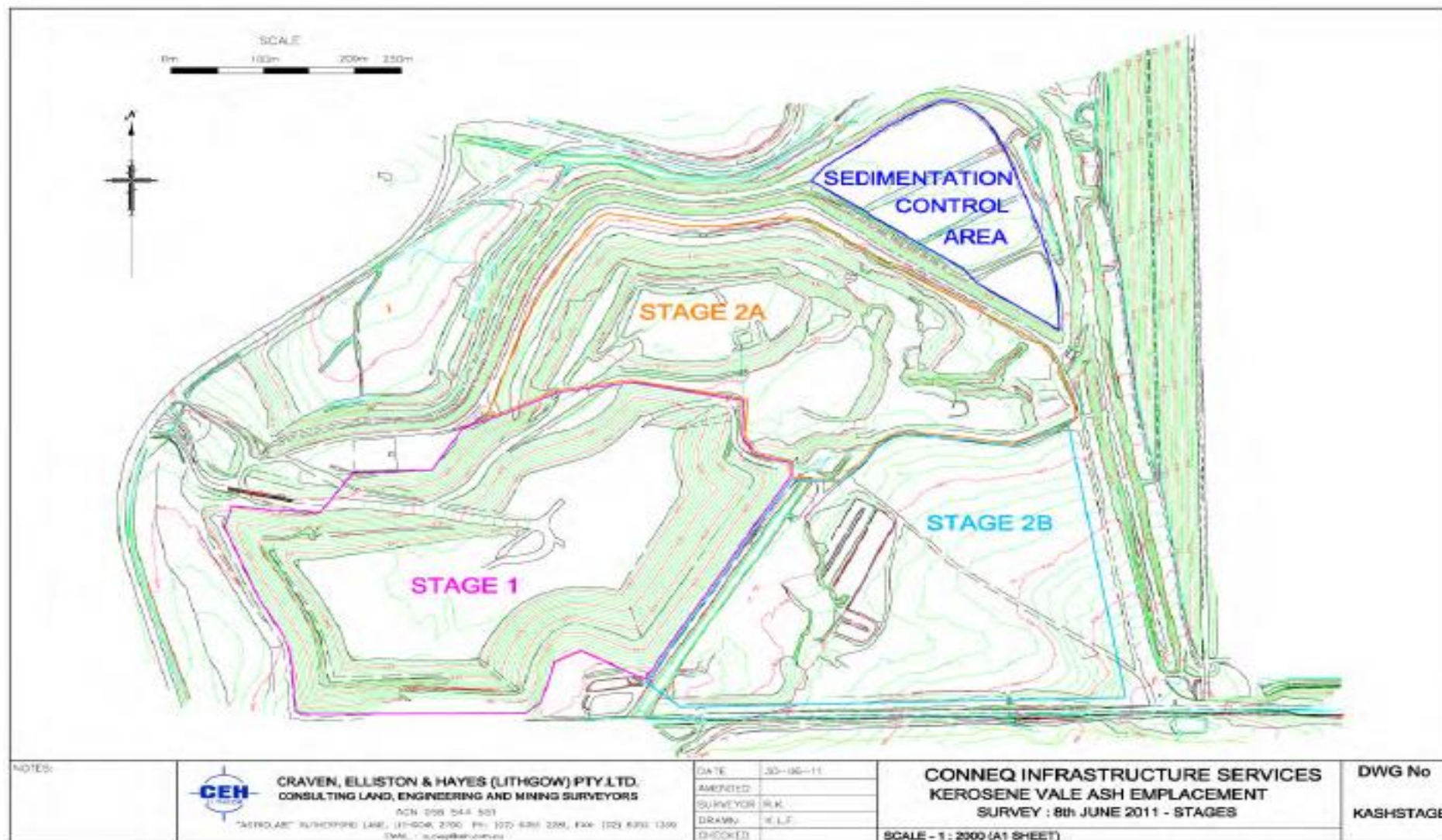


Figure 2.2 Revised ash placement strategy for KVAR – Stages 1, 2A and 2B

Source: EnergyAustralia NSW 2019-2020 AEMR

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 2020 to 31 August 2021 (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:

Mr Paul Glasson

Western Region Manager

M: 0418 708 113

E: paul.glasson@gpmco.com.au

Mr John Pola

Facility Environment & Safety Manager

M: 0429 205 290

E: john.pola@gpmco.com.au

3 Consents, leases and licences

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, licenses 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).

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 contractor to undertake regular, ongoing maintenance activities. The contractor primarily maintains surface water management structures, water sprays for dust suppression and any other 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 and no additional capping or rehabilitation activities were completed. A summary of activities during the reporting period is provided in. (Table 4.1).

Table 4.1 **Operations summary**

Activity	Previous reporting period	This reporting period	Next reporting period
Ash delivered to site (T)	0	0	0
Ash reused (T)	0	0	0
Total Ash footprint (ha)	37.07	37.07	37.07
Area of repository capped (ha)	33.4	33.4	33.4

4.1 Operating 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 operating 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 infrastructure upgrades including:

- installation of a temporary demountable with an ablutions block built to serve as a temporary site crib room;
- installation of a temporary storage facility to house pumps, generators and associated maintenance items;
- replacement of a site transformer enabling upgrades the site electrical system; and
- improvements to the SSCAD discharge system including installation of a temporary pH correction plant.

4.4 Wallerawang DDR Works

The closure of the WPS is outlined in a three-phase plan, that involves the decommissioning, deconstruction and repurposing (DDR) of the Site including the ash repository and SSCAD.

In 2014, the closure and demolition of the Power Station was approved, including development of an asbestos repository on the Site for the disposal of material from the Power Station site. The selected 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). Currently the SSCAD and KVAR are said to remain in an operational state as no remediation or management actions have been taken towards the closure and/or rehabilitation of either repository.

Care and maintenance activities will continue to be undertaken in accordance with the Project Approval and Environmental Protection Licence. Monitoring will be undertaken to ensure compliance with relevant air and noise emission limits. The management of the environmental aspects, including groundwater, surface water and landscape aspects of the Lidsdale Ash Repository, will continue to be monitored and managed to ensure regulatory compliance is achieved.

A development consent has been recently lodged by Greenspot (the current owner of the WPS site) to modify the planning approval to move the proposed asbestos disposal area (currently within the southern part of the Site) to a location within KVAR. The outcome of the development consent remained pending at the time this report was prepared.

The environmental assessment concluded that the environmental impacts associated with the project would be minimal and not expected to increase the impacts from the already approved operational activities at the Site. The existing Site OEMP would effectively manage any environmental risks associated with the project, while a project specific CEMP would be developed to provide explicit guidance for any contractors or staff working specifically on the project and any additional management measures required.

5 Actions required from previous AEMR review

EnergyAustralia NSW received a letter dated 13 July 2020 from the 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 DPIE.

6 Environmental management and 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 Lend Lease as a monthly Client Service Report and through external consultant and internal data and reports. Summaries of these reports are provided in the sections below and in Appendix B and Appendix C.

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.	L _{Aeq} L _{Aeq} (15minute) Location A: 33 dB(A); Location B: 33 dB(A); Location C: 31 dB(A).	Quarter 2 2021. Day L _{Aeq} (15minute) Location A: <30 dB Location B: Inaudible Location C: Inaudible Evening L _{Aeq} (15minute) Location A: Inaudible Location B: Inaudible Location C: Inaudible Quarter 3 2021 Day L _{Aeq} (15minute) Location A: <30 dB Location B: Inaudible Location C: <30 dB 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 – Swayers 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 1.11 to 2.85 g/m ² /month deposited dust	Annual average dust levels show a slight increasing trend.	Nil additional management actions required
Waste	Waste disposal to reflect EPL 21185.	Wastes disposed of accordingly.	Nil waste dispose if at the Repository during the reporting period	Decrease in waste disposed of at the repository.	Nil additional management actions required
Heritage	Minimal impact on heritage values of the area.	Heritage impacts considered to be minimal and are manageable with appropriate and well – established procedures.	No additional heritage sites were identified	No additional heritage sites have been identified during the reporting period.	Nil additional management actions required

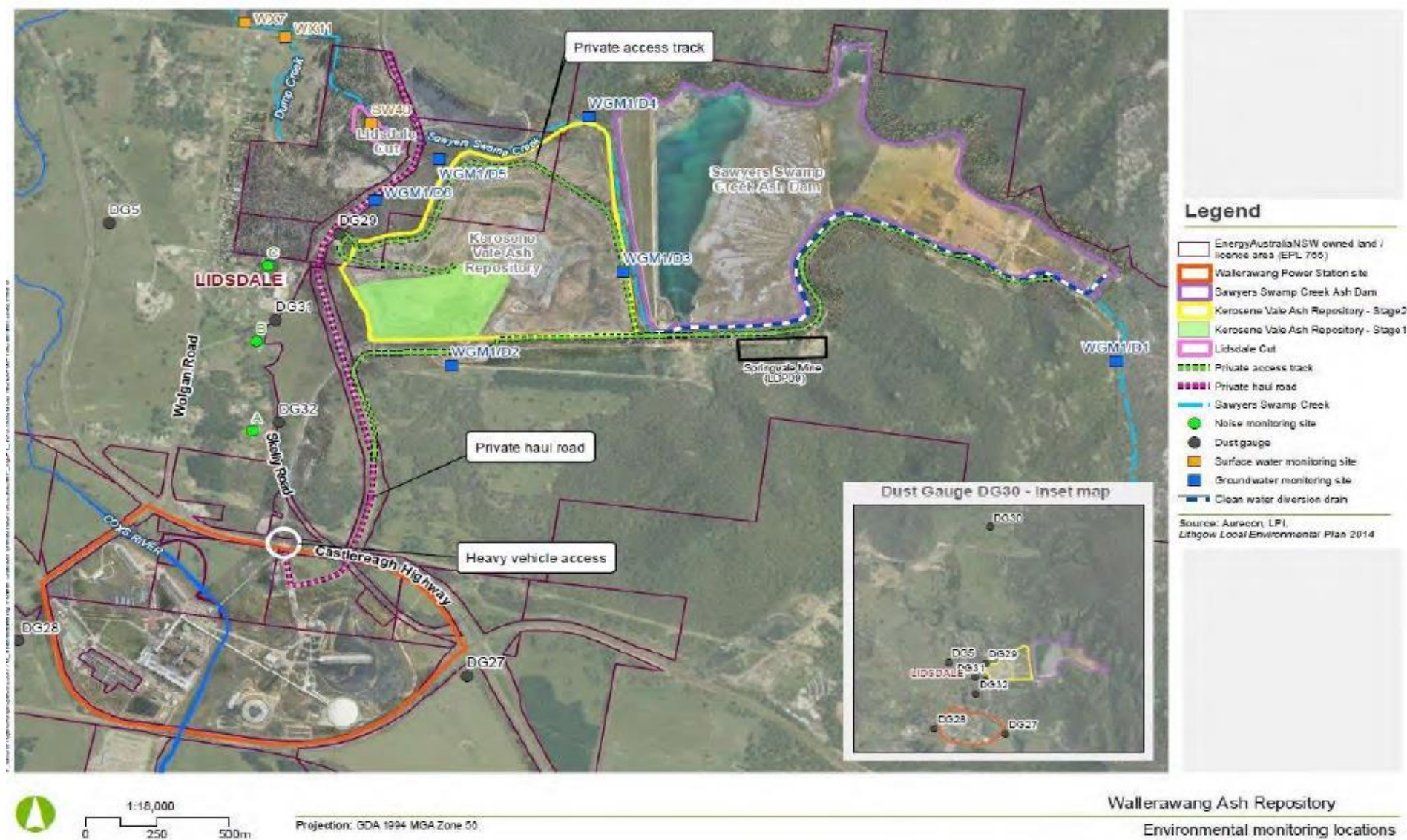


Figure 6.1 Environmental monitoring location

Source: EnergyAustralia 2019-2020 AEMR

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 Operational noise monitoring

6.2.1 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 6.2 and depicted in Figure 2.1.

Table 6.2 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:

- Wind speeds up to 3 m/s at 10 m above ground; and/or
- 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.

6.2.2 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). 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 of 30 June 2021 (Quarter 2) and 18/19 August 2021 (Quarter 3).

Vehicles on nearby roads, conveyors from another mining operation, wildlife and breeze in foliage primarily generated measured noise levels during the Quarter 2 2021 monitoring. Engine and exhaust noise from activities at KVAR was audible briefly during the day measurement at Location A and generated a site-only L_{Aeq} of less than 30 dB.

Vehicles on nearby roads, conveyors from another mining operation, birds and frogs primarily generated measured noise levels during the Quarter 3 2021 monitoring. Engine and exhaust noise from KVAR was audible briefly during the day measurement at Site 1 and generated a site-only L_{Aeq} of less than 30 dB.

Noise levels from the Lidsdale Ash Repository complied with relevant criteria at all monitoring locations during the Quarter 2 and Quarter 3 2021 noise surveys.

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 B.

6.2.3 Reportable incidents

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

6.2.4 Further improvements

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

The scope of the noise monitoring commensurate with the level of activity while the Site is in care and maintenance is currently being reviewed by GPM as a part of the review of the OEMP.

6.3 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.

Therefore, ecological monitoring as required under Condition 3.7 of the Project Approval is not required.

6.4 Air quality monitoring

6.4.1 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 is monitored at 7 depositional dust gauges located in residential areas outside of the Lidsdale Ash Repository (refer to 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.

6.4.2 Environmental performance

i Dust deposition monitoring

Dust gauge data for Lidsdale Ash Repository has been reviewed for the reporting period. During handover of the site from between EnergyAustralia NSW to GPM, the dust data primarily for the month of October (3/10/2020 – 2/11/2020 monitoring period) was not recorded. As per the dust results shown in Figure 6.2 to Figure 6.7 below, it can be assumed that the missing dust monitoring data would follow similar trends as the data recorded for the 4/09/2020 – 2/10/2020 and 3/11/2020 – 4/12/2020 monitoring periods.

The dust gauge data obtained from the reporting period of Lidsdale Ash Repository confirm that air quality emissions have complied with compliance criteria at dust gauges DG28 – DG32.

Two exceedances of insoluble matter were recorded at DG27 during the reporting period. The first exceedance was during the August dust monitoring period 3/07/2021 – 4/08/2021. The second exceedance of insoluble matter at DG27 was during the December dust monitoring period 3/11/2021 – 4/12/2021. The insoluble matter recorded during the August and December dust monitoring period was well above the yearly average, with results recorded 8.7 g/m² and 7.3 g/m² 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 three-year period is presented in Figure 6.2 to Figure 6.7. An examination of the historical data indicates a slight increase in the depositional dust concentrations in dust gauges situated around the Lidsdale Ash Dam Areas. This correlates with the extended drought conditions between 2018 to 2019 which was associated with frequent state-wide dust storms and the severe fire season over the 2019 and 2020 summer.

Operations at WPS and Lidsdale Ash Repository Areas ceased in April 2014, with a reduction during the care and maintenance phase (2014 onwards) from previous site depositional dust concentrations. Depositional dust results are shown to be considerably lower than the concentrations predicted in the Environmental Assessment performed by Parsons Brinckerhoff (2008b) for KVAR Stage 2 (predicted annual average of 3.5 g/m²/month deposited dust).

Historical high depositional dust gauge readings have generally been isolated events and are often associated with elevated combustible material which indicates possible insect activity or other similar type interference. Elevated results typically occur over the warmer months. It is possible that hazard reduction burns, and state-wide dust events may influence these results as well. The Lidsdale Ash Repository is under care and maintenance with minimal activity and vehicle movements. No additional air quality control measures have been implemented beyond the existing effective practices with ongoing trends indicating the Lidsdale Ash Repository is not impacting air quality in the local area.

In November 2019 monitoring of DG5 ceased and the dust gauge was removed from its location by EnergyAustralia NSW at the request of the landowner. GPM now take responsibility as the current owners of the site to reinstate DG5 at the landowner's request.

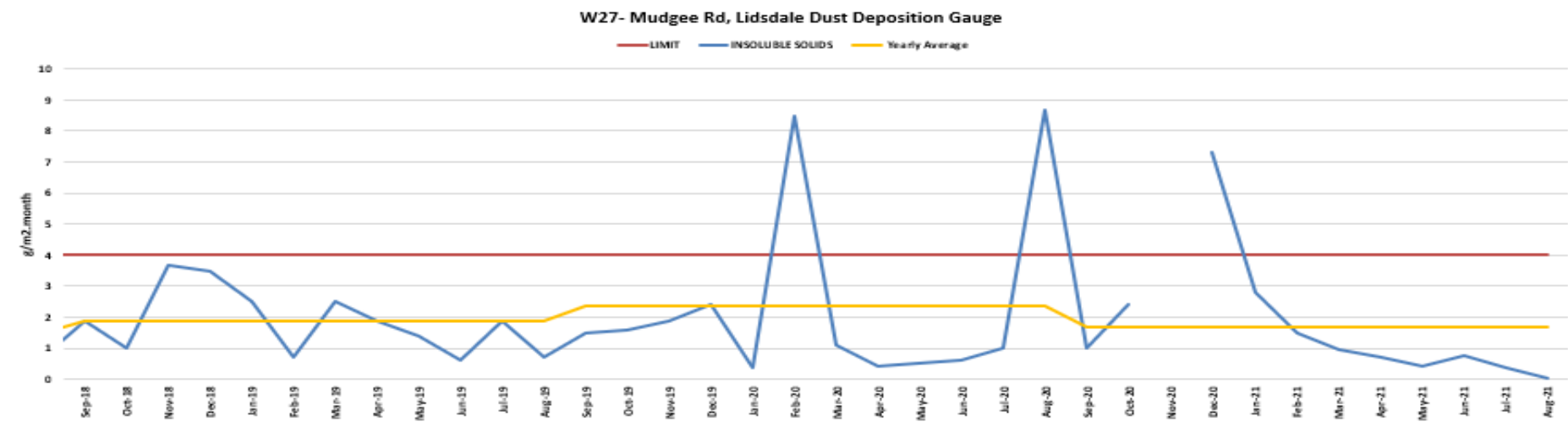


Figure 6.2 Depositional dust summary – Dust Gauge 27

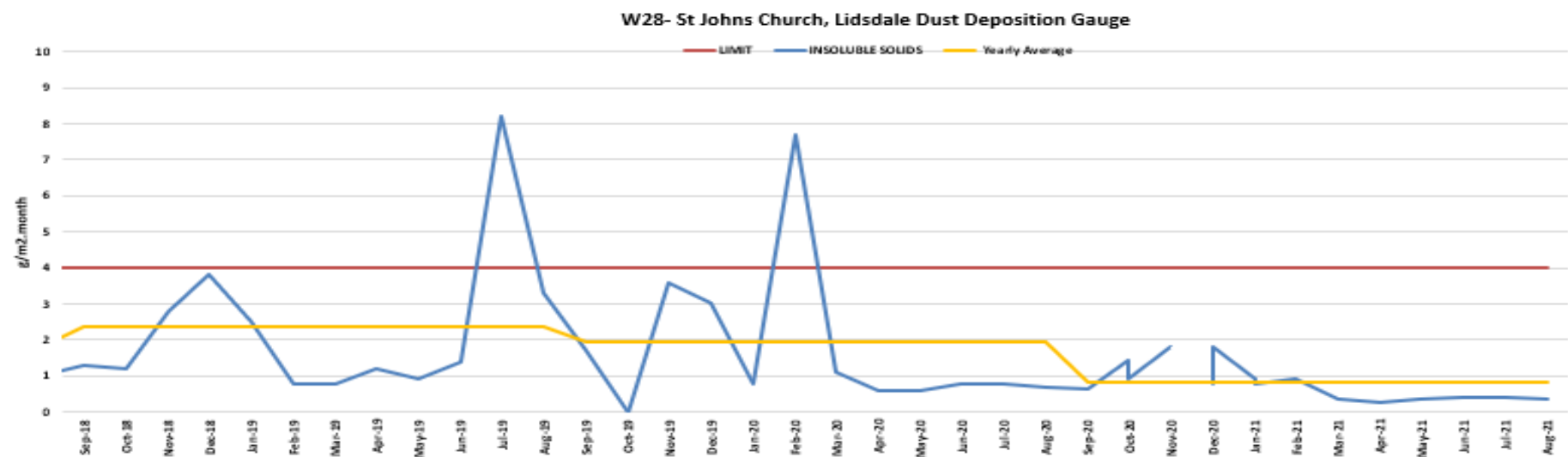


Figure 6.3 Depositional dust summary – Dust gauge 28

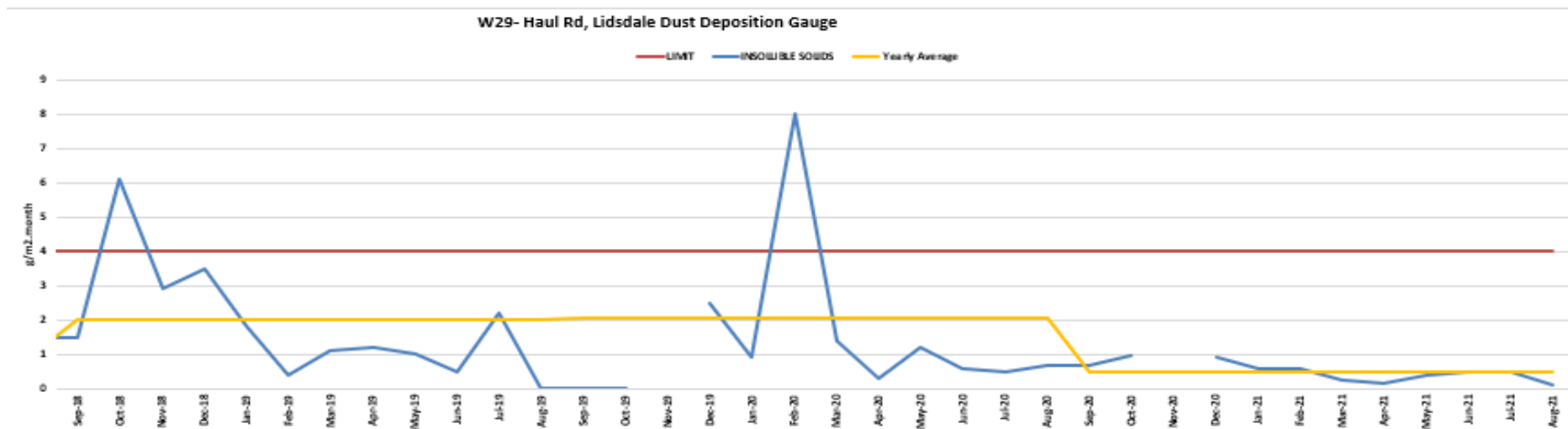


Figure 6.4 Depositional dust summary – Dust gauge 29

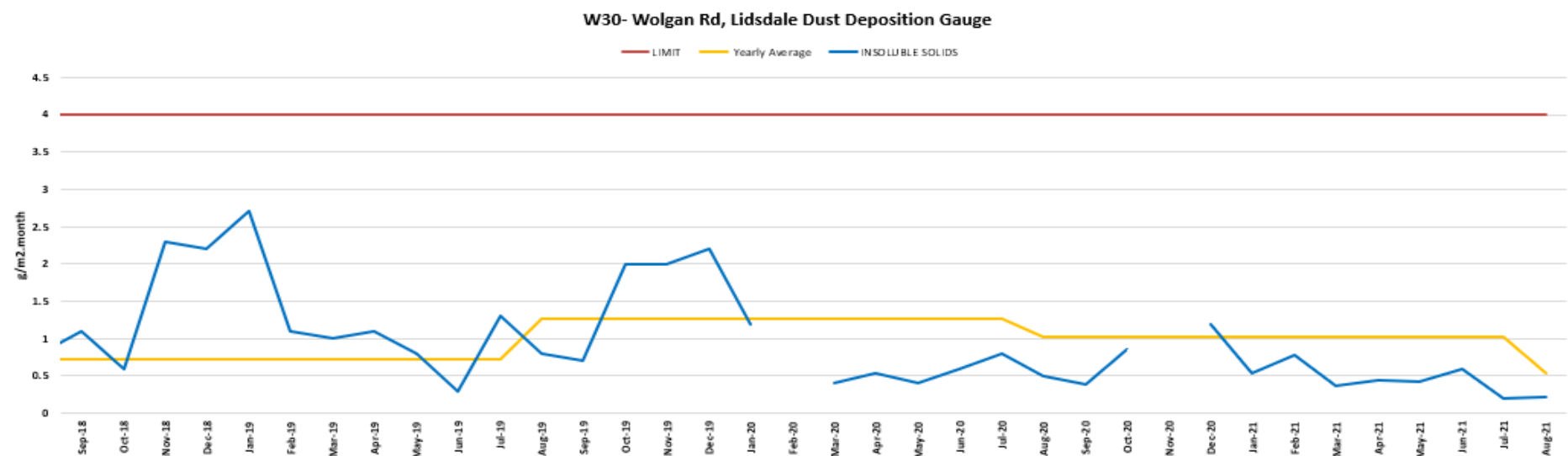


Figure 6.5 Depositional dust summary – Dust gauge 30

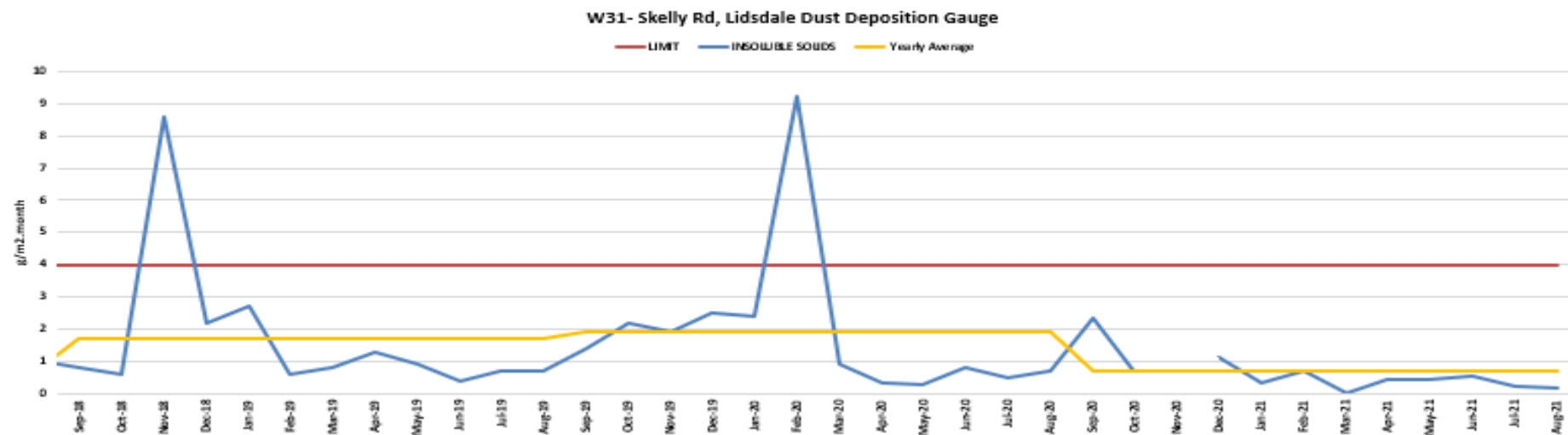


Figure 6.6 Depositional dust summary – dust gauge 31

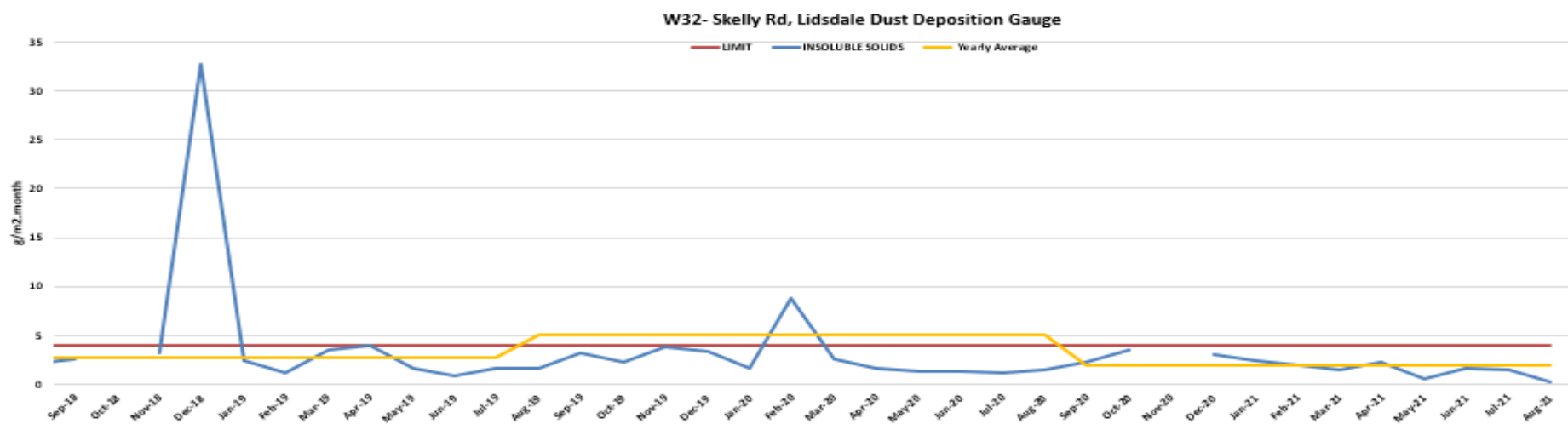


Figure 6.7 Depositional dust summary – Dust gauge 32

6.4.3 Reportable incidents

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

6.4.4 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. GPM have set up new contracts for the dust gauge monitoring to ensure sampling continues uninterrupted.

6.5 Waste

6.5.1 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.

6.5.2 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.

6.5.3 Reportable incidents

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

6.5.4 Further improvements

No further waste management improvements are proposed.

6.6 Heritage management

6.6.1 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. The heritage management measures are specifically addressed in the Ash delivery and placement sub-plan.

The Environmental Assessment 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.

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.

6.6.2 Environmental performance

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

6.6.3 Reportable incidents

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

6.6.4 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 C.

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 managed in the following systems, which are located in Figure 7.1:

- **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 and SSCAD embankment drainage systems and water pumped from the Power Station site. This water transfer is undertaken in accordance with a commercial agreement with the Power Station site operator and EPL conditions for both the Power Station and the Site. The transfer of potentially contaminated water to SSCAD Pond assists in minimising incidental surface and groundwater discharges from both the Site and the Power Station. The SSCAD Pond also receives runoff from direct rainfall, some clean water catchment areas and overflows from the SSCAD Upper Dam (described below). Water accumulation in the SSCAD Pond is managed via irrigation to exposed ash areas and at times via controlled discharges into the Coks River at a licensed discharge point located within the Power Station site (referred to as LDP3). Controlled discharges are treated in the Caustic Injection Plant (CIP), which adjusts pH and reduces metal concentrations. It is noted that controlled discharges at LDP3 are monitored in accordance with the requirements in EPL no. 21185 and is reported in the annual return.
- **SSCAD – Upper Dam** refers to dam Sections B, C and D (see Figure 7.1) which are in the eastern portion of the SSCAD. Each of these sections has been separated by shallow earthen embankments. Sections C and D have been partially capped while Section B comprises mostly exposed ash. Runoff from several clean water catchments located to the north of SSCAD (the Northern Catchments) accumulates in each of these bunded areas. These catchments have a combined area of 210 ha. Macrophytes have established in each section due to the flat surface levels and ephemeral inundation regime. Water that accumulates in Sections B, C and D is known to be clean and is pumped into the Sawyers Swamp Creek Diversion.
- **SSCAD embankment drainage system** is a drainage system that collects seepage from the toe of the SSCAD embankment. Collected water is pumped into the SSCAD Pond on an ongoing basis.
- **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, which are dewatered to the SSCAD Pond via pumping.
- **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 Water Management Area. The diversion joins the original Sawyers Swamp Creek channel to the north-west of the KVAR Water Management Area.

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

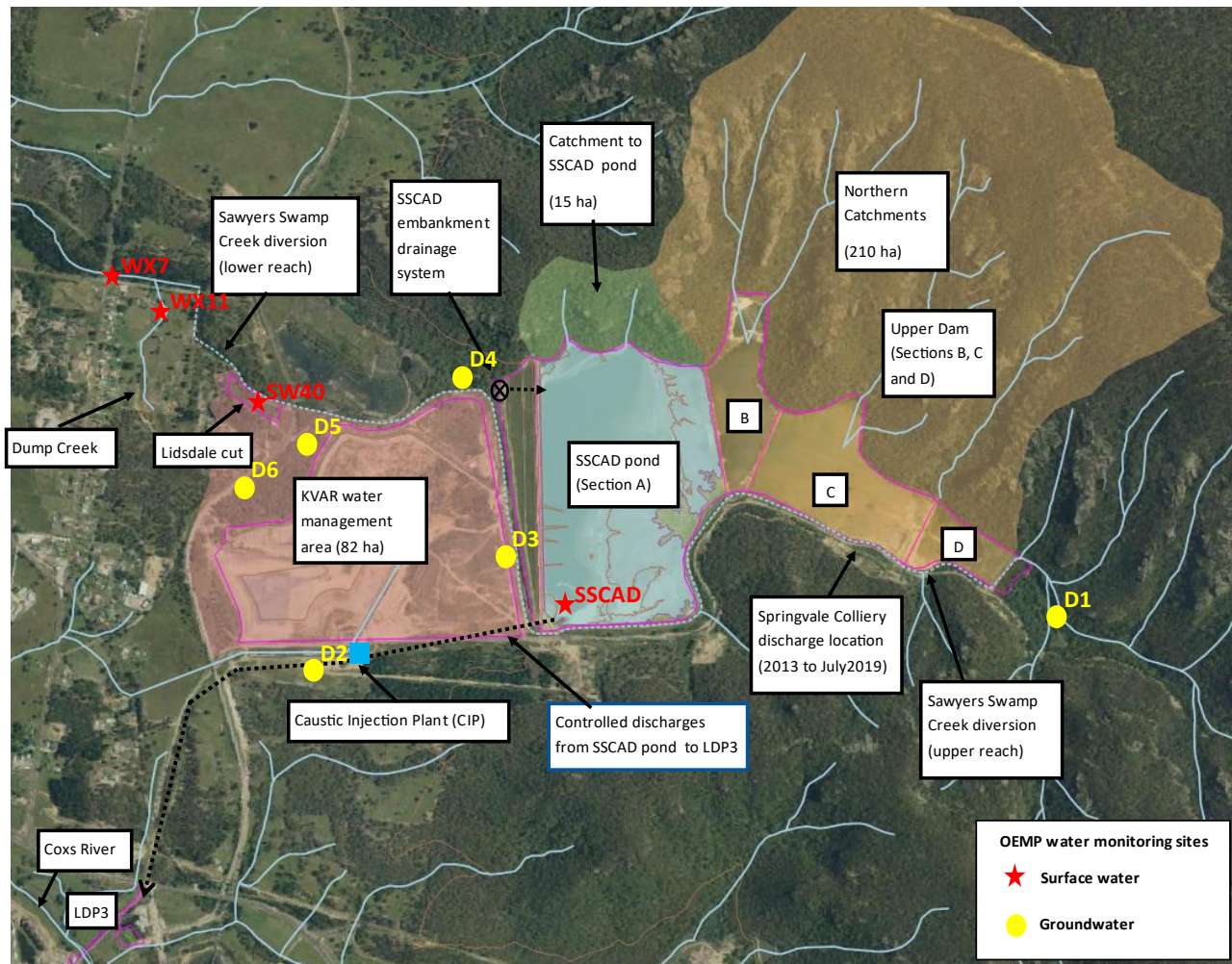


Figure 7.1 Water management features and monitoring locations

7.1.2 Water management actions over the period

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 following water management actions have been undertaken over the period:

- Potentially contaminated water captured within the KVAR and SSCAD embankment drainage systems was pumped into SSCAD Pond.
- Potentially contaminated water from the Power Station site was pumped into SSCAD Pond. This water transfer was undertaken in accordance with a commercial agreement with the Power Station site operator and EPL conditions for both the Power Station and the Site.
- A new CIP was constructed and commissioned to treat water from SSCAD Pond prior to discharge.
- Following commissioning of the CIP, the SSCAD Pond was dewatered to restore flood storage capacity.

- Several measures were undertaken to improve clean water management including ensuring all stormwater drainage channels are unblocked and free draining.
- Near the end of the AEMR Period GPM identified that parts of the KVAR subsurface drainage system was in poor condition. This may have resulted in contaminated seepage from the KVAR water management system entering Sawyers Swamp Creek. GPM have initiated works to reinstate the subsurface drainage, which will assist in separating contaminated water from Sawyers Swamp Creek.

GPM have undertaken a review of existing water management and monitoring practices and propose to implement updated practices, which will be documented in the updated OEMP (described in Section 7.2).

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 this report.

It is noted that some water from SSCAD Pond was dewatered to LDP3 over the period. These discharges were monitored and reported in accordance with the requirements of EPL no. 21185. The associated data is not reported in this AEMR as the scope of this review is to address the OEMP.

Table 7.1 OEMP – water monitoring and reporting requirements

	Description	OEMP reference	AWQR reference
Surface water			
Monitoring	Monthly water quality monitoring at four locations: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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

Table 7.1 OEMP – water monitoring and reporting requirements

	Description	OEMP reference	AWQR reference
Analysis	Groundwater quality monitoring data is to be assessed against: <ul style="list-style-type: none">• 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 OEMP updates and future studies

GPM are currently updating the OEMP which will include a revised water monitoring and analysis approach. It is anticipated that the updated OEMP will be implemented during the 2021-2022 AEMR period.

GPM is also currently in discussions with regulators as to the best management and regulatory approach for the Site. It is anticipated that several future studies will be undertaken that will result in an improved understanding of both the water cycle processes that may contribute to discharges and the extent and nature of known surface and groundwater contamination at the Site. These studies are currently being discussed with regulators and are generically referred to as future studies in this chapter and in the AWQR.

7.3 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 2017 to the current period in the AWQR);
- surface water quality varies due to wet weather; and
- some incidental discharge of contaminated water into Sawyer Swamp Creek is occurring. Inflows from Dump Creek are one known source.

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.

7.4 Reportable incidents

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

7.5 Further improvements

GPM propose the following water management improvements:

- reinstate parts of the KVAR subsurface drainage system that are in poor condition;
- review potential sources of contamination as part of future studies that are currently being discussed with regulators; and
- update the OEMP with a revised water monitoring and analysis approach. It is anticipated that the updated OEMP will be implemented during the 2021-2022 AEMR period.

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.

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 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.	Not Applicable – No capping has been performed during the 2020-2021 reporting period.
Revegetation	Develop a broad acre planting strategy on slopes at a 1 to 4 ratio.	Satisfactory – As per previous AEMR, a Repository Management Plan (Lend Lease, 2012) has been developed.
	A developed revegetation procedure in place and implemented.	Satisfactory – As per previous AEMR, a Repository Management Plan (Lend Lease, 2012) has been developed.
	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.

Table 8.1 Rehabilitation status summary

Performance indicator	Completion criteria*	Current status (reporting period)
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.
Rehabilitation	All new batters rehabilitated as soon as practicable.	Not Applicable – No new batters have been developed.
	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 no new areas rehabilitated during the reporting period.

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

Approximately 7.0 ha have had topsoil applied and have been seeded and is actively growing and is considered to be land under active rehabilitation. Landscaping and revegetation at Site for the 2020-21 reporting period has been limited to maintaining the previous planting and weed management for blackberry, thistle and pampas grass colonisation. Successful spraying campaign was completed in May 2021 and again in September/October 2021.

A review of the weed management for the site will be undertaken as part of the review and potential update to the OEMP.

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). No capping has been performed during the 2020-2021 reporting period.

The majority of 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 are considered to be in line with the relevant OEMP target, given the project's progress to date.



Photograph 8.1 Lidsdale Ash Repository Stage 1 rehabilitation works– planted August 2014, photo taken September 2021



Photograph 8.2 Lidsdale Ash Repository Stage 1 rehabilitation works– planted August 2014, photo taken September 2021



Photograph 8.3 **Lidsdale Ash Repository Stage 1 rehabilitation works – planted August 2014, photo taken September 2021**

8.3 Reportable incidents

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

8.4 Further improvements

A review of the weed management for the site will be undertaken as part of the review and potential update to the OEMP.

9 Community

9.1 Community engagement

In September 2020, GPM announced their ownership of the Lidsdale Ash Repository through a media release available on GPM's website (<https://gpmco.com.au/media-releases/>).

A community update was posted on GPM website during February 2021. The update advised that GPM had undertaken some clearing works of buffer land at the KVAR and SSCAD, to reduce fire risk and the presence of vermin behind properties along Wolgan Road and Neubeck Street, Lidsdale.

9.2 Community contributions

GPM have undertaken work which benefits the community and region.

9.2.1 Heritage barn

During the reporting period GPM have completed a revitalisation project on a heritage barn located near the Site on Skelly Road. The heritage barn is listed under the NSW Heritage Act and previously served as a coach stop and later as a dairy. Care and maintenance works included replacing burnt rafters, removing rubbish, landscaping, removing existing asbestos piping and installing new fencing and roof sheeting. All activities were carried out in accordance with the standards required with maintaining structures listed under the NSW Heritage Act.

9.2.2 Vegetation management

GPM have undertaken extensive vegetation management works around the Lidsdale Ash Repository. The work was undertaken to reduce the fire risk to near-by residences and the Site. The vegetation management also served to minimise the presence of vermin behind properties along Wolgan Road and Neubeck Street at Lidsdale. Work was undertaken in consultation with locals and in accordance with the RFS requirements.

Vegetation management was also undertaken to clear vegetation which impeded visibility at the Skelly Road and Castlereagh Highway intersection.

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:

- Draft Preliminary Site Investigation (PSI) (currently with the NSW EPA for review and comment).
- Water Quality Discharge Assessment (currently with the NSW EPA for review and comment).
- Pollution Reduction Study - – Development of a Coal Ash Repository Water Sampling Program (Due to EPA NSW by 31 January 2022).
- 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.

References

EnergyAustralia NSW 2018, Wallerawang Ash Wallerawang Ash Repository Operational Environmental Management Plan (OEMP)

Hyder Consulting 2001, Wallerawang Ash Management Proposed Dry Ash Handling Facility

Lend Lease 2012, Ash & Dust Repository Management Plan - Wallerawang Power Station, MP-PL-702 Version 05. 1st June 2012

NSW EPA 1999, Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-liquid Wastes

Parsons Brinckerhoff 2008a, Stage 2 Kerosene Vale Ash Repository Operation Environmental Management Plan

Parsons Brinckerhoff 2008b, Stage 2 Kerosene Vale Ash Repository Environmental Assessment

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

Appendix A

Detailed review checklist and recommendations for conditions of approval

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 13 July 2020 from the 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 DPIE.

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 General Property Managers Co EPL 21185. (See 3.1).

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 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, as no construction activities have taken place.

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 2 and Quarter 3 2021 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 result of the review, it is determined that ash haulage and placement times can commence later and/or finish earlier, the Proponent shall aim to observe the reduced hours whenever possible.

Compliance assessment Observations and Comments

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 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.

Compliance assessment Observations and comments

Lend Lease 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) a) the dates and a description of the emergency situations;*
- b) b) an assessment of all reasonable and feasible mitigation measures to avoid recurrence of the emergency situations;*
- c) c) identification of a preferred mitigation measure(s); and*
- d) 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 LAeq (15 minute) of 40 dB(A) at the nearest most affected sensitive receiver during normal operating hours as defined in condition 2.8 of this approval.

This noise criterion applies under the following meteorological conditions:

- wind speeds up to 3 m/s at 10 metres above ground; and/or
- temperature inversion conditions of up to 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.

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 August 2021 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, but not limited to –
 - i) Construction of a noise barrier along the haulage road*
 - ii) Alternative ash haulage routes, and*
 - iii) Alternative methods of ash conveyance to the repository; and**
- b) Identification of the preferred measure(s) for reducing noise at the source;*
- c) Feedback from directly affected property owners and the EPA on the proposed noise mitigation measures; and*
- d) Location, type, timing and responsibility for implementation of the noise mitigation measure(s).*

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

Compliance Assessment Observations and Comments

During handover of the site from between EnergyAustralia NSW to GPM Co, the dust data primarily for the month of October (3/10/2020 – 2/11/2020 monitoring period) was not recorded. Dust data trend analysis (as detailed in section 6 or the AEMR) show that the missing dust monitoring data would likely follow similar trends as the data recorded for the 4/09/2020 – 2/10/2020 and 3/11/2020 4/12/2020 monitoring periods.

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 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.

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 2.25 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.

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 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 Director-General 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 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 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.

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 and operation of the project entering waterways.

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

Compliance Assessment Observations and Comments

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 which are dewatered to the SSCAD Pond via pumping. 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 reasonable and 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

Lend Lease supply GPM with Monthly Client Service Reports 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.

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 loading or unloading ash material.

Compliance Assessment Observations and Comments

No issues with load coverings were recorded for the 2020-21 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

Lend Lease 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) of this approval; and*
- c) Adhere to a Construction Vehicle Code of Conduct prepared to manage driver behaviour along the local road network to address traffic impacts (and associated noise) along nominated haulage routes.*

Compliance Assessment Observations and Comments

A Construction Traffic Management Plan was submitted to and approved by the DPI as part of the Construction Environment Management Plan. Updating of the Operational Environmental Management Plan is underway to include a Transport Management Plan for the haulage of capping material (consent conditions 2.36A, & 6.5 f)

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. A Transport Management Plan is in the process of being prepared in consultation with RMS and Council, prior to importing capping material from sources outside of the Lithgow local government area.

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 is in the process of being prepared in consultation with RMS and Council, prior to importing capping material from sources outside of the Lithgow local government area.

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 and non-indigenous heritage sites and items.

Compliance Assessment Observations and Comments

The Lend Lease Work Procedures 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

Lend Lease 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 Lend Lease 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 approval and 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 describing any 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 predicted noise 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, the Proponent 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 DPI 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 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, 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 local groundwater quality and hydrology. The program shall be developed in consultation with, and to the satisfaction of, WaterNSW, and shall describe the location, frequency, rationale and procedures and protocols for collecting groundwater samples, as well as the parameters analysed and methods of analysis. The monitoring program shall be ongoing for the life of the project and include, but not be limited to:

- a) Monitoring at established bore sites (or replacement bore sites in the event that existing sites are damaged or lost) as described in the document referred to under condition 1.1b) of this approval; and*
- b) A schedule for periodic monitoring of groundwater quality, depth and flow at all monitoring sites, at an initial frequency of no less than once every month for the first 12 months of operation.*

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

Compliance Assessment Observations and Comments

A Groundwater Monitoring Program in the form of the Groundwater Quality sub-plan was developed as part of the OEMP (EANSW, 2018) and provided to EnergyAustralia NSW to determine the minimum monitoring requirements for groundwater following receipt of approval from the DPI. 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 the parameters 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 and post 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 phosphorus and 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.

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 shall include but not necessarily be limited to, monitoring for dust at the monitoring sites identified in the document referred to under condition 1.1b) 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 DPI. 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 DPI 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 track compliance with the requirements of this approval and shall include, but not necessarily be limited to:

- a) Provisions for periodic review of the compliance status of the project against the requirements of this approval and the Statement of Commitments detailed in the document referred to in condition 1.1(c) 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/or Environmental 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 approval relevant to their respective activities.*

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

Compliance Assessment Observations and Comments

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

Lend Lease (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 information associated with the project. The Proponent shall, subject to confidentiality, publish and maintain up-to-date information on this website or dedicated pages including, but not necessarily limited to:

- a) The documents referred to under condition 1.1 of this approval;*
- b) This project approval, Environment Protection Licence and any other relevant environmental approval, licence or permit required and 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
- Operation Environmental Management Plan
- Annual Environmental Management Reports
- Environment Protection Licence 21185
- Pollution Incident Response Management Plan

Compliance Assessment Finding - Compliant

Complaints and enquiries procedure

Condition of Approval 5.3

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

A 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 the commencement 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) independent of 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 Lend Lease 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

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 along haulage 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 to land 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

Conditions of Approval 6.4 and 6.5

6.4 – The Proponent shall prepare and implement an Operation Environmental Management Plan to detail an environmental management framework, 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 the project;
- 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 be periodically 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 from the Secretary.

Nothing in this approval precludes the Proponent from incorporating the requirements of the Operational Environmental Management Plan into existing environmental management systems and plans 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 Proponent shall 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 in consultation with, and to the satisfaction of, WaterNSW and 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 erosion and the discharge of sediments and other pollutants to land and/or waters throughout the life of the project. The Plan shall be based on best environmental practice and shall be prepared in consultation with, and to the satisfaction of, WaterNSW and 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

i. 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, Lend Lease (site contractor) conduct routine site inspections. These inspections are provided to GPM in the form of monthly reports.

GPM are currently reviewing the site OEMP to ensure it reflects current care and maintenance activities. As part of the review and potential update to the OEMP, GPM will be updating the Site's Compliance Tracking Program

Compliance Assessment Findings - Compliant

Environmental Reporting

Environmental incident reporting

Conditions of Approval 7.1 and 7.2

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

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

Compliance Assessment Observations and Comments

There were no reportable incidents during the 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 Environmental Management Report (AEMR). The AEMR shall review the performance of the project against the Operation Environmental Management Plan (refer to condition 6.4 of this approval) and the conditions of this approval. The AEMR shall include, but not necessarily be limited to:

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

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

Compliance Assessment Observations and Comments

This AEMR satisfies the requirements of Conditions of Approval 7.3.

Compliance Assessment Finding - Compliant

Appendix B

Noise Report

Kerosene Vale Ash Repository

*Environmental Noise Monitoring
Quarter 2 2021*

*Prepared for
Generator Property Management Pty
Ltd*



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 2 2021

Reference: 21134_R01

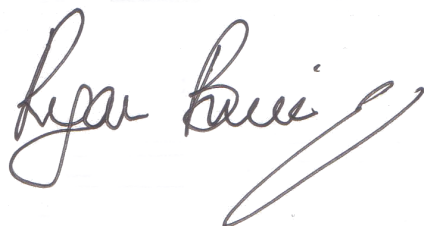
Report date: 10 September 2021

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: Ryan Bruniges
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

1 INTRODUCTION.....	1
1.1 Background.....	1
1.2 Monitoring Locations.....	1
1.3 Terminology & Abbreviations.....	3
2 REGULATOR REQUIREMENTS AND NOISE CRITERIA.....	4
2.1 Development Consent.....	4
2.2 Environment Protection Licence.....	4
2.3 Noise Management Plan.....	4
2.4 Noise Criteria.....	4
2.5 Meteorological Conditions.....	4
2.6 Modifying Factors.....	5
3 METHODOLOGY.....	6
3.1 Overview.....	6
3.2 Attended Noise Monitoring.....	6
3.3 Modifying Factors.....	7
3.4 Attended Noise Monitoring Equipment.....	7
4 RESULTS.....	8
4.1 Total Measured Noise Levels.....	8
4.2 Modifying Factors.....	8
4.3 Attended Noise Monitoring.....	9
4.4 Atmospheric Conditions.....	10
5 DISCUSSION.....	11
5.1 Noted Noise Sources.....	11
5.1.1 Location A – Day.....	12
5.1.2 Location A – Evening.....	13
5.1.3 Location B – Day.....	14
5.1.4 Location B – Evening.....	15
5.1.5 Location C – Day.....	16

5.1.6 Location C – Evening.....	17
6 SUMMARY.....	18

Appendices

A REGULATOR DOCUMENTS.....	19
B CALIBRATION CERTIFICATES.....	30

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 30 June 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 Neubeck Street, Lidsdale NSW

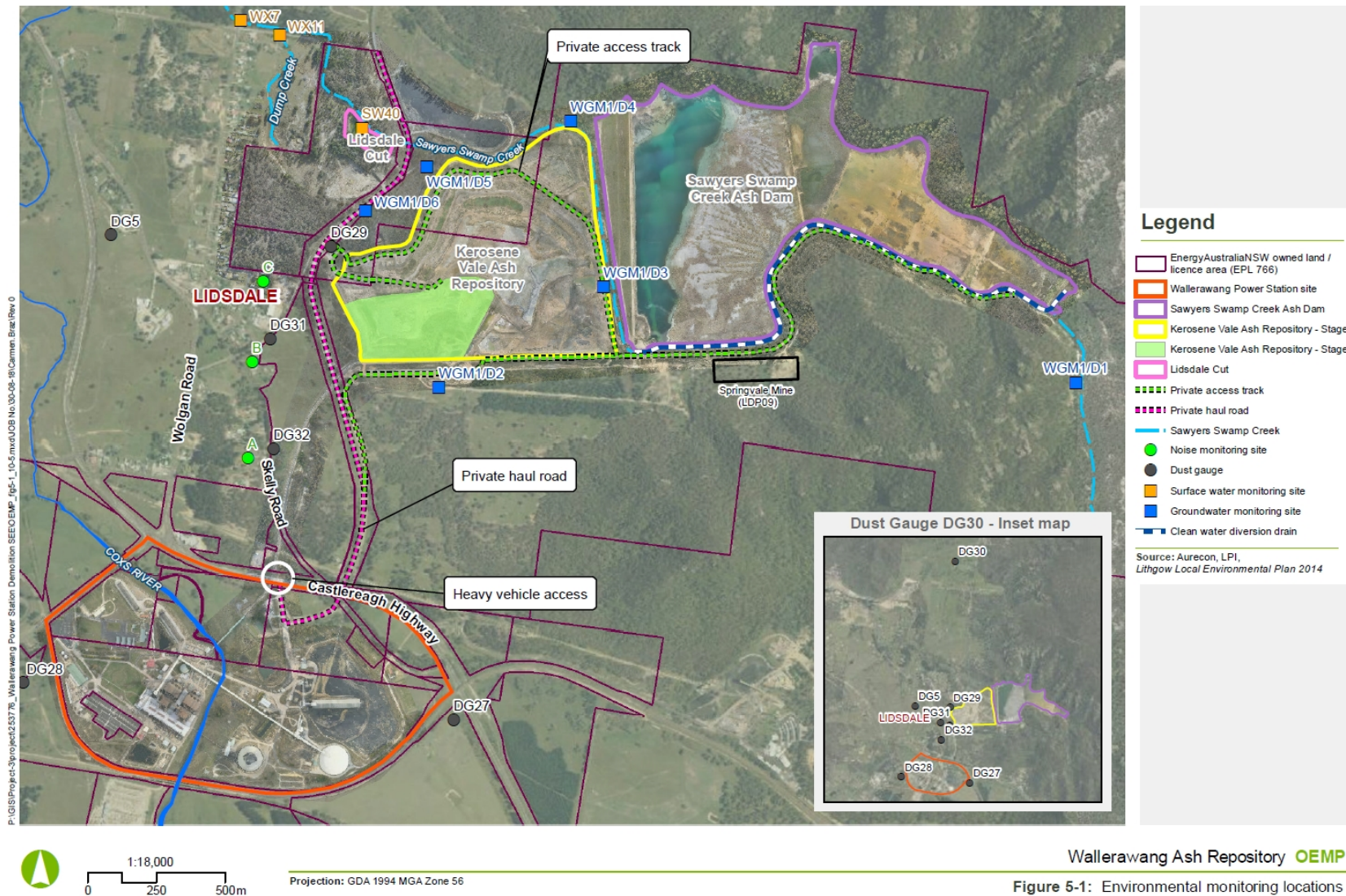


Figure 1: KVAR Attended Noise Monitoring Locations

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 development consent and 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 operates 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 $L_{Aeq,15\text{minute}}$ (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 NPfL. 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 $L_{Aeq,15\text{minute}}$ level.

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 2 2021¹

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	30/06/2021 13:54	55	43	38	36	35	32	29
B	30/06/2021 14:59	70	60	47	47	37	34	31
C	30/06/2021 15:23	65	57	48	45	34	30	27
Evening								
A	30/06/2021 19:50	45	42	40	38	37	36	35
B	30/06/2021 20:41	53	49	46	43	41	39	37
C	30/06/2021 20:17	52	46	40	37	35	33	31

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 2 2021

Location	Start Date and Time	Wind Speed m/s	Criterion <i>L_{Aeq,15min}</i> dB	Criterion Applies? ²	KVAR <i>L_{Aeq,15min}</i> dB ^{3,4}	Exceedance ⁵
Day						
A	30/06/2021 13:54	2.1	40	Yes	<30	Nil
B	30/06/2021 14:59	2.6	40	Yes	IA	Nil
C	30/06/2021 15:23	1.5	40	Yes	IA	Nil
Evening						
A	30/06/2021 19:50	1.0	40	Yes	IA	Nil
B	30/06/2021 20:41	1.5	40	Yes	IA	Nil
C	30/06/2021 20:17	1.0	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 2 2021

Location	Start Date and Time	Temperature ° C	Wind Speed m/s	Wind Direction ° Magnetic North ¹	Cloud Cover 1/8s
Day					
A	30/06/2021 13:54	15	1.6	60	4
B	30/06/2021 14:59	14	1.3	90	3
C	30/06/2021 15:23	13	0.5	80	3
Evening					
A	30/06/2021 19:50	8	0.0	0	5
B	30/06/2021 20:41	5	0.0	0	0
C	30/06/2021 20:17	4	0.8	80	3

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} .

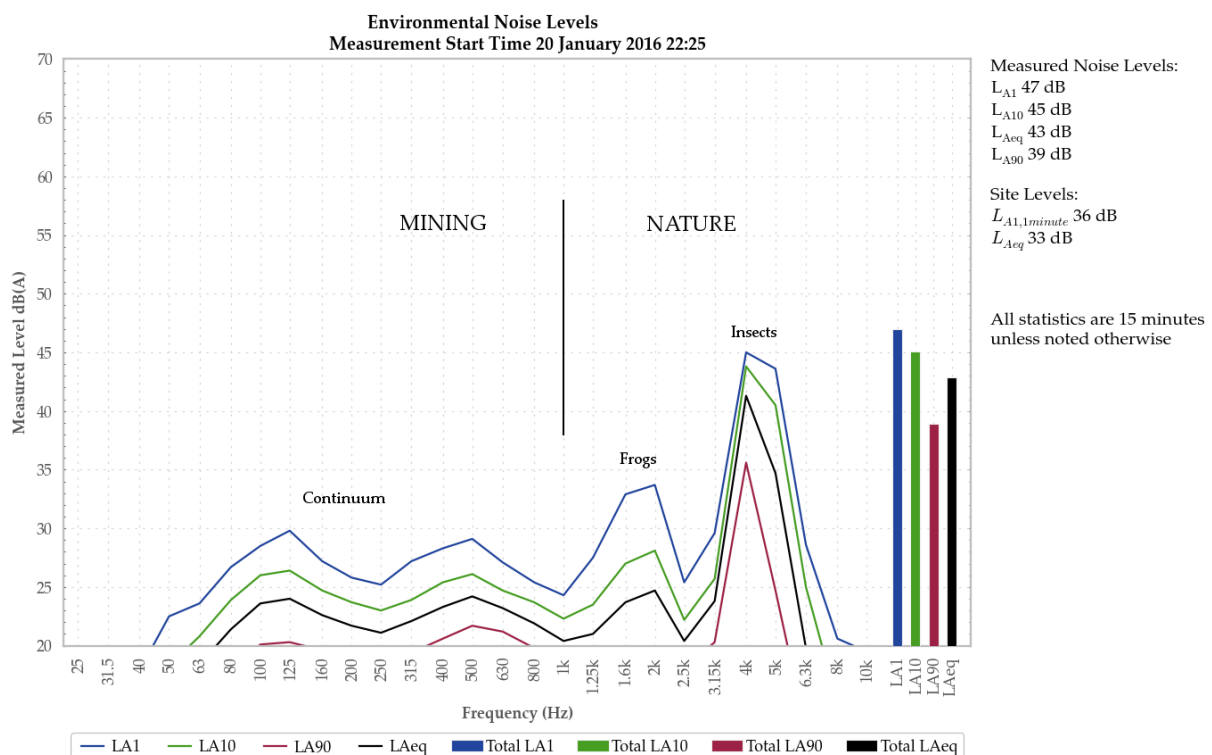


Figure 2: Example Graph (refer to section 5.1 for explanatory note)

5.1.1 Location A – Day

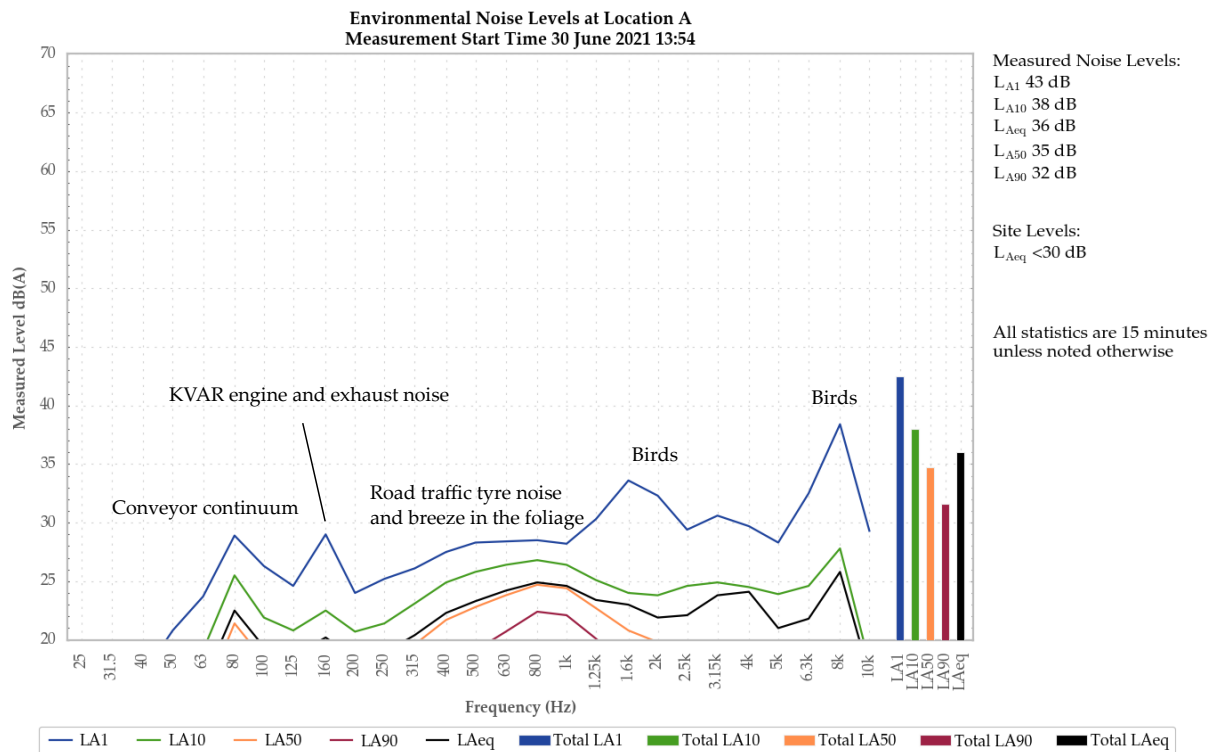


Figure 3: Environmental Noise Levels, Location A

Engine and exhaust noise from unloading activities was audible briefly during the measurement and generated the site-only L_{Aeq} of less than 30 dB.

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

5.1.2 Location A – Evening

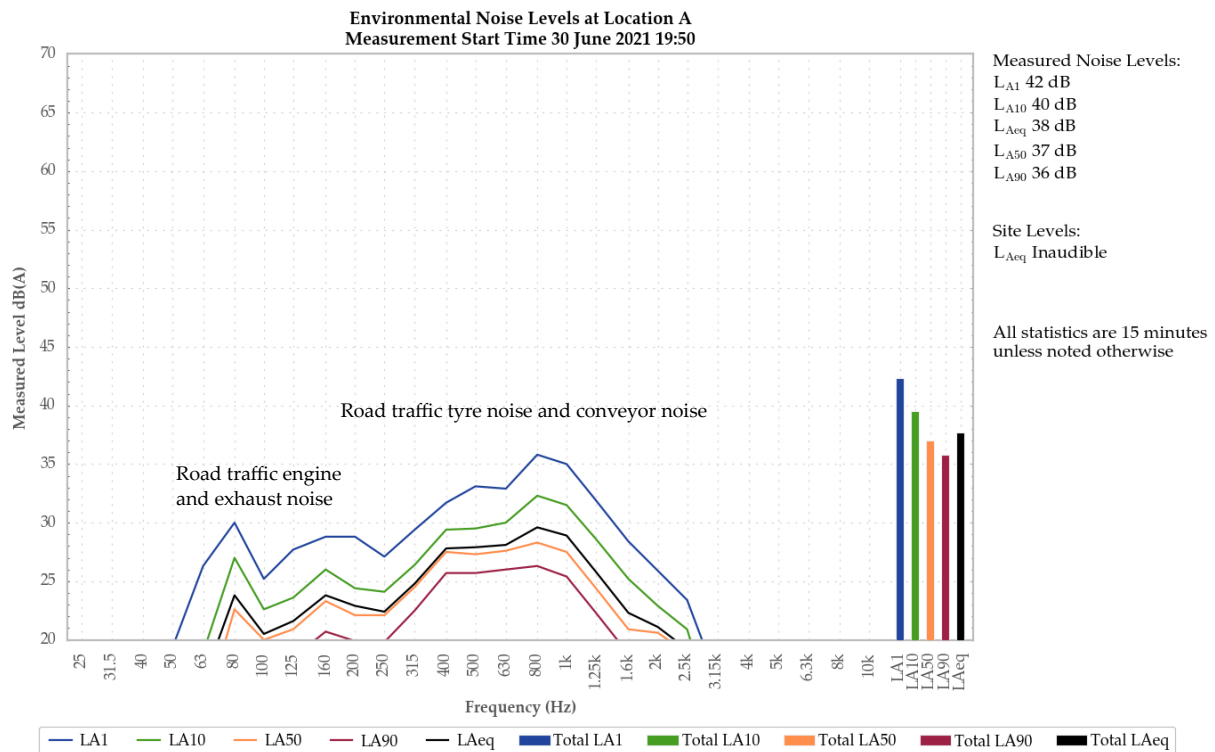


Figure 4: Environmental Noise Levels, Location A

KVAR was inaudible during the measurement.

Road traffic noise generated the L_{A1} and contributed to the measured L_{A10} and L_{Aeq} . Conveyor continuum was primarily responsible for the measured L_{A10} , L_{Aeq} , L_{A50} , and L_{A90} .

Frogs were also noted.

5.1.3 Location B – Day

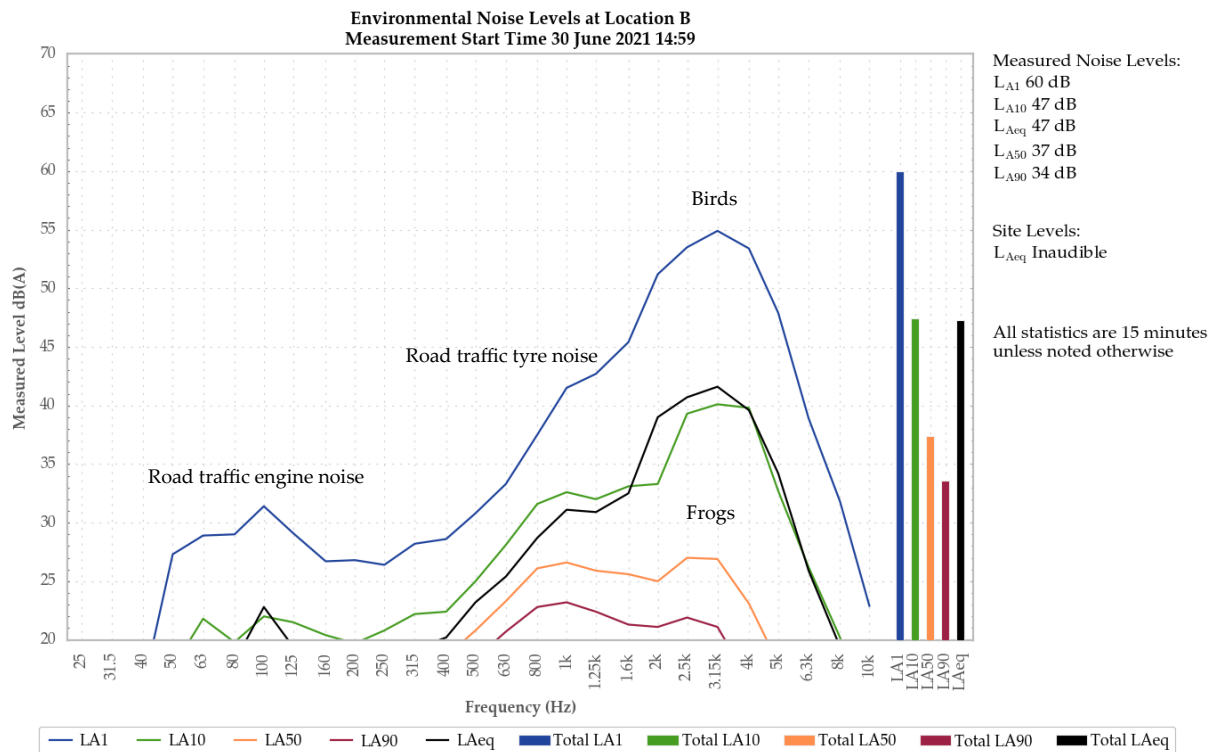


Figure 5: Environmental Noise Levels, Location B

KVAR was inaudible during the measurement.

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

Local impact noise and music were noted.

5.1.4 Location B – Evening

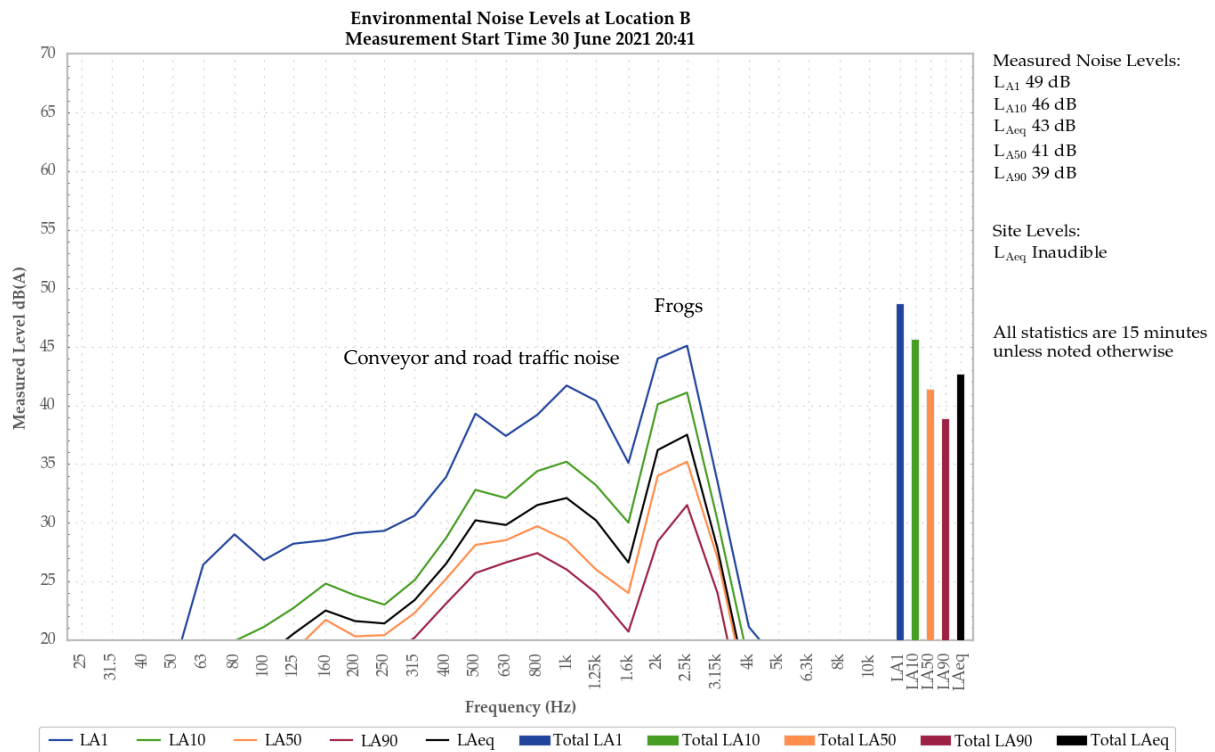


Figure 6: Environmental Noise Levels, Location B

KVAR was inaudible during the measurement.

Road traffic noise and frogs were responsible for the measured noise levels.

Dogs were also noted.

5.1.5 Location C – Day

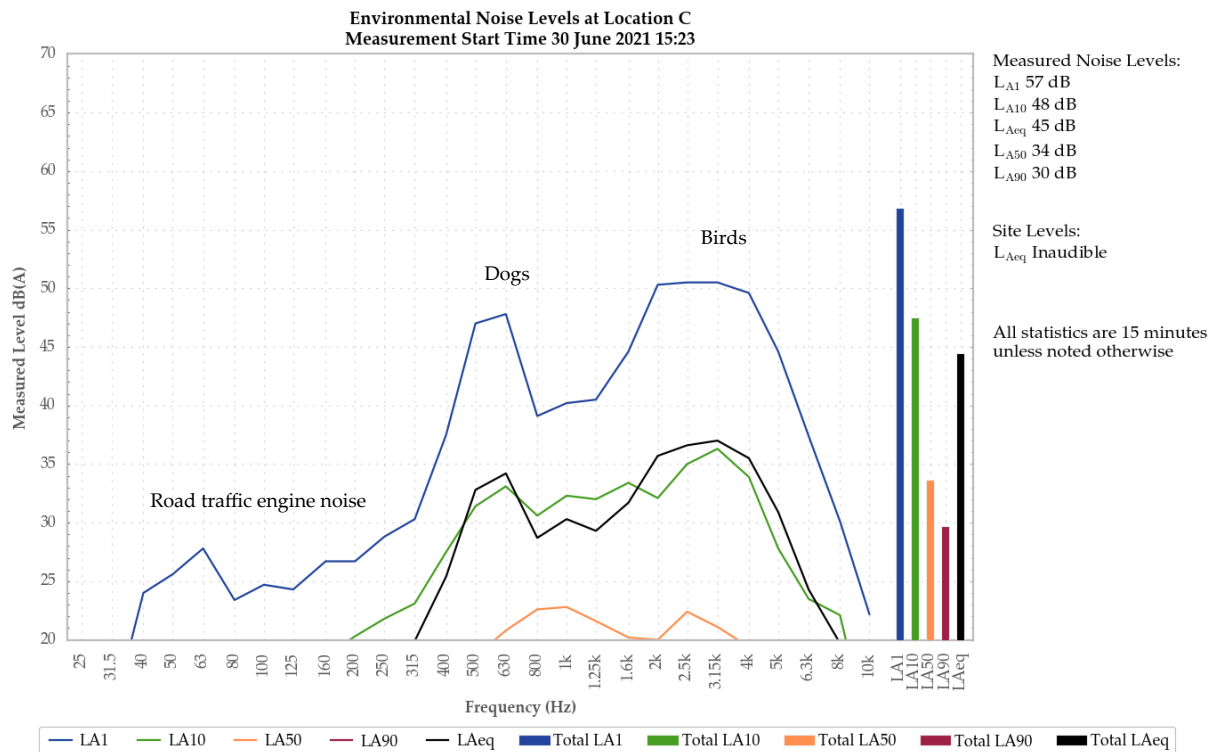


Figure 7: Environmental Noise Levels, Location C

KVAR was inaudible during the measurement.

Dogs and birds were responsible for the measured L_{A1} , L_{A10} and L_{Aeq} . Road traffic noise was responsible for the measured L_{A50} and L_{A90} .

Local voices, impact noises and frogs were noted.

5.1.6 Location C – Evening

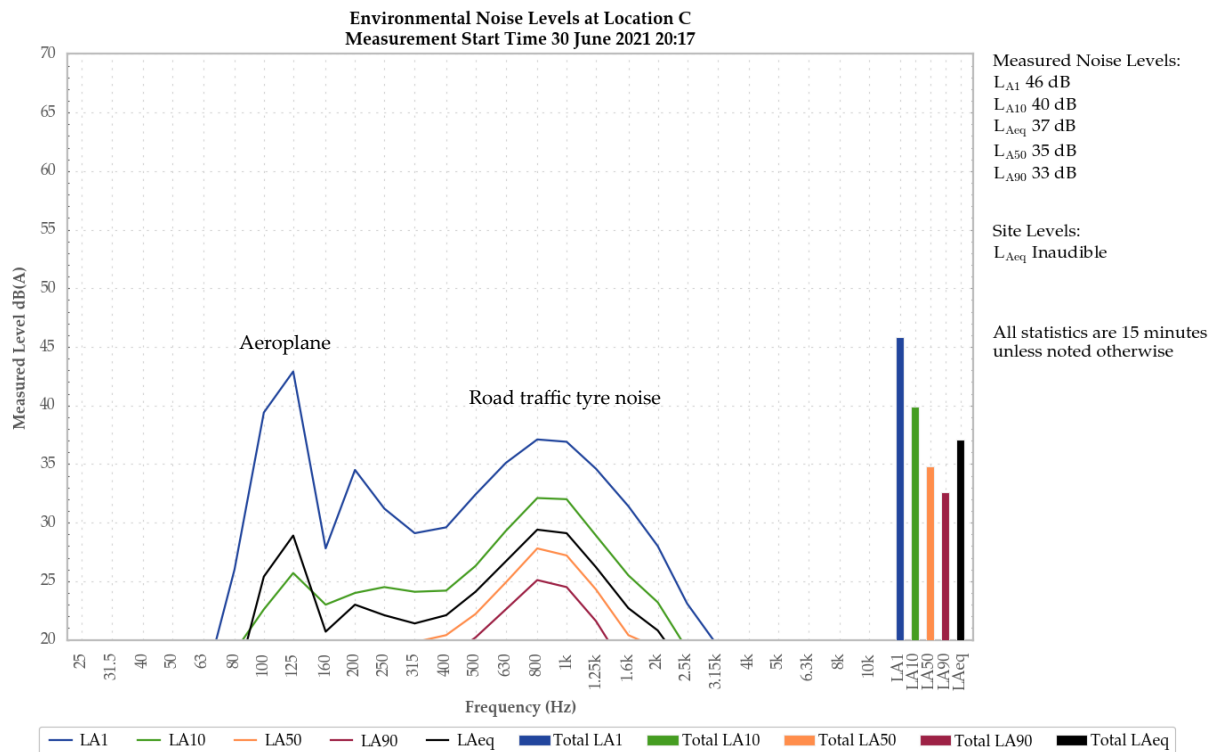


Figure 8: Environmental Noise Levels, Location C

KVAR was inaudible during the measurement.

Road traffic noise was primarily responsible for the measured noise levels. An aeroplane contributed to the measured LA1.

Dogs and frogs 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 30 June 2021 at a total of three monitoring locations.

Noise levels from KVAR complied with relevant criteria at all monitoring locations during the Quarter 2 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	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> The noise management log shall be reviewed on a periodic basis to determine trends. 	OEMP	Annually	Noise incident log	EnergyAustralia NSW
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> The Noise and Vibration Management Plan shall be reviewed every 5 years. 	OEMP	Every 5 years	Noise Management Sub-Plan revision	EnergyAustralia NSW
Reporting	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> The criterion to limit cumulative operational noise levels to below 40 dB(A) $L_{Aeq, 15 \text{ min}}$ 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
	<ul style="list-style-type: none"> 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 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
Ambient Temperature : 20.6°C
Relative Humidity : 47%
Barometric Pressure : 101.05kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 22.4°C
Relative Humidity : 44%
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 - Environmental Conditions			
Acoustic Tests		Temperature	±0.2°C
125Hz	±0.12dB	Relative Humidity	±2.4%
1kHz	±0.11dB	Barometric Pressure	±0.015kPa
8kHz	±0.13dB		
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



**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.



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

Kerosene Vale Ash Repository

*Environmental Noise Monitoring
Quarter 3 2021*

*Prepared for
Generator Property Management Pty
Ltd*



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 3 2021

Reference: 21161_R01

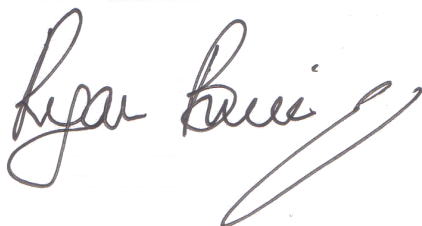
Report date: 10 September 2021

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: Ryan Bruniges
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

1 INTRODUCTION.....	1
1.1 Background.....	1
1.2 Monitoring Locations.....	1
1.3 Terminology & Abbreviations.....	3
2 REGULATOR REQUIREMENTS AND NOISE CRITERIA.....	4
2.1 Development Consent.....	4
2.2 Environment Protection Licence.....	4
2.3 Noise Management Plan.....	4
2.4 Noise Criteria.....	4
2.5 Meteorological Conditions.....	4
2.6 Modifying Factors.....	5
3 METHODOLOGY.....	6
3.1 Overview.....	6
3.2 Attended Noise Monitoring.....	6
3.3 Modifying Factors.....	7
3.4 Attended Noise Monitoring Equipment.....	7
4 RESULTS.....	8
4.1 Total Measured Noise Levels.....	8
4.2 Modifying Factors.....	8
4.3 Attended Noise Monitoring.....	9
4.4 Atmospheric Conditions.....	10
5 DISCUSSION.....	11
5.1 Noted Noise Sources.....	11
5.1.1 Location A – Day.....	12
5.1.2 Location A – Evening.....	13
5.1.3 Location B – Day.....	14
5.1.4 Location B – Evening.....	15
5.1.5 Location C – Day.....	16

5.1.6 Location C – Evening.....	17
6 SUMMARY.....	18

Appendices

A REGULATOR DOCUMENTS.....	19
B CALIBRATION CERTIFICATES.....	30

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 18/19 August 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

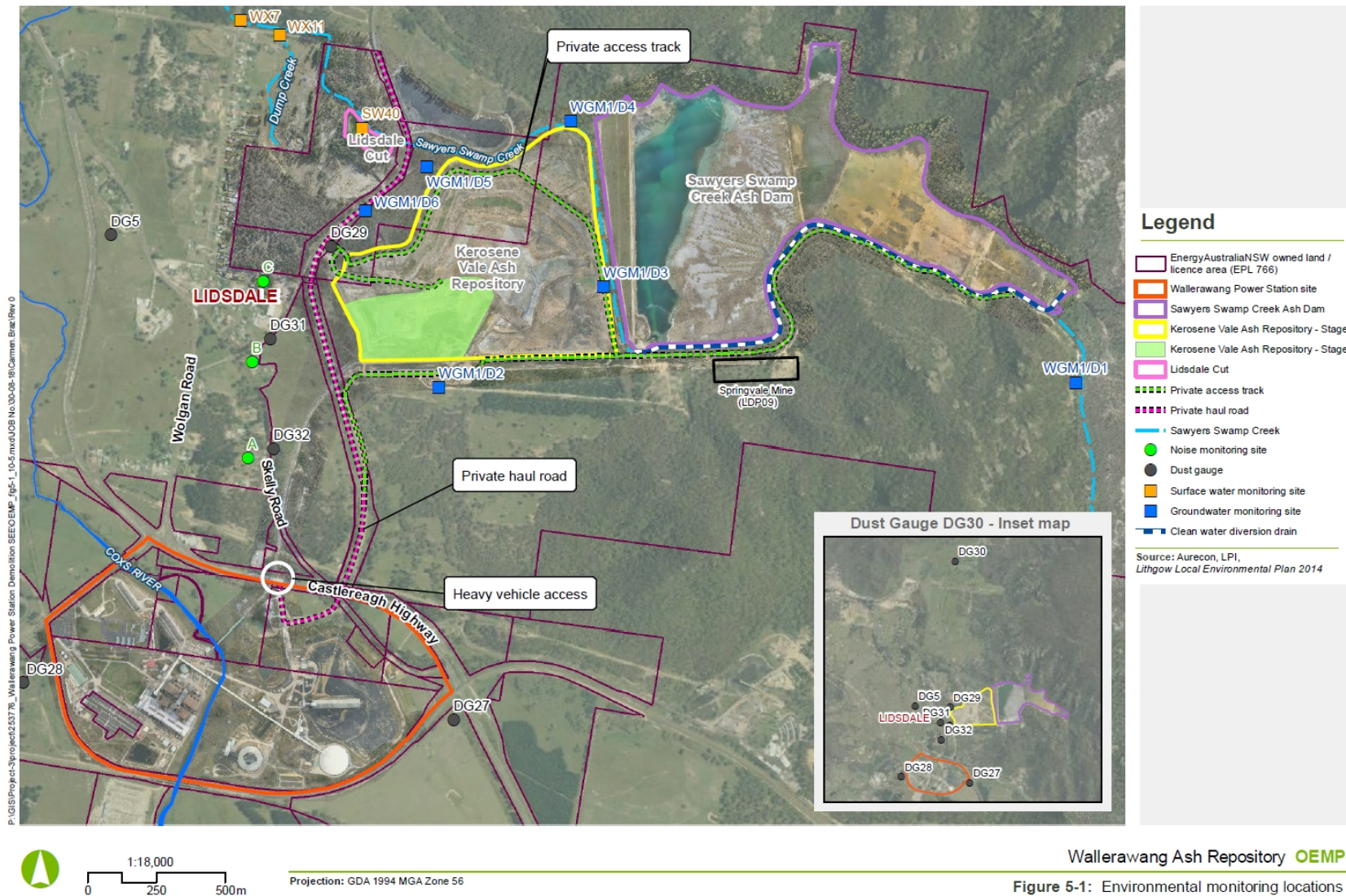


Figure 1: KVAR Attended Noise Monitoring Locations

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 development consent and 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:

- 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 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 operates 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 $L_{Aeq,15\text{minute}}$ (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 NPfL. 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 $L_{Aeq,15\text{minute}}$ level.

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	00370304	24/11/2022
Pulsar 106 acoustic calibrator	81134	24/11/2022

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 3 2021¹

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	19/08/2021 09:33	56	48	43	40	38	35	31
B	19/08/2021 10:01	64	53	44	42	38	33	29
C	19/08/2021 10:23	59	52	43	41	37	33	30
Evening								
A	18/08/2021 19:33	51	45	39	37	37	35	34
B	18/08/2021 19:10	55	50	47	44	44	41	38
C	18/08/2021 18:50	52	43	37	35	34	32	31

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 3 2021

Location	Start Date and Time	Wind Speed m/s	Criterion <i>L_{Aeq,15min}</i> dB	Criterion Applies? ²	KVAR <i>L_{Aeq,15min}</i> dB ^{3,4}	Exceedance ⁵
Day						
A	19/08/2021 09:33	1.5	40	Yes	<30	Nil
B	19/08/2021 10:01	1.5	40	Yes	IA	Nil
C	19/08/2021 10:23	2.1	40	Yes	<30	Nil
Evening						
A	18/08/2021 19:33	1.5	40	Yes	IA	Nil
B	18/08/2021 19:10	0.0	40	Yes	IA	Nil
C	18/08/2021 18:50	0.5	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 3 2021

Location	Start Date and Time	Temperature ° C	Wind Speed m/s	Wind Direction ° Magnetic North ¹	Cloud Cover 1/8s
Day					
A	19/08/2021 09:33	11	0.0	-	0
B	19/08/2021 10:01	14	0.0	-	0
C	19/08/2021 10:23	16	0.5	340	2
Evening					
A	18/08/2021 19:33	8	0.0	-	0
B	18/08/2021 19:10	5	0.0	-	0
C	18/08/2021 18:50	5	0.5	-	0

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} .

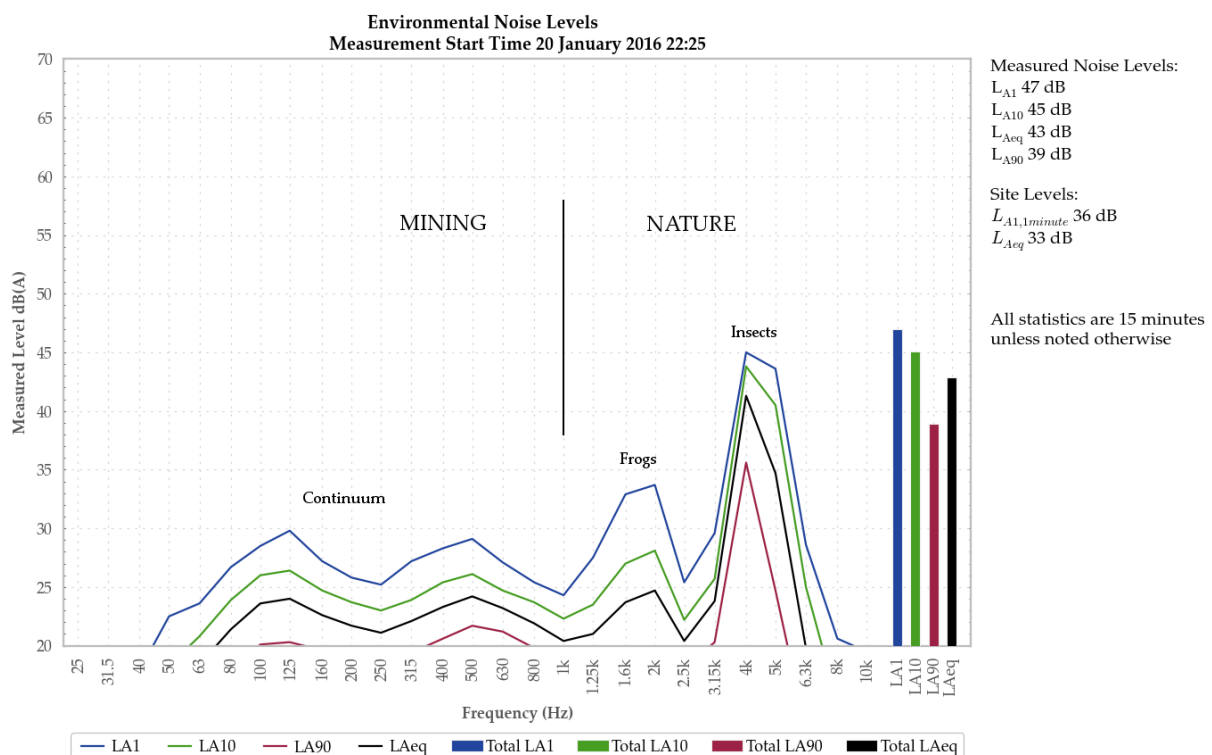


Figure 2: Example Graph (refer to section 5.1 for explanatory note)

5.1.1 Location A – Day

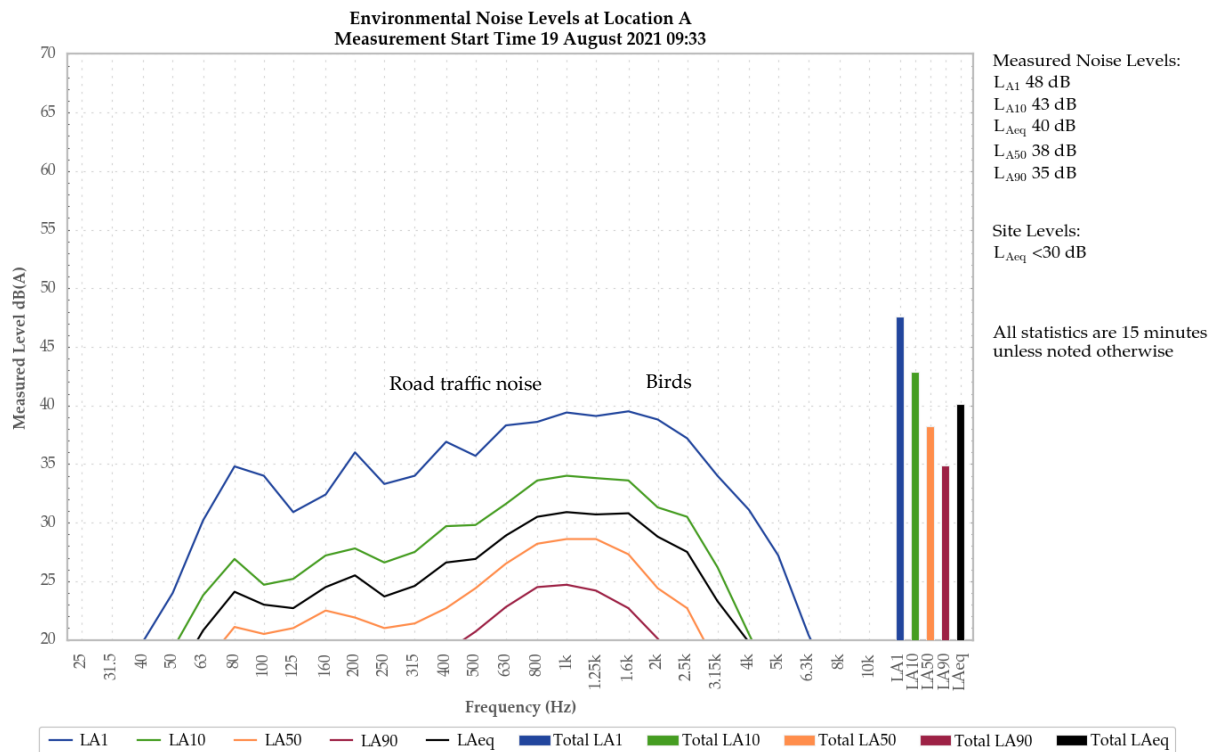


Figure 3: Environmental Noise Levels, Location A

Engine and exhaust noise was audible briefly during the measurement and generated the site-only L_{Aeq} of less than 30 dB.

Road traffic noise was primarily responsible for all measured noise levels. Birds contributed to the measured L_{A1} , L_{A10} and L_{Aeq} .

Dogs, cows and conveyor noise were noted.

5.1.2 Location A – Evening

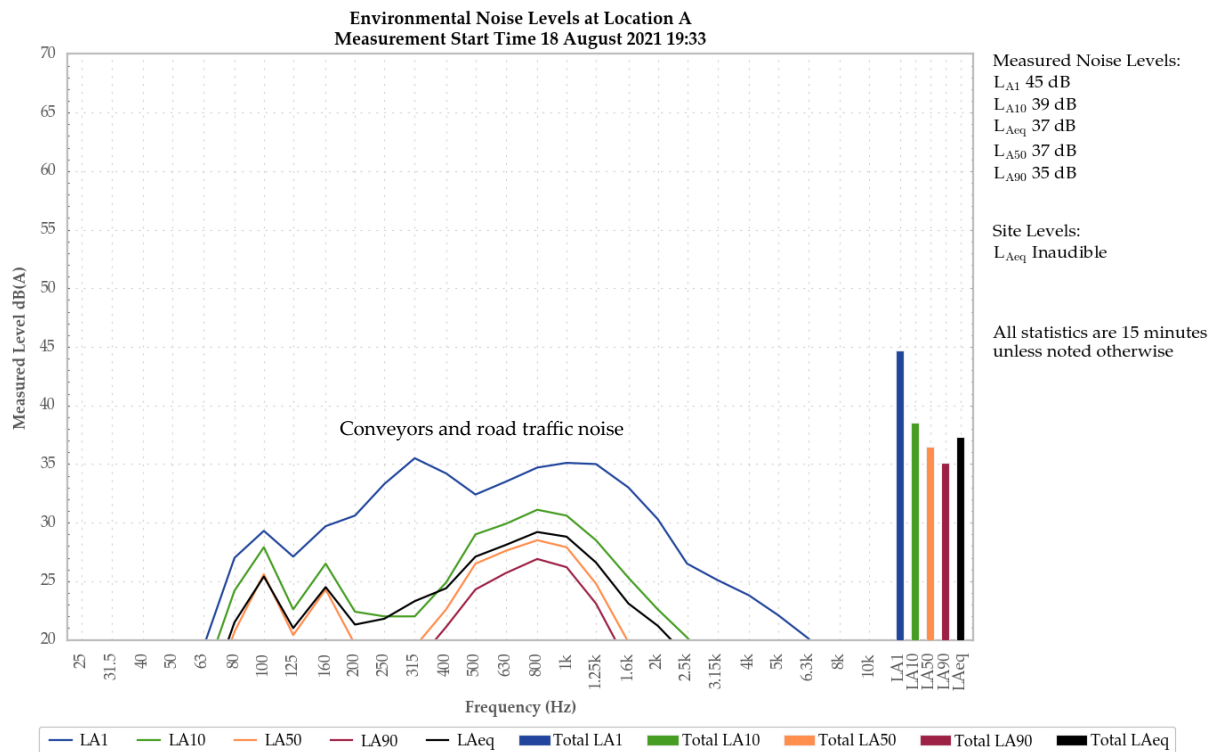


Figure 4: Environmental Noise Levels, Location A

KVAR was inaudible during the measurement.

Conveyor noise was responsible for the measured L_{A90} , L_{A50} , L_{Aeq} and L_{A10} . Road traffic noise and local impact noises were responsible for the measured L_{A1} .

5.1.3 Location B – Day

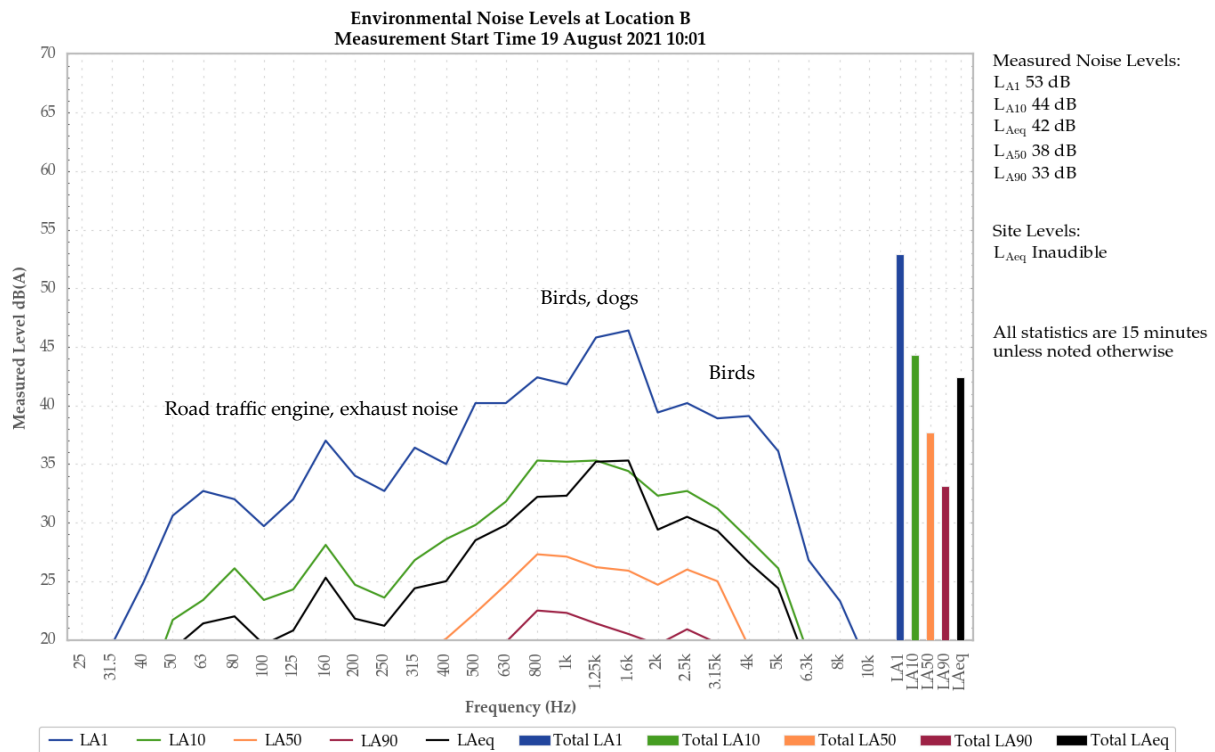


Figure 5: Environmental Noise Levels, Location B

KVAR was inaudible during the measurement.

Road traffic noise and birds were primarily responsible for all measured noise levels. Dogs contributed to the measured L_{A1} .

Horses and insects were noted.

5.1.4 Location B – Evening

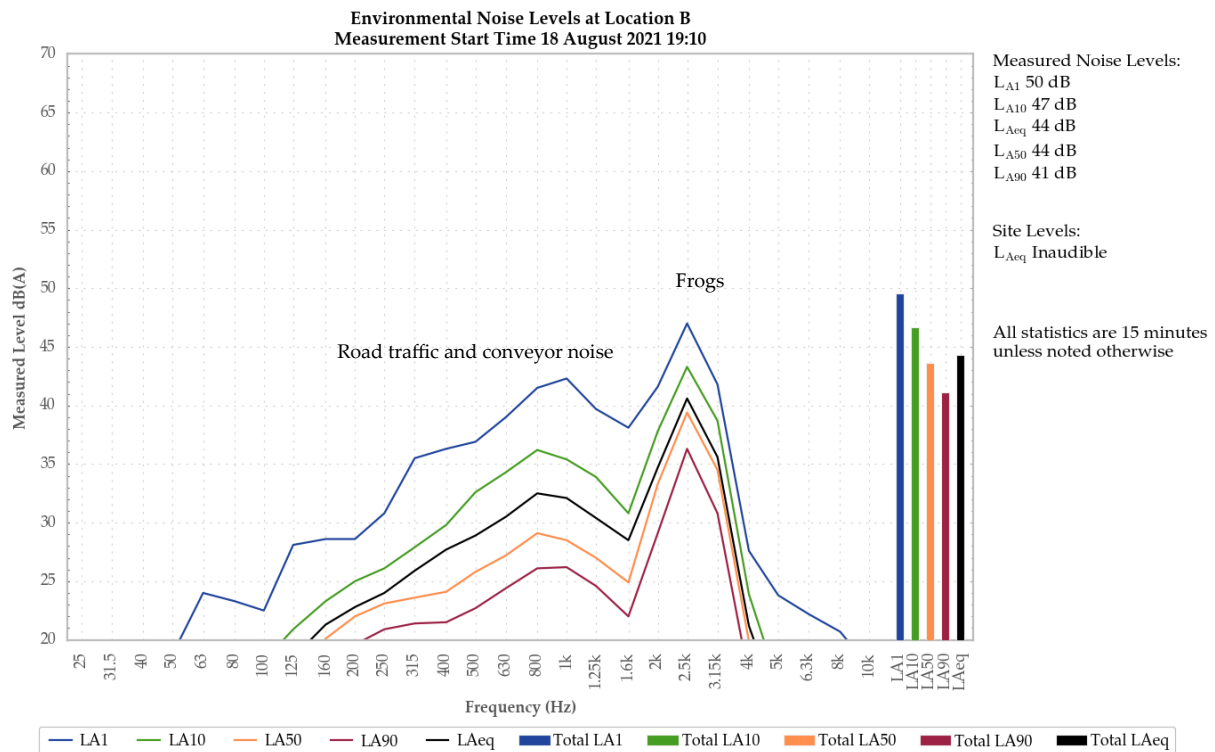


Figure 6: Environmental Noise Levels, Location B

KVAR was inaudible during the measurement.

Frogs were primarily responsible for all measured noise levels. Road traffic noise contributed to the measured L_{A1} .

Conveyor noise was noted.

5.1.5 Location C – Day

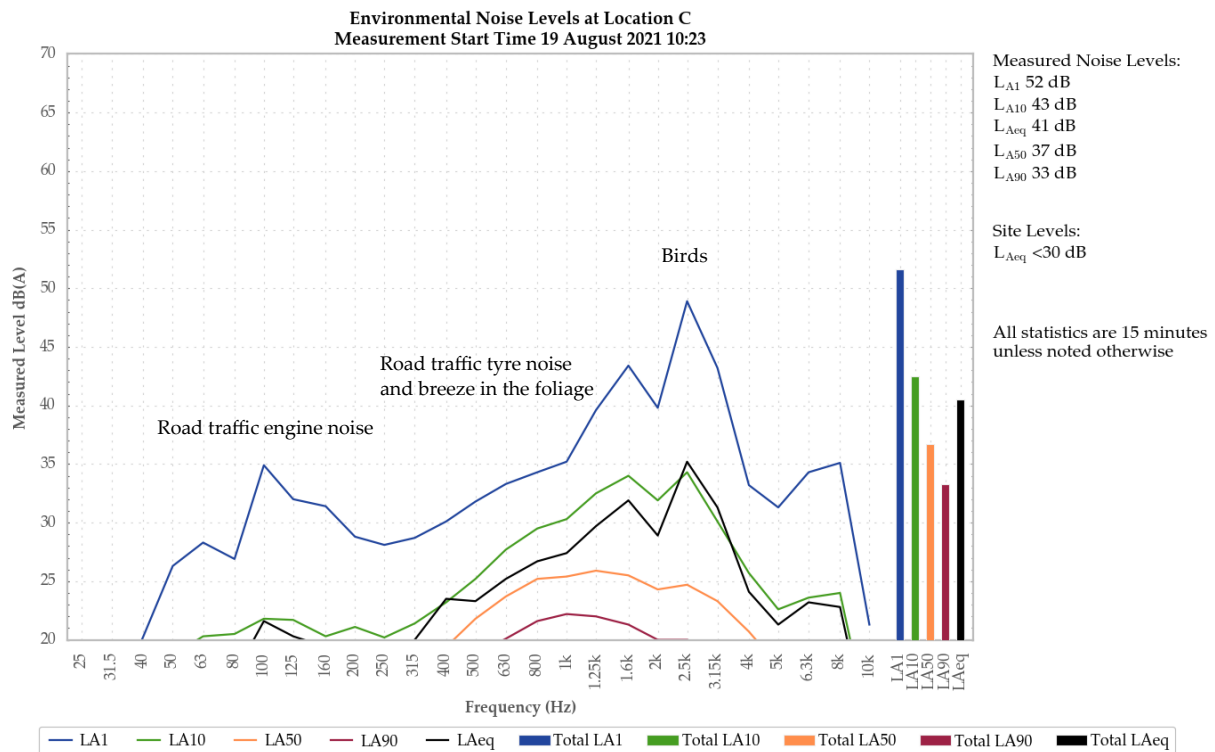


Figure 7: Environmental Noise Levels, Location C

Engine and exhaust noise was audible briefly during the measurement and generated the site-only L_{Aeq} of less than 30 dB.

Road traffic noise and birds were primarily responsible for all measured noise levels. Breeze in the foliage contributed to the measured L_{A50} and L_{A90} .

Music, impacts and generator noise from a nearby construction site were noted.

5.1.6 Location C – Evening

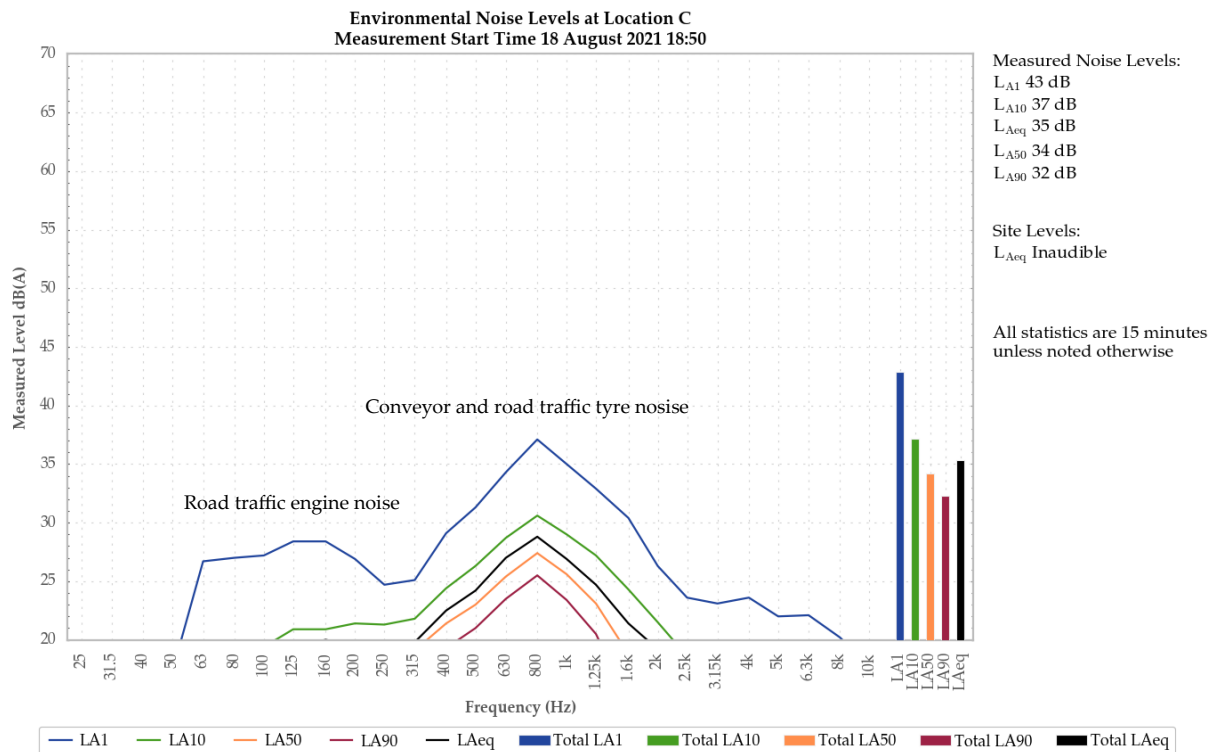


Figure 8: Environmental Noise Levels, Location C

KVAR was inaudible during the measurement.

Road traffic and conveyor noise were responsible for all measured noise levels.

Dogs and cows were 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 18/19 August 2021 at a total of three monitoring locations.

Noise levels from KVAR complied with relevant criteria at all monitoring locations during the Quarter 3 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<p>Appendix A: - KVAR Stage 2 Operations- Operational Noise and Vibration Management Plan</p> <p>Australian Standard AS 2436 – Guide to noise control on construction, maintenance and demolition sites</p>
Key issues/constraints/strategies	<p>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.</p> <p>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.</p> <p>A Specialist Consultant will be undertaking the prescribed monitoring and analysis of noise results, as per this plan.</p>

Relevant aspect/impact	Management and mitigation measures	Source of requirement	Frequency	Relevant records	Responsibility
On site truck noise attenuation	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> The noise management log shall be reviewed on a periodic basis to determine trends. 	OEMP	Annually	Noise incident log	EnergyAustralia NSW
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> The Noise and Vibration Management Plan shall be reviewed every 5 years. 	OEMP	Every 5 years	Noise Management Sub-Plan revision	EnergyAustralia NSW
Reporting	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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 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 Ambient Temperature : 22°C Relative Humidity : 50.6% Barometric Pressure : 100.08kPa	Post-Test Atmospheric Conditions Ambient Temperature : 21.9°C Relative Humidity : 50.1% Barometric Pressure : 100.09kPa
Calibration Technician : Lucky Jaiswal Calibration Date : 24 Nov 2020	Secondary Check: Max Moore 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: 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 - Environmental Conditions			
Acoustic Tests		Temperature	±0.2°C
125Hz	±0.12dB	Relative Humidity	±2.4%
1kHz	±0.11dB	Barometric Pressure	±0.015kPa
8kHz	±0.13dB		
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




**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 C20676

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	Pulsar Model 106
Instrument Serial Number :	81334
Atmospheric Conditions	
Ambient Temperature :	22.1°C
Relative Humidity :	50.6%
Barometric Pressure :	100.09kPa
Calibration Technician :	Lucky Jaiswal
Calibration Date :	24 Nov 2020
Secondary Check:	Max Moore
Report Issue Date :	25 Nov 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	94.13	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 - Environmental Conditions			
Specific Tests		Temperature	±0.2°C
Generated SPL	±0.14dB	Relative Humidity	±2.4%
Frequency	±0.09%	Barometric Pressure	±0.015kPa
Distortion	±0.09%		

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.

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

Appendix C

Annual water quality review

Annual Water Quality Review

Kerosene Vale Ash Dam Areas

Prepared for Generator Property Management Pty Ltd
November 2021

EMM Newcastle
Level 3, 175 Scott Street
Newcastle NSW 2300

T 02 4907 4800
E info@emmconsulting.com.au

www.emmconsulting.com.au

Annual Water Quality Review

Kerosene Vale Ash Dam Areas

Report Number

E210780 RP2

Client

Generator Property Management Pty Ltd

Date

19 November 2021

Version

v2 Final

Prepared by

Reviewed by

Approved by



Chris Kuczera

Associate Water Resources Engineer
19 November 2021



Amanda Weston

Associate Director Environmental Scientist
19 November 2021



Chris Kuczera

Associate Water Resources Engineer
19 November 2021

EMM Consulting Pty Limited (EMM) has prepared this document for the sole use of Generator Property Management Pty Ltd (GPM) and for a specific and agreed purpose and scope, as expressly stated in this document. No other party should rely on this document without the prior written consent of EMM. EMM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on GPM's description of its requirements and EMM's experience, having regard to assumptions that EMM can reasonably be expected to make in accordance with sound professional principles. EMM may also have relied upon information provided by GPM and other third parties to prepare this document, some of which may not have been verified.

Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in entirety. EMM accepts no liability of any kind for any unauthorised use of any of the content of this document and EMM reserves the right to seek compensation for any such unauthorised use. This document was prepared for the specific purpose described herein. From a technical perspective, the subsurface environment at any site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic and hydrogeologic conditions can have substantial impacts on water and chemical movement.

EMM's professional opinions are based upon its professional judgement, experience, and training. These opinions are also based upon data derived from the testing and analysis described in this document. It is possible that additional testing and analysis might produce different results and/or different opinions. EMM believes that its opinions are reasonably supported by the sampling and analysis that have been done, and that those opinions have been developed according to the professional standard of care for the environmental consulting profession in this area at the date of this document. That standard of care may change with advancements in professional practice, new methods and techniques of investigation, sampling, analysis and remediation, and changes in applicable statutes and/or guidelines may develop in the future, which might produce different results.

© Reproduction of this report for educational or other non-commercial purposes is authorised without prior written permission from EMM provided the source is fully acknowledged. Reproduction of this report for resale or other commercial purposes is prohibited without EMM's prior written permission.

Executive Summary

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 2020 – 31 August 2021, which is the initial 12-month period GPM has owned the Site. This period is referred to as the AEMR Period in this report.

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.

The review of surface water quality data concluded that:

- surface water quality trends during the AEMR Period are generally consistent with recent AEMR periods (which is described as 2017 to the current period in this report);
- surface water quality varies due to wet weather; and
- some incidental discharge of contaminated water into Sawyers Swamp Creek is occurring. Inflows from Dump Creek and poorly performing parts of the KVAR subsurface drainage system have been identified as potentially contributing to the incidental discharge of contaminated water into Sawyers Swamp Creek.

The review of groundwater quality data 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.

This report notes that GPM propose to:

- reinstate parts of the KVAR subsurface drainage system that are in poor condition.
- review potential sources of contamination as part of future studies that are currently being discussed with regulators; and
- update the OEMP with a revised water monitoring and analysis approach. It is anticipated that the updated OEMP will be implemented during the 2021-2022 AEMR period.

Table of Contents

Executive Summary	ES.1
Acronyms	iii
1 Introduction	1
1.1 Background	1
1.2 Report scope	1
1.3 OEMP updates and future studies	2
1.4 Report structure	2
2 Water management system	5
3 AEMR Period	7
3.1 Weather	7
3.2 Water management actions	7
4 Surface water quality review	9
4.1 OEMP monitoring requirements	9
4.1.1 Monitoring locations and approach	9
4.1.2 Assessment criteria	10
4.2 Results	11
4.2.1 Lidsdale Cut – SW40	12
4.2.2 SSCAD Pond	13
4.2.3 Dump Creek – WX11	15
4.2.4 Sawyers Swamp Creek – WX7	16
4.3 Summary	18
5 Groundwater quality review	19
5.1 Hydrogeological context	19
5.2 OEMP monitoring requirements	19
5.2.1 Monitoring locations and approach	19
5.2.2 Assessment criteria	20
5.3 Results	23
5.3.1 Groundwater monitoring location D1	23
5.3.2 Groundwater monitoring location D2	24
5.3.3 Groundwater monitoring location D3	26

5.3.4	Groundwater monitoring location D4	27
5.3.5	Groundwater monitoring location D5	28
5.3.6	Groundwater monitoring location D6	29
5.4	Summary	30
References		31

Appendices

Appendix A	Surface water quality charts	A.1
Appendix B	Groundwater quality charts	B.1

Tables

Table 1.1	OEMP – water monitoring and reporting requirements	2
Table 4.1	Surface water monitoring requirements	9
Table 4.2	Surface water monitoring analytes - OEMP	9
Table 4.3	Surface water assessment criteria	10
Table 4.4	Lidsdale Cut WX5 – results summary	12
Table 4.5	Dump Creek WX11 – results summary	15
Table 4.6	Sawyers Swamp Creek WX7 – results summary	17
Table 5.1	Surface water monitoring requirements	20
Table 5.2	Groundwater monitoring analytes - OEMP	20
Table 5.3	Groundwater assessment criteria	21
Table 5.4	Groundwater monitoring location D1 – results summary	23
Table 5.5	Groundwater monitoring location D2 – results summary	25
Table 5.6	Groundwater monitoring location D3 – results summary	26
Table 5.7	Groundwater monitoring location D4 – results summary	27
Table 5.8	Groundwater monitoring location D6 – results summary	29

Figures

Figure 1.1	Site layout	4
Figure 2.1	Water management features and monitoring locations	6
Figure 3.1	Monthly rainfall over the AEMR Period	7
Figure 5.1	Indicative groundwater levels	19

Acronyms

Term	Definition
AEMR	Annual environmental management review
AHD	Australian height datum
ANZECC	Australian and New Zealand Environment and Conservation Council, Australian and New Zealand Guidelines for Fresh and Marine Water Quality
ANZG	Australian and New Zealand Governments, Guidelines for Fresh and Marine Water Quality
AWQR	Annual water quality review (this document)
CoPC	Contaminants of potential concern
CIP	Caustic Injection Plant
DGV	Default Guideline Values
EC	Electrical conductivity
EIS	Environmental impact statement
EMM	EMM Consulting Pty Ltd
EPL	Environmental protection licence
GPM	Generator Property Management Pty Ltd
KVAD	Kerosene Vale Ash Dam
KVAR	Kerosene Vale Ash Repository
LDP	Licensed discharge point
LGA	Local government area
NSW	New South Wales
OEMP	Operational environmental management plan
SSCAD	Sawyers Swamp Creek Ash Dam
SSCAD Pond	The waterbody that is in the western portion of the SSCAD
SSCAD Upper Dam	Dam Sections B, C and D which are in the eastern portion of the SSCAD
WQA	Water Quality Assessment

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) has been commissioned by Generator Property Management Pty Ltd (GPM) to prepare an annual water quality review (AWQR) at 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) and is situated primarily on Lot 5 in Deposited Plan (DP) 829137 (see Figure 1.1). It is approximately 15 kilometres (km) northwest of Lithgow and 2.5 km north-east of the former Wallerawang Power Station (herein referred to as ‘the Power Station’).

The Site includes the following key features:

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

In 2014, the closure and demolition of the Power Station was approved. The approval included development of an asbestos repository on the Site for the disposal of material from the Power Station demolition. The selected repository site is located immediately south of the return water canal near the southwestern corner of the KVAR/KVAD (see Figure 1.1).

Currently the Site is operated on a care and maintenance arrangement consistent with NSW Planning Approval 07_0005 (MOD1) and Environmental Protection Licence (EPL) No. 21185. 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 then appropriately remediate the balance of the Site for permanent closure. The approach, timing and regulatory approvals to complete these works are yet to be established but are expected to be significantly progressed by the end of 2023.

1.2 Report scope

This 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. 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 2020 – 31 August 2021, which is the initial 12-month period GPM has owned the Site. This period is referred to as the AEMR Period in this report.

Table 1.1 OEMP – water monitoring and reporting requirements

	Description	OEMP reference	Report reference
Surface water			
Monitoring	Monthly water quality monitoring at four locations: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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

1.3 OEMP updates and future studies

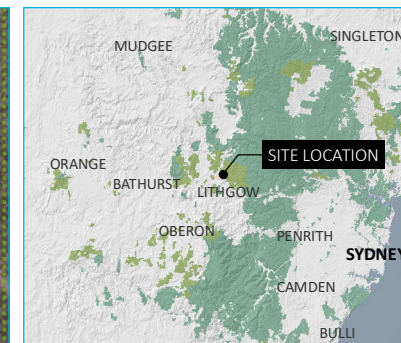
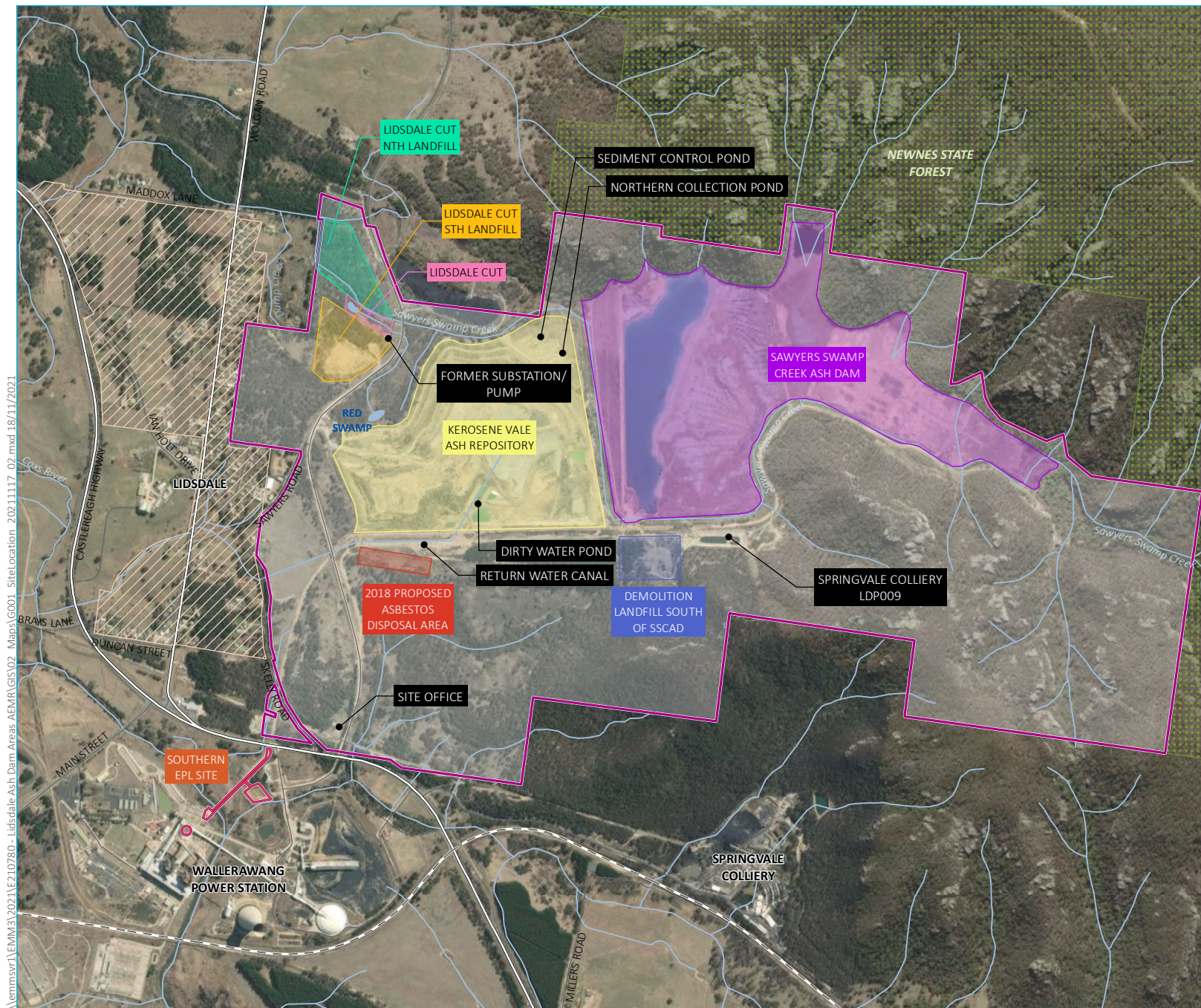
GPM are currently updating the OEMP which will include a revised water monitoring and analysis approach. It is anticipated that the updated OEMP will be implemented during the 2021-2022 AEMR period.

GPM is also currently in discussions with regulators as to the best management and regulatory approach for the Site. It is anticipated that several future studies will be undertaken that will result in an improved understanding of both the water cycle processes that may contribute to discharges and the extent and nature of known surface and groundwater contamination at the Site. These studies are currently being discussed with regulators and are generically referred to as future studies in this AWQR.

1.4 Report structure

This report is structured as follows:

- Chapter 2 describes the water management system;
- Chapter 3 described 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

2 Water management system

Surface water within the Site is managed in the following systems, which are located in Figure 2.1:

- **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 and SSCAD embankment drainage systems and water pumped from the Power Station site. This water transfer is undertaken in accordance with a commercial agreement with the Power Station site operator and EPL conditions for both the Power Station and the Site. The transfer of potentially contaminated water to SSCAD Pond assists in minimising incidental surface and groundwater discharges from both the Site and the Power Station site. The SSCAD Pond also receives runoff from direct rainfall, some clean water catchment areas and overflows from the SSCAD Upper Dam (described below). Water accumulation in the SSCAD Pond is managed via irrigation to exposed ash areas and at times via controlled discharges into the Coks River at a licensed discharge point located within the Power Station site (referred to as LDP3). Controlled discharges are treated in the Caustic Injection Plant (CIP), which adjusts pH and reduces metal concentrations. It is noted that controlled discharges at LDP3 are monitored in accordance with the requirements in EPL no. 21185. This data is not reported in this AWQR as the scope of this review is to address the OEMP but is reported in the EPL annual returns.
- **SSCAD – Upper Dam** refers to dam Sections B, C and D (see Figure 2.1) which are in the eastern portion of the SSCAD. Each of these sections has been separated by shallow earthen embankments. Sections C and D have been partially capped while Section B comprises mostly exposed ash. Runoff from several clean water catchments located to the north of SSCAD (the Northern Catchments) accumulates in each of these bunded areas. These catchments have a combined area of 210 ha. Macrophytes have established in each section due to the flat surface levels and ephemeral inundation regime. Water that accumulates in Sections B, C and D is known to be clean and is pumped into the Sawyers Swamp Creek Diversion.
- **SSCAD embankment drainage system** is a drainage system that collects seepage from the toe of the SSCAD embankment. Collected water is pumped into the SSCAD Pond on an ongoing basis.
- **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, which are dewatered to the SSCAD Pond via pumping.
- **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 Water Management Area. The diversion joins the original Sawyers Swamp Creek channel to the north-west of the KVAR Water Management Area.

Figure 2.1 shows the abovementioned features and the OEMP surface and groundwater monitoring sites (see Table 1.1).



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 870 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, periods of above average monthly rainfall occurred from November 2020 through the March 2021 and from June 2021 to August 2021. The highest monthly rainfall occurred in March 2021, with 154 mm recorded.

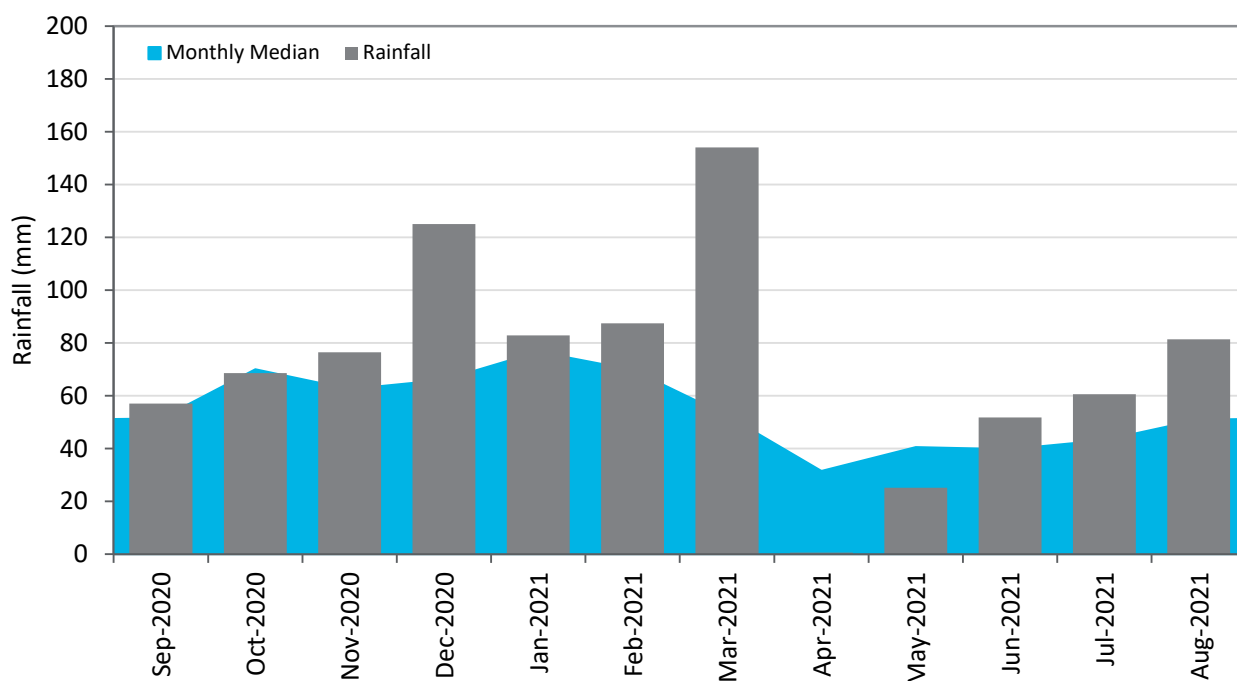


Figure 3.1 Monthly rainfall over the AEMR Period

3.2 Water management actions

GPM commenced ownership and responsibility for the Site in September 2020, 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 following water management actions have been undertaken over the period:

- Potentially contaminated water captured within the KVAR and SSCAD embankment drainage systems was pumped into SCCAD Pond.
- Potentially contaminated water from the Power Station site was pumped into SSCAD Pond, in accordance with a commercial agreement with the Power Station site operator.
- A new CIP was constructed and commissioned to treat water from SSCAD Pond prior to discharge.

- Following commissioning of the CIP, the SSCAD Pond was dewatered to restore flood storage capacity.
- Several measures were undertaken to improve clean water management including ensuring all stormwater drainage channels are unblocked and free draining.
- Near the end of the AEMR Period GPM identified that parts of the KVAR subsurface drainage system was in poor condition. This may have resulted in contaminated seepage from the KVAR water management system entering Sawyers Swamp Creek. GPM have initiated works to reinstate the subsurface drainage, which will assist in separating contaminated water from Sawyers Swamp Creek.

GPM have undertaken a review of existing water management and monitoring practices and propose to implement updated practices, which will be documented in the updated OEMP (see Section 1.3).

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

This section describes the surface water monitoring and assessment requirements established in the OEMP.

4.1.1 Monitoring locations and approach

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.

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 1 st order watercourse located to the west (down gradient) of the KVAR water management area. It flows to the north and joins Sawyers Swamp Creek upstream of WX7 (see Figure 2.1).	Monthly monitoring	See Table 4.2
Sawyers Swamp Creek Ash Dam	This monitoring location is in the SSCAD Pond (see Figure 2.1).	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

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 SCCAD 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)			
			SSC 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
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	0.025 - 0.025	0.025 - 0.025

Table 4.3 **Surface water assessment criteria**

	Units	DGV (ANZG 2018)	Baseline range (OEMP, Table B in Appendix B)			
			SSC WX7	Dump Creek WX11	Lidsdale cut WX5	SSCAD
Silver	mg/L	0.00005	0.00500 - 0.00500	0.00500 - 0.00500	0.00500 - 0.00500	0.00500 - 0.00500
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	0.0010 - 0.0010	0.0010 - 0.0010	0.0010 - 0.0010	0.0010 - 0.0070
Chromium	mg/L	0.001	0.005 - 0.005	0.005 - 0.005	0.005 - 0.005	0.005 - 0.010
Copper	mg/L	0.0014	0.005 - 0.005	0.005 - 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	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	0.0050 - 0.0050	0.0050 - 0.0050	0.0050 - 0.0050	0.0050 - 0.0050
Selenium	mg/L	0.005	0.003 - 0.003	0.003 - 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

1. Refers to total concentrations unless stated

4.2 Results

Surface water monitoring results for the AEMR Period are presented and discussed in this section. The results for each monitoring location are presented in table form and compared to the assessment criteria established in Section 4.1.2.

Results for key analytes from all surface water monitoring locations are also presented as time-series charts provided in Appendix A. These charts show all results from 1 January 2017 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 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.

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

4.2.1 Lidsdale Cut – SW40

Lidsdale Cut is one of the storages in the KVAR water management system (see Figure 2.1). It receives runoff and seepage from the western portion of the KVAR water management area and is dewatered to SSCAD Pond to minimise overflows to Sawyers Swamp Creek.

Two 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 is variable, with significant variation in the pH, EC and metal concentrations between the two samples. This variability is likely due to one of the two samples being collected during or after wet conditions when most of the water in Lidsdale Cut would have originated from surface water runoff. The time-series charts provided in Appendix A indicate that the initial sample collected in September 2020 comprised a low pH, and elevated salinity (as indicated by EC) and metal concentrations. These water quality levels / concentrations generally exceeded both the DGV and baseline range (see Table 4.4), but are consistent with water quality in Lidsdale Cut over recent AEMR periods (ie 2017 to the current period).

The second sample collected in April 2021 had a near neutral pH, salinity levels that were below the DGV and metal concentrations that were substantially lower than the September 2020 results. The time-series charts provided in Appendix A indicate that April 2021 results are not consistent with general water quality trends and are therefore likely to be associated with surface water runoff that occurred during March 2021, which was the highest rainfall month over the period (see Section 3.1).

In summary available data indicates that the water quality in Lidsdale Cut is generally characterised as having low pH and elevated salinity and metal concentrations. The water quality appears to be stable relative to recent AEMR periods but as noted above can be influenced by dilution from surface water runoff. The data indicates 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	2	<u>3.2</u>	<u>5.0</u>	<u>6.8</u>
EC	µS/cm	350	207 - 919	2	128	<u>1,449</u>	<u>2,770</u>
Total dissolved solids	mg/L	-	180 - 620	2	68	<u>999</u>	<u>1,930</u>
DO	mg/L	-	NM	2	9.6	10.0	10.3
turbidity	NTU	25	NM	2	0.3	4.7	9.0
Total nitrogen	mg/L	0.25	NM	2	0.80	1.60	2.40
Total phosphorus	mg/L	0.02	NM	2	0.02	0.03	0.03
Anions							
Chloride	mg/L		6 - 28	2	11	16	21
Fluoride	mg/L		0.3 - 3.2	2	<u>0.1</u>	<u>5.2</u>	<u>10.2</u>
Sulfate	mg/L		57 - 490	2	<u>29</u>	<u>664</u>	<u>1300</u>
Cations							
Sodium	mg/L	-	13 - 71	2	15	<u>76</u>	<u>136</u>
Potassium	mg/L	-	9 - 50	2	<u>6</u>	<u>53</u>	<u>99</u>

Table 4.4 Lidsdale Cut WX5 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Calcium	mg/L	-	15 - 52	2	<u>4</u>	<u>74</u>	<u>145</u>
Magnesium	mg/L	-	4 - 25	2	<u>3</u>	<u>33</u>	<u>64</u>
Metals¹							
Aluminium	mg/L	0.055	NM	2	0.590	15.495	30.400
Arsenic	mg/L	0.013	0.025 - 0.025	2	<0.001	<u>0.004</u>	<u>0.007</u>
Silver	mg/L	0.00005	0.00500 - 0.00500	2	<0.001	<u>0.00050</u>	<u>0.00050</u>
Barium	mg/L	-	0.03 - 0.08	2	<u>0.008</u>	<u>0.02650</u>	0.04500
Boron	mg/L	0.94	0.24 - 1.60	2	<u>0.12</u>	2.83	5.54
Cadmium	mg/L	0.0002	0.0010 - 0.0010	2	<0.0001	0.0017	0.0033
Chromium	mg/L	0.001	0.005 - 0.005	2	<0.001	0.002	0.003
Copper	mg/L	0.0014	0.005 - 0.005	2	<0.001	0.0038	0.0070
Iron (filtered)	mg/L	-	0.03 - 4.00	1	0.167	0.167	0.167
Mercury	mg/L	0.00006	0.0001 - 0.0001	2	<0.00004	<u>0.000035</u>	<u>0.00005</u>
Manganese	mg/L	1.9	0.4 - 3.4	1	<u>0.11</u>	<u>0.11</u>	<u>0.11</u>
Molybdenum	mg/L	0.034	NM	2	<0.001	0.001	0.002
Nickel	mg/L	0.011	NM	2	0.005	0.448	0.891
Lead	mg/L	0.0034	0.0050 - 0.0050	2	<0.001	0.0078	0.0150
Selenium	mg/L	0.005	0.003 - 0.003	2	<0.0002	0.03505	0.07
Zinc	mg/L	0.008	0.030 - 0.130	2	0.028	0.924	1.820

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes analyte was not monitored
1. Refers to total concentrations unless stated

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 and SSCAD embankment drainage systems, water pumped from the Power Station site, 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 in the CIP. 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 these discharges were monitored and reported 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.

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	4.2	4.4	4.5
EC	µS/cm	350	1,966 - 2,453	3	1700	1720	1760
Total dissolved solids	mg/L	-	1640 - 1950	1	1240	1240	1240
DO	mg/L	-	NM	0			
turbidity	NTU	25	NM	1	1	1	1
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	18.5	24	24
Fluoride	mg/L		5.5 - 10.0	3	3.6	4.9	6.2
Sulfate	mg/L		1100 - 1800	3	695	842.5	990
Cations							
Sodium	mg/L	-	290 - 370	3	136	157	220
Potassium	mg/L	-	71 - 93	3	64	76	83
Calcium	mg/L	-	110 - 140	3	102	121	150
Magnesium	mg/L	-	15 - 18	3	<u>29</u>	<u>34</u>	<u>46</u>
Metals¹							
Aluminium	mg/L	0.055	NM	3	17.000	17.700	19.800
Arsenic	mg/L	0.013	0.025 - 0.025	3	0.002	<u>0.004</u>	<u>0.004</u>
Silver	mg/L	0.00005	0.00500 - 0.00500	1	0.0010	0.0010	0.0010
Barium	mg/L	-	0.08 - 0.09	3	0.04	0.04	0.40
Boron	mg/L	0.94	4.80 - 7.30	2	3.54	3.62	3.70
Cadmium	mg/L	0.0002	0.0010 - 0.0070	3	0.0038	0.0064	<u>0.0079</u>
Chromium	mg/L	0.001	0.005 - 0.010	1	0.002	0.002	0.002
Copper	mg/L	0.0014	0.005 - 0.040	3	0.0070	0.0110	0.0120
Iron (filtered)	mg/L	-	0.03 - 0.69	3	0.10	0.30	0.36
Mercury	mg/L	0.00006	0.0001 - 0.0001	3	0.0001	0.0001	0.0001
Manganese	mg/L	1.9	1.1 - 1.4	3	3.2	4.0	4.1
Molybdenum	mg/L	0.034	NM	3	0.005	0.010	0.016
Nickel	mg/L	0.011	NM	3	0.170	0.248	0.261
Lead	mg/L	0.0034	0.0050 - 0.0050	3	0.001	0.001	0.004
Selenium	mg/L	0.005	0.053 - 0.110	3	0.007	0.013	0.020
Zinc	mg/L	0.008	0.220 - 0.400	3	0.410	0.602	0.681

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes analyte was not monitored
1. Refers to total concentrations unless stated

4.2.3 Dump Creek – WX11

Dump Creek is a 1st order watercourse located to the west (down gradient) of the KVAR water management area. It flows to the north and joins Sawyers Swamp Creek upstream of WX7 (see Figure 2.1).

Four 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 from the four samples have consistent water quality, which is characterised as having low pH and elevated salinity and metal concentrations. These water quality levels / concentrations generally exceeded both the DGV and baseline range (see Table 4.6), but are consistent with water quality in previous AEMR periods (ie 2017 to the current period)

The Water Quality Assessment for the previous AMER Period (Aurecon 2020a) describes similar water quality characteristics and noted that there are multiple potential sources for the poor water quality, including chitter dumps in the catchment and seepage from the KVAR water management area. GPM propose to investigate the source of poor water quality in Dump Creek as part of the future studies (see Section 1.3).

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	4	<u>3.3</u>	<u>3.5</u>	<u>3.6</u>
EC	µS/cm	350	407 - 620	3	<u>1,040</u>	<u>1,130</u>	<u>1,350</u>
Total dissolved solids	mg/L	-	300 - 430	4	<u>652</u>	<u>702</u>	<u>730</u>
DO	mg/L	-	NM	4	3.9	6.4	8.3
turbidity	NTU	25	NM	4	0.6	8.6	42.6
Total nitrogen	mg/L	0.25	NM	4	0.40	1.00	1.50
Total phosphorus	mg/L	0.02	NM	4	0.03	0.09	0.16
Anions							
Chloride	mg/L	-	19 - 22	4	17	<u>23</u>	<u>26</u>
Fluoride	mg/L	-	0.3 - 0.8	4	0.3	0.4	0.6
Sulfate	mg/L	-	150 - 300	4	<u>410</u>	<u>437</u>	<u>472</u>
Cations							
Sodium	mg/L	-	42 - 58	4	<u>69</u>	<u>73</u>	<u>82</u>
Potassium	mg/L	-	13 - 16	4	<u>17</u>	<u>22</u>	<u>28</u>
Calcium	mg/L	-	13 - 19	4	<u>40</u>	<u>43</u>	<u>60</u>
Magnesium	mg/L	-	12 - 20	4	<u>33</u>	<u>35</u>	<u>47</u>
Metals							
Aluminium	mg/L	0.055	NM	4	1.110	1.685	3.790
Arsenic	mg/L	0.013	0.025 - 0.025	4	<0.001	<u>0.001</u>	<u>0.001</u>
Silver	mg/L	0.00005	0.00500 - 0.00500	4	<0.001	<u>0.00050</u>	<u>0.00050</u>

Table 4.6 Dump Creek WX11 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Barium	mg/L	-	0.02 - 0.02	4	<u>0.017</u>	<u>0.02350</u>	<u>0.02600</u>
Boron	mg/L	0.94	0.63 - 1.20	4	1.11	1.67	1.99
Cadmium	mg/L	0.0002	0.0010 - 0.0010	4	<0.0001	0.0004	0.0008
Chromium	mg/L	0.001	0.005 - 0.005	4	<0.001	<u>0.001</u>	<u>0.001</u>
Copper	mg/L	0.0014	0.005 - 0.005	4	<0.001	0.0030	0.0060
Iron (filtered)	mg/L	-	0.06 - 0.83	3	<u>2.55</u>	<u>6.730</u>	<u>11.700</u>
Mercury	mg/L	0.00006	0.0001 - 0.0001	4	<0.00004	<u>0.00002</u>	<u>0.00002</u>
Manganese	mg/L	1.9	1.0 - 2.0	3	3.20	3.94	5.04
Molybdenum	mg/L	0.034	NM	4	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	4	0.164	0.246	0.484
Lead	mg/L	0.0034	0.0050 - 0.0050	4	<0.001	<u>0.0025</u>	0.0060
Selenium	mg/L	0.005	0.003 - 0.003	4	<0.01	<u>0.0006</u>	<u>0.005</u>
Zinc	mg/L	0.008	0.140 - 0.340	4	0.275	0.598	1.240

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes analyte was not monitored
1. Refers to total concentrations unless stated

4.2.4 Sawyers Swamp Creek – WX7

WX7 is located on Sawyers Swamp Creek approximately 500 m downstream of the Site. Four 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 from the four samples show some variation in water quality. With reference to the time-series charts provided in Appendix A, an initial sample collected in November 2020 comprised low pH and elevated salinity and metal concentrations indicating that some incidental discharge of contaminated water into Sawyers Swamp Creek was occurring at the time of sampling.

Three samples collected in March, April and July 2021 all had a near neutral pH, salinity levels below the DGV and substantially lower metal concentrations. This variation in water quality is consistent with post July 2019 trends (ie following the cessation of discharges from Springvale Colliery) and suggests that any incidental discharges of contaminated water into Sawyers Swamp Creek occur at low rates and can be diluted by streamflow in the creek, which occurs intermittently.

In summary, the water quality results indicate some incidental discharge of contaminated water into Sawyers Swamp Creek is occurring. Inflows from the Dump Creek are one known source (see Section 4.2.3). Near the end of the AEMR Period GPM also identified that parts of the KVAR subsurface drainage system was in poor condition (see Section 3.2). This may have resulted in contaminated seepage from the KVAR water management system entering Sawyers Swamp Creek. GPM have initiated works to reinstate the subsurface drainage, which will assist in separating contaminated water from Sawyers Swamp Creek. GPM propose to investigate other potential sources of contamination in Sawyers Swamp Creek as part of the future studies (see Section 1.3).

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	4	<u>4.2</u>	6.6	<u>6.9</u>
EC	µS/cm	350	614 - 1,426	3	135	244	1,760
Total dissolved solids	mg/L	-	440 - 1060	4	<u>82</u>	<u>147</u>	<u>1,290</u>
DO	mg/L	-	NM	2	5.1	6.4	7.6
turbidity	NTU	25	NM	4	2.4	6.6	10.9
Total nitrogen	mg/L	0.25	NM	4	0.20	1.05	2.00
Total phosphorus	mg/L	0.02	NM	4	<0.01	0.01	0.30
Anions							
Chloride	mg/L	-	18 - 35	4	<u>11</u>	<u>17</u>	<u>17</u>
Fluoride	mg/L	-	0.7 - 1.1	4	<0.2	<u>0.1</u>	<u>0.2</u>
Sulfate	mg/L	-	250 - 710	4	<u>31</u>	<u>67</u>	<u>711</u>
Cations							
Sodium	mg/L	-	62 - 150	4	<u>16</u>	<u>24</u>	139
Potassium	mg/L	-	14 - 30	4	<u>5</u>	<u>7</u>	24
Calcium	mg/L	-	29 - 82	4	<u>4</u>	<u>7</u>	<u>121</u>
Magnesium	mg/L	-	17 - 48	4	<u>3</u>	<u>5</u>	47
Metals							
Aluminium	mg/L	0.055	NM	4	0.080	0.425	6.200
Arsenic	mg/L	0.013	0.025 - 0.025	4	<0.001	<u>0.001</u>	<u>0.001</u>
Silver	mg/L	0.00005	0.00500 - 0.00500	4	<0.001	<u>0.00050</u>	<u>0.00050</u>
Barium	mg/L	-	0.02 - 0.03	4	<u>0.031</u>	<u>0.04250</u>	<u>0.05000</u>
Boron	mg/L	0.94	1.10 - 3.40	4	<u>0.13</u>	<u>0.22</u>	<u>0.94</u>
Cadmium	mg/L	0.0002	0.0010 - 0.0010	4	<0.0001	<u>0.0001</u>	0.0041
Chromium	mg/L	0.001	0.005 - 0.005	4	<0.001	<u>0.001</u>	<u>0.001</u>
Copper	mg/L	0.0014	0.005 - 0.005	4	<0.001	<u>0.0005</u>	<u>0.0010</u>
Iron (filtered)	mg/L	-	0.03 - 0.16	4	<u>0.174</u>	<u>0.325</u>	<u>3.140</u>
Mercury	mg/L	0.00006	0.0001 - 0.0001	4	<0.00004	<u>0.00002</u>	<u>0.00002</u>
Manganese	mg/L	1.9	0.3 - 1.0	4	<u>0.13</u>	0.30	32.00
Molybdenum	mg/L	0.034	NM	4	<0.001	0.001	0.002
Nickel	mg/L	0.011	NM	4	0.006	0.011	1.250
Lead	mg/L	0.0034	0.0050 - 0.0050	4	<0.001	<u>0.0005</u>	<u>0.0005</u>
Selenium	mg/L	0.005	0.003 - 0.003	4	<0.01	<u>0.00075</u>	<u>0.005</u>
Zinc	mg/L	0.008	0.040 - 0.180	4	0.014	0.031	2.860

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes analyte was not monitored
1. Refers to total concentrations unless stated

4.3 Summary

The surface water quality results for the AEMR Period indicate that:

- surface water quality trends during the AEMR Period are generally consistent with recent AEMR periods (ie 2017 to the current period);
- surface water quality varies due to wet weather; and
- some incidental discharge of contaminated water into Sawyers Swamp Creek is occurring. Inflows from Dump Creek and poorly performing parts of the KVAR subsurface drainage system have been identified as potentially contributing to the incidental discharge of contaminated water into Sawyers Swamp Creek.

GPM propose to review:

- potential sources of contamination in Sawyers Swamp Creek as part of future studies (see Section 1.3); and
- the surface water monitoring approach as part of the proposed OEMP revision (see Section 1.3).

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 AMER Period (Aurecon 2020a) and shows interpreted groundwater levels and flow directions. The OEMP groundwater monitoring sites are also shown.

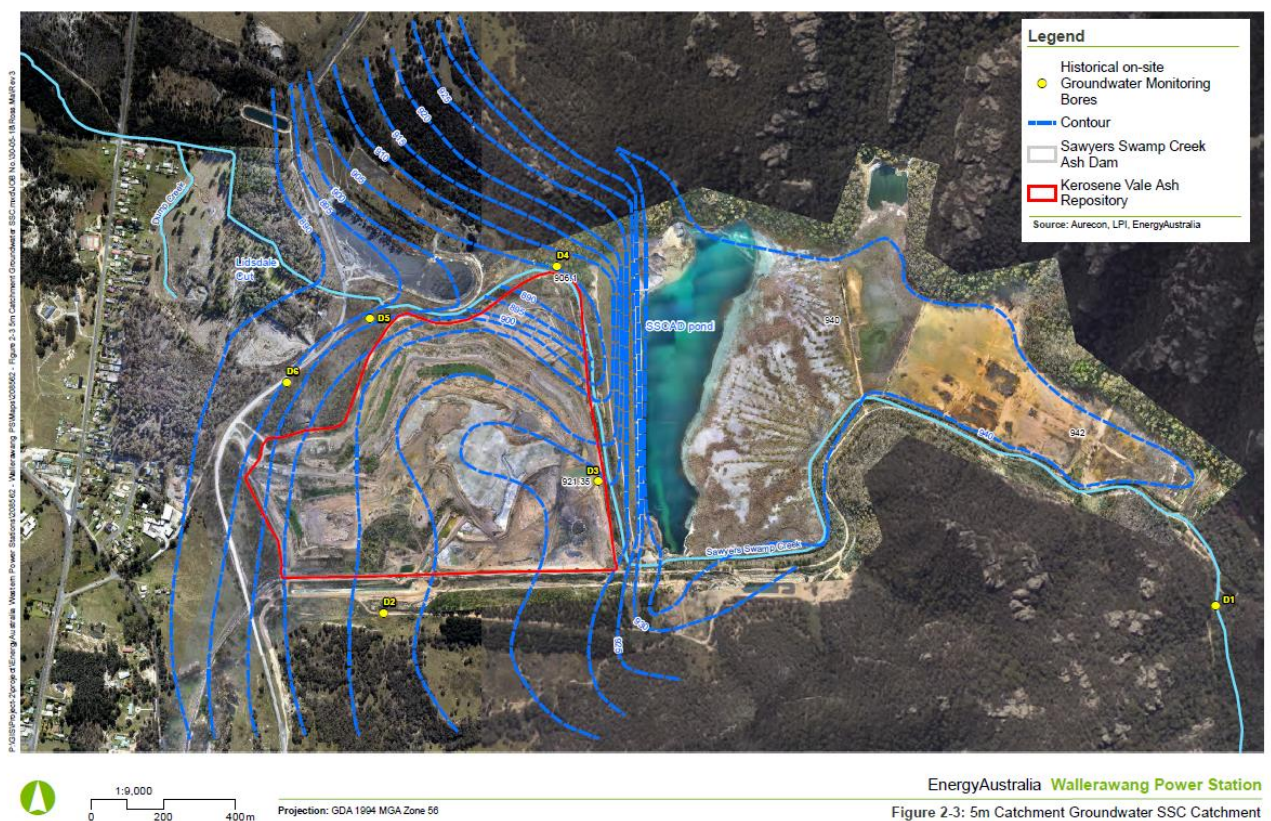


Figure 5.1 Indicative groundwater levels

Source: Aurecon 2020a

5.2 OEMP monitoring requirements

This section describes the groundwater monitoring and assessment requirements established in the OEMP.

5.2.1 Monitoring locations and approach

The environmental monitoring plan established in the OEMP identifies six groundwater monitoring locations. Table 4.1 describes each of these monitoring locations and associated monitoring requirements.

Table 5.1 **Surface water 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 4.2 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 ¹	Aluminium, arsenic, silver, barium, boron, cadmium, chromium, copper, iron (filtered), mercury, manganese, molybdenum, nickel, lead, selenium, zinc

Notes: 1. Refers to total concentrations

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 SCCAD 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								
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

Table 5.3 **Groundwater assessment criteria**

	Units	DGV	Baseline range (OEMP, Table C in Appendix B)					
			D1	D2	D3	D4	D5	D6
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
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 form and compared to the assessment criteria established in Section 5.2.2.

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 2017 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.

The water quality results for each surface 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.

Eleven 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 variable salinity, with the EC ranging from 115 to 2,200 $\mu\text{S}/\text{cm}$. This is likely due to intermittent surface water influences. Median concentrations of aluminium, copper, nickel, lead 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 2017 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	11	<u>3.5</u>	<u>5.1</u>	<u>6.2</u>
EC	$\mu\text{S}/\text{cm}$	350	90 - 170	9	115	<u>1,060</u>	<u>2,220</u>
Total dissolved solids	mg/L	-	60 - 302	11	83	<u>425</u>	<u>1,990</u>
Anions							
Chloride	mg/L		12 - 37	11	12	27	<u>46</u>

Table 5.4 Groundwater monitoring location D1 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Fluoride	mg/L		0.0 - 0.1	10	<0.01	0.0	<u>0.6</u>
Sulfate	mg/L		3 - 8	10	<u>8</u>	<u>315</u>	<u>1490</u>
Cations							
Sodium	mg/L	-	8 - 19	11	14	<u>58</u>	<u>118</u>
Potassium	mg/L	-	2 - 10	11	4	5	<u>22</u>
Calcium	mg/L	-	2 - 9	11	<u>1</u>	3	<u>74</u>
Magnesium	mg/L	-	1 - 5	11	2	<u>15</u>	<u>92</u>
Metals¹							
Aluminium	mg/L	0.055	NM	11	0.010	1.630	4.960
Arsenic	mg/L	0.013	0.001 - 0.001	11	<0.001	<u>0.001</u>	<u>0.010</u>
Silver	mg/L	0.00005	0.00025 - 0.00100	11	<0.001	0.00050	0.00050
Barium	mg/L	-	0.04 - 0.06	11	<u>0.016</u>	0.04200	<u>0.11700</u>
Boron	mg/L	0.94	0.02 - 0.05	11	<0.05	<u>0.16</u>	1.43
Cadmium	mg/L	0.0002	0.0001 - 0.0010	11	<0.0001	0.0001	0.0116
Chromium	mg/L	0.001	0.010 - 0.010	11	<0.001	<u>0.001</u>	0.005
Copper	mg/L	0.0014	0.002 - 0.055	11	<0.001	0.0080	0.0150
Iron (filtered)	mg/L	-	0.02 - 4.50	10	<u>0.015</u>	<u>9.255</u>	<u>256.000</u>
Mercury	mg/L	0.00006	0.0000 - 0.0002	11	<0.00004	0.00002	0.00011
Manganese	mg/L	1.9	0.0 - 0.2	10	0.02	<u>1.08</u>	12.70
Molybdenum	mg/L	0.034	NM	11	<0.001	0.001	0.002
Nickel	mg/L	0.011	NM	11	0.002	0.032	0.694
Lead	mg/L	0.0034	0.0005 - 0.0160	11	<0.001	0.0050	0.0210
Selenium	mg/L	0.005	0.001 - 0.001	11	<0.0002	<u>0.0004</u>	<u>0.005</u>
Zinc	mg/L	0.008	0.030 - 0.240	11	0.033	0.118	1.610

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes analyte was not monitored
1. Refers to total concentrations unless stated

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, silver, 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 AMER Period.

The time-series charts provided in Appendix B indicate that the water quality over the AMER Period was generally consistent with water quality in recent AEMR periods (ie 2017 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	4.4	4.5	4.7
EC	µS/cm	350	278 - 502	2	319	332	345
Total dissolved solids	mg/L	-	120 - 315	3	204	206	213
Anions							
Chloride	mg/L		12 - 104	3	19	22	23
Fluoride	mg/L		0.0 - 0.1	3	<0.02	0.0	0.0
Sulfate	mg/L		57 - 180	3	98	100	100
Cations							
Sodium	mg/L	-	17 - 58	3	31	33	34
Potassium	mg/L	-	0 - 5	3	4	4	4
Calcium	mg/L	-	1 - 5	3	<u>1</u>	1	1
Magnesium	mg/L	-	7 - 22	3	11	12	12
Metals¹							
Aluminium	mg/L	0.055	NM	3	0.130	0.290	0.640
Arsenic	mg/L	0.013	0.001 - 0.025	3	<0.001	<u>0.001</u>	<u>0.001</u>
Silver	mg/L	0.00005	0.00025 - 0.00500	3	<0.001	0.00050	0.00050
Barium	mg/L	-	0.04 - 0.13	3	<u>0.031</u>	<u>0.03400</u>	<u>0.03600</u>
Boron	mg/L	0.94	0.01 - 0.15	3	<0.05	0.03	0.07
Cadmium	mg/L	0.0002	0.0001 - 0.0010	3	0.0001	0.0001	0.0001
Chromium	mg/L	0.001	0.001 - 0.010	3	<0.001	<u>0.001</u>	<u>0.001</u>
Copper	mg/L	0.0014	0.001 - 0.005	3	<0.001	<u>0.0005</u>	<u>0.0005</u>
Iron (filtered)	mg/L	-	0.03 - 5.70	3	<0.05	<u>0.025</u>	<u>0.025</u>
Mercury	mg/L	0.00006	0.0000 - 0.0002	3	<0.00004	0.00002	0.00013
Manganese	mg/L	1.9	0.3 - 0.7	3	<u>0.30</u>	0.31	0.35
Molybdenum	mg/L	0.034	NM	3	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	3	0.034	0.035	0.038
Lead	mg/L	0.0034	0.0020 - 0.0080	3	<0.001	<u>0.0005</u>	<u>0.0010</u>
Selenium	mg/L	0.005	0.001 - 0.003	3	<0.01	<u>0.0003</u>	<u>0.005</u>
Zinc	mg/L	0.008	0.048 - 0.130	3	0.037	0.044	0.049

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes analyte was not monitored
1. Refers to total concentrations unless stated

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 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 AMER Period was generally consistent with water quality in recent AEMR periods (ie 2017 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	<u>4.2</u>	<u>4.2</u>	<u>4.5</u>
EC	µS/cm	350	332 - 773	2	<u>1,380</u>	<u>1,975</u>	<u>2,570</u>
Total dissolved solids	mg/L	-	238 - 538	3	<u>1,080</u>	<u>1,810</u>	<u>2,430</u>
Anions							
Chloride	mg/L		32 - 140	3	<u>22</u>	<u>26</u>	<u>26</u>
Fluoride	mg/L		0.1 - 0.2	3	<u>2.0</u>	<u>3.5</u>	<u>8.0</u>
Sulfate	mg/L		54 - 130	3	<u>758</u>	<u>1310</u>	<u>1560</u>
Cations							
Sodium	mg/L	-	35 - 96	3	82	<u>108</u>	<u>158</u>
Potassium	mg/L	-	5 - 12	3	<u>32</u>	<u>51</u>	<u>61</u>
Calcium	mg/L	-	11 - 27	3	<u>71</u>	<u>116</u>	<u>190</u>
Magnesium	mg/L	-	11 - 30	3	<u>54</u>	<u>79</u>	<u>115</u>
Metals¹							
Aluminium	mg/L	0.055	NM	3	12.800	36.000	60.400
Arsenic	mg/L	0.013	0.001 - 0.025	3	0.002	0.004	0.016
Silver	mg/L	0.00005	0.00025 - 0.00500	3	<0.001	0.00050	0.00050
Barium	mg/L	-	0.05 - 0.13	3	<u>0.019</u>	<u>0.02100</u>	<u>0.02300</u>

Table 5.6 Groundwater monitoring location D3 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Boron	mg/L	0.94	0.01 - 0.06	3	<u>2.12</u>	<u>4.21</u>	<u>5.26</u>
Cadmium	mg/L	0.0002	0.0001 - 0.0010	3	<u>0.0090</u>	<u>0.0202</u>	<u>0.0285</u>
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	<u>0.024</u>	<u>0.0640</u>	<u>0.1120</u>
Iron (filtered)	mg/L	-	0.01 - 6.50	3	<u>7.32</u>	<u>8.370</u>	<u>15.600</u>
Mercury	mg/L	0.00006	0.0000 - 0.0002	3	<0.00004	0.00002	0.00004
Manganese	mg/L	1.9	0.2 - 1.1	3	<u>3.58</u>	<u>6.81</u>	<u>9.00</u>
Molybdenum	mg/L	0.034	NM	3	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	3	<u>0.772</u>	<u>1.330</u>	<u>1.340</u>
Lead	mg/L	0.0034	0.0005 - 0.0080	3	0.003	<u>0.0120</u>	<u>0.0130</u>
Selenium	mg/L	0.005	0.001 - 0.003	3	<u>0.0033</u>	<u>0.0094</u>	<u>0.03</u>
Zinc	mg/L	0.008	0.030 - 0.061	3	<u>0.943</u>	<u>1.770</u>	<u>1.820</u>

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes analyte was not monitored
1. Refers to total concentrations unless stated

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.

Two 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 has being slightly acidic and having salinity (as indicated by EC) that is elevated relative to both the DGV and baseline range.

Median concentrations of boron, chromium, 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 AMER Period was generally consistent with water quality in recent AEMR periods (ie 2017 to the current period).

Table 5.7 Groundwater monitoring location D4 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Physico-chemical parameters							
pH	-	6.5–8.0	5.0 - 6.6	2	<u>5.7</u>	<u>5.8</u>	<u>6.0</u>
EC	µS/cm	350	492 - 1,331	2	<u>1,730</u>	<u>2,010</u>	<u>2,290</u>
Total dissolved solids	mg/L	-	270 - 1210	2	<u>1,230</u>	<u>1,575</u>	<u>1,920</u>
Anions							

Table 5.7 Groundwater monitoring location D4 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Chloride	mg/L		16 - 86	2	36	62	<u>89</u>
Fluoride	mg/L		0.0 - 0.1	2	<0.2	0.1	0.1
Sulfate	mg/L		77 - 770	2	<u>788</u>	<u>1039</u>	<u>1290</u>
Cations							
Sodium	mg/L	-	27 - 91	2	<u>150</u>	<u>179</u>	<u>208</u>
Potassium	mg/L	-	5 - 10	2	<u>8</u>	<u>9</u>	<u>10</u>
Calcium	mg/L	-	38 - 100	2	<u>103</u>	<u>112</u>	<u>120</u>
Magnesium	mg/L	-	21 - 73	2	64	67	70
Metals¹							
Aluminium	mg/L	0.055	NM	2	0.020	0.040	0.060
Arsenic	mg/L	0.013	0.001 - 0.025	2	<0.001	<u>0.001</u>	<u>0.001</u>
Silver	mg/L	0.00005	0.00025 - 0.00500	2	<0.001	0.00050	0.00050
Barium	mg/L	-	0.03 - 0.13	2	<u>0.012</u>	<u>0.01250</u>	<u>0.01300</u>
Boron	mg/L	0.94	0.23 - 1.30	2	0.85	1.06	1.26
Cadmium	mg/L	0.0002	0.0001 - 0.0010	2	<0.0001	<u>0.0001</u>	<u>0.0001</u>
Chromium	mg/L	0.001	0.001 - 0.010	2	<0.001	0.002	0.004
Copper	mg/L	0.0014	0.001 - 0.005	2	<0.001	<u>0.0008</u>	0.0010
Iron (filtered)	mg/L	-	22.00 - 71.00	2	<u>13.2</u>	33.100	53.000
Mercury	mg/L	0.00006	0.0000 - 0.0002	2	<0.00004	0.00002	0.00002
Manganese	mg/L	1.9	6.0 - 20.0	2	4.91	6.14	7.36
Molybdenum	mg/L	0.034	NM	2	<0.001	0.001	0.002
Nickel	mg/L	0.011	NM	2	0.041	0.044	0.047
Lead	mg/L	0.0034	0.0005 - 0.0100	2	<0.001	0.0005	0.0005
Selenium	mg/L	0.005	0.001 - 0.003	2	<0.0002	<u>0.00015</u>	<u>0.0002</u>
Zinc	mg/L	0.008	0.020 - 0.090	2	0.087	<u>0.109</u>	<u>0.130</u>

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes analyte was not monitored
1. Refers to total concentrations unless stated

5.3.5 Groundwater monitoring location D5

Groundwater monitoring bore D5 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 KVAR.

No groundwater samples were collected over the AEMR Period as this bore was dry. Aurecon 2020a notes that this bore has been dry since July 2019, which is when controlled discharges for Springvale Colliery to Sawyers Swamp Creek ceased.

The time-series charts provided in Appendix B indicate that the water quality at D5 prior to July 2019 was similar to D3 and D6.

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 5.6 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 D5 appears to be degraded relative to baseline water quality. The Water Quality Assessment for the previous AMER 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 AMER Period was generally consistent with water quality in recent AEMR periods (ie 2017 to the current period).

Table 5.8 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	4.1	4.2	4.2
EC	µS/cm	350	283 - 1,013	2	<u>1,480</u>	<u>1,615</u>	<u>1,750</u>
Total dissolved solids	mg/L	-	200 - 902	3	<u>1,070</u>	<u>1,460</u>	<u>1,500</u>
Anions							
Chloride	mg/L		14 - 118	3	19	32	34
Fluoride	mg/L		0.0 - 0.2	3	<0.2	<u>0.3</u>	<u>2.7</u>
Sulfate	mg/L		89 - 360	3	<u>712</u>	<u>910</u>	<u>972</u>
Cations							
Sodium	mg/L	-	25 - 58	3	<u>104</u>	<u>110</u>	<u>114</u>
Potassium	mg/L	-	4 - 9	3	8	<u>9</u>	<u>10</u>
Calcium	mg/L	-	4 - 24	3	20	<u>33</u>	<u>36</u>
Magnesium	mg/L	-	12 - 29	3	<u>68</u>	<u>73</u>	<u>79</u>
Metals¹							
Aluminium	mg/L	0.055	NM	3	5.970	6.270	7.020

Table 5.8 Groundwater monitoring location D6 – results summary

	Units	DGV	Baseline range	No. samples	Minimum	Median	Maximum
Arsenic	mg/L	0.013	0.004 - 0.025	3	<0.001	<u>0.001</u>	<u>0.001</u>
Silver	mg/L	0.00005	0.00100 - 0.00500	3	<0.001	<u>0.00050</u>	<u>0.00050</u>
Barium	mg/L	-	0.02 - 0.07	3	<u>0.018</u>	<u>0.01900</u>	0.02100
Boron	mg/L	0.94	0.12 - 0.82	3	0.73	1.00	1.18
Cadmium	mg/L	0.0002	0.0010 - 0.0010	3	0.0008	0.0010	0.0010
Chromium	mg/L	0.001	0.002 - 0.010	3	<0.001	0.002	0.002
Copper	mg/L	0.0014	0.002 - 0.010	3	0.002	0.0030	0.0030
Iron (filtered)	mg/L	-	13.00 - 104.00	3	52	<u>113.000</u>	<u>127.000</u>
Mercury	mg/L	0.00006	0.0001 - 0.0002	3	<0.00004	<u>0.00002</u>	<u>0.00002</u>
Manganese	mg/L	1.9	0.6 - 4.3	3	2.65	5.48	5.73
Molybdenum	mg/L	0.034	NM	3	<0.001	0.001	0.001
Nickel	mg/L	0.011	NM	3	0.482	0.588	0.589
Lead	mg/L	0.0034	0.0020 - 0.0110	3	0.005	0.0060	0.0070
Selenium	mg/L	0.005	0.001 - 0.003	3	<0.01	<u>0.0004</u>	<u>0.005</u>
Zinc	mg/L	0.008	0.050 - 0.566	3	1.08	1.210	1.280

Notes: **Bold** indicates DGV exceeded, underlined indicates baseline range exceeded. NM denotes analyte was not monitored
1. Refers to total concentrations unless stated

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 2017 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 propose to review:

- potential sources of groundwater contamination as part of future studies (see Section 1.3); and
- the groundwater monitoring approach as part of the proposed OEMP revision (see Section 1.3).

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

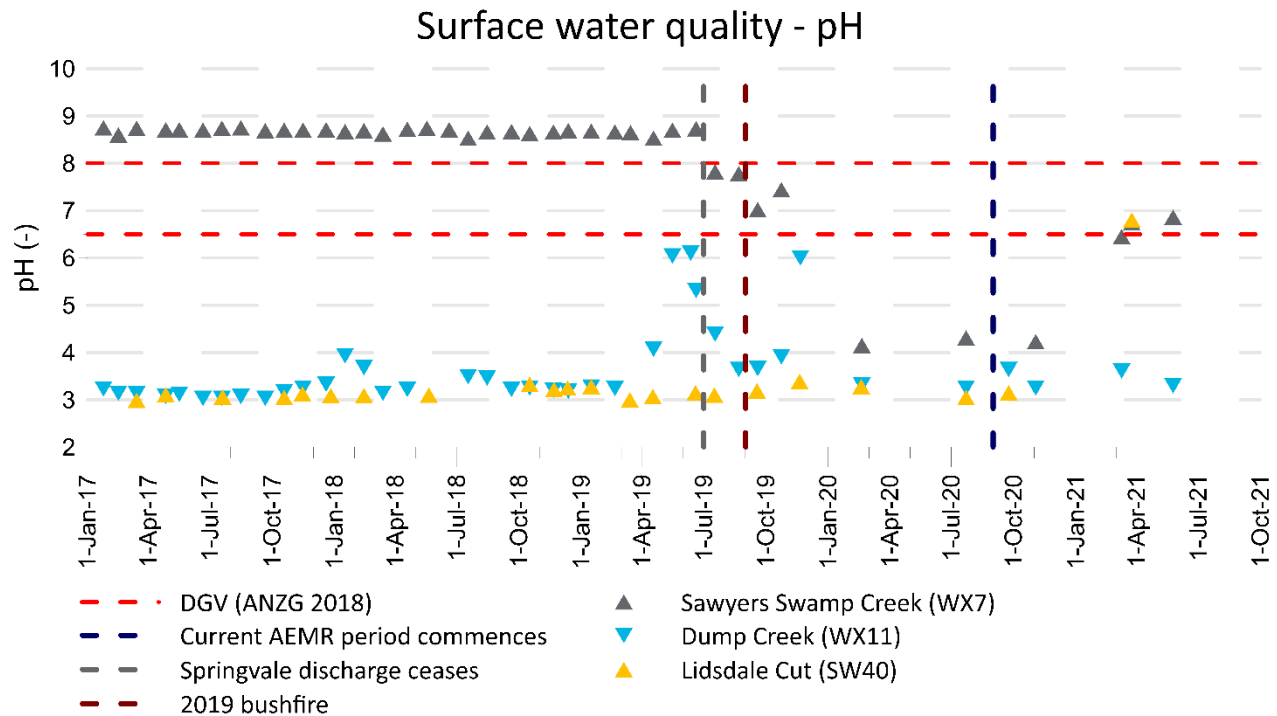
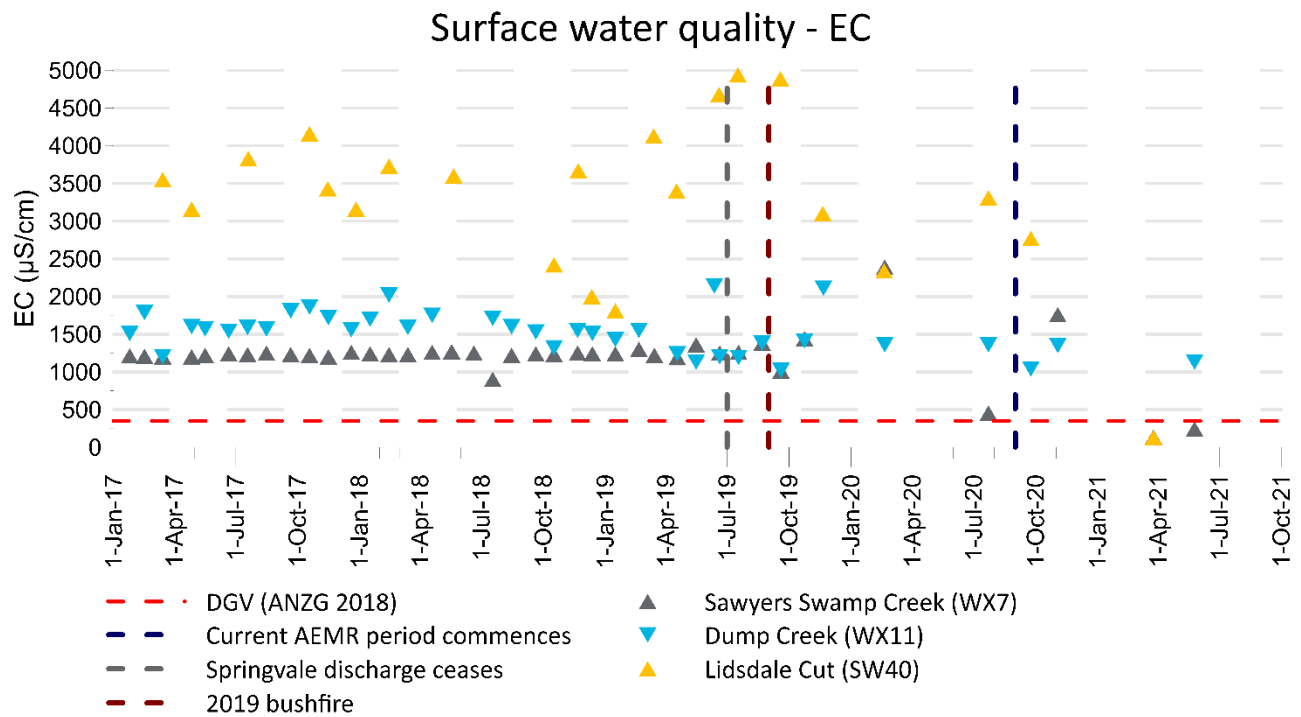
Aurecon 2020b, Wallerawang Closure Plan, Kerosene Vale Groundwater Assessment

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

Appendix A

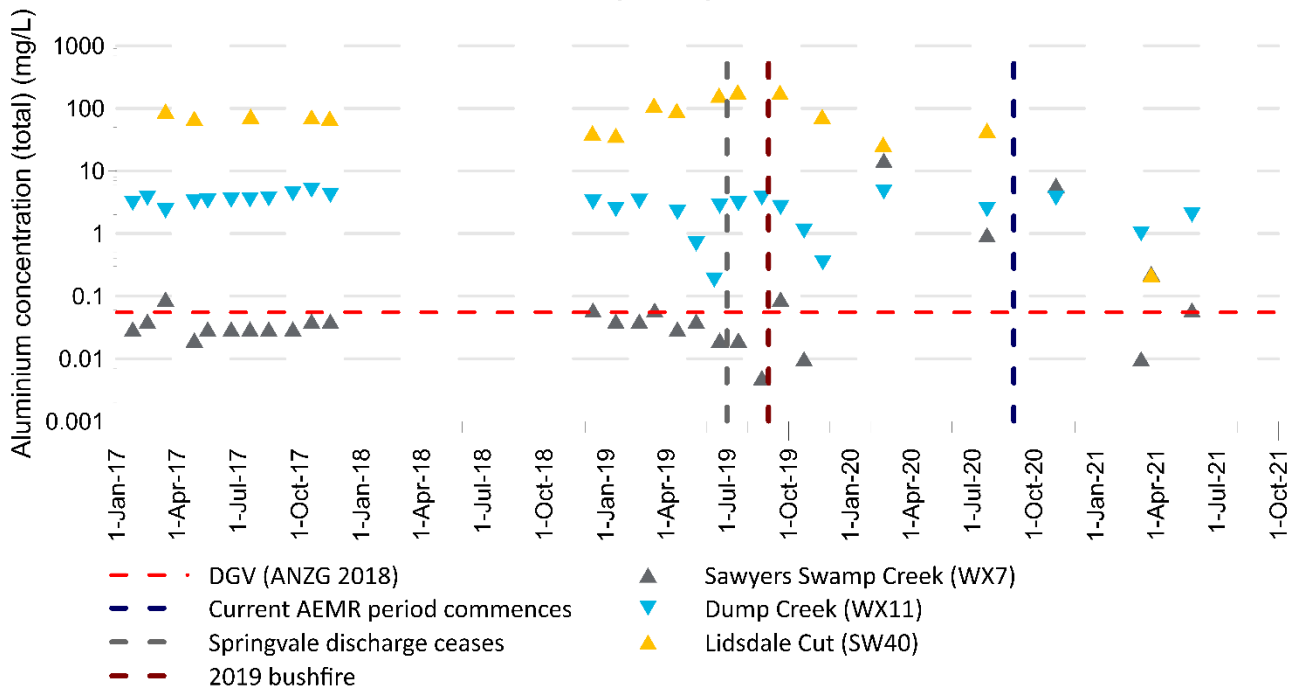
Surface water quality charts

A.1 Physico-chemical paramater charts

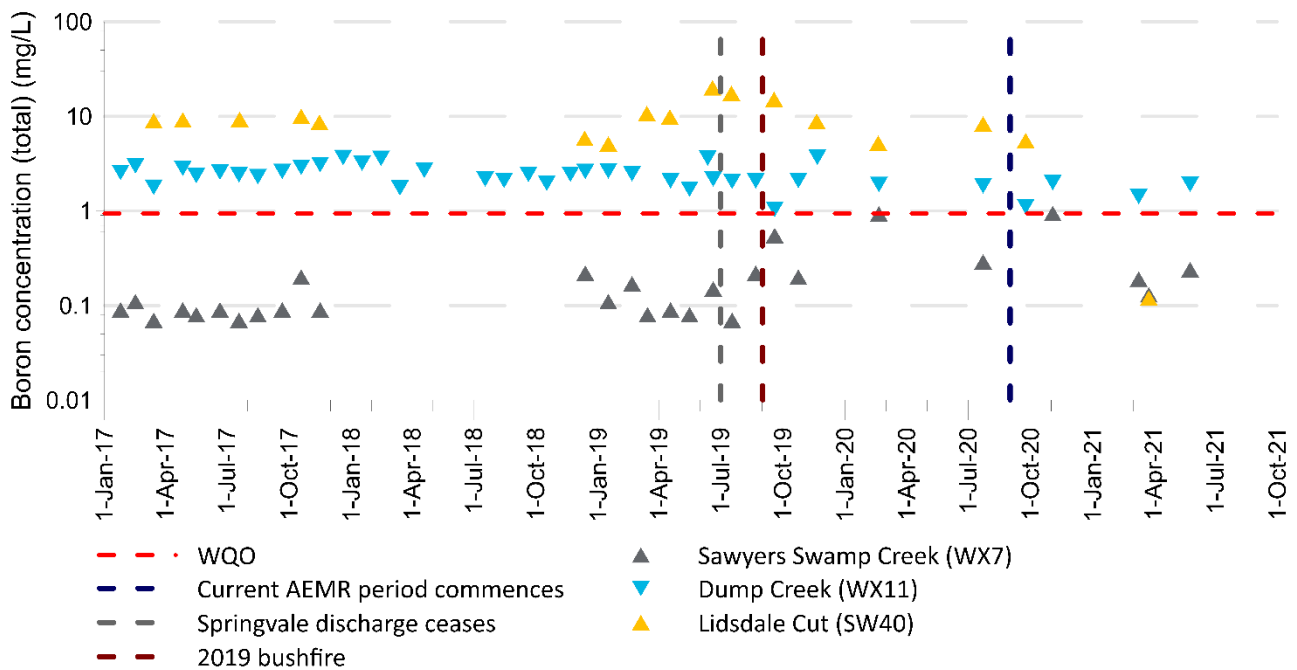


A.2 Metals charts

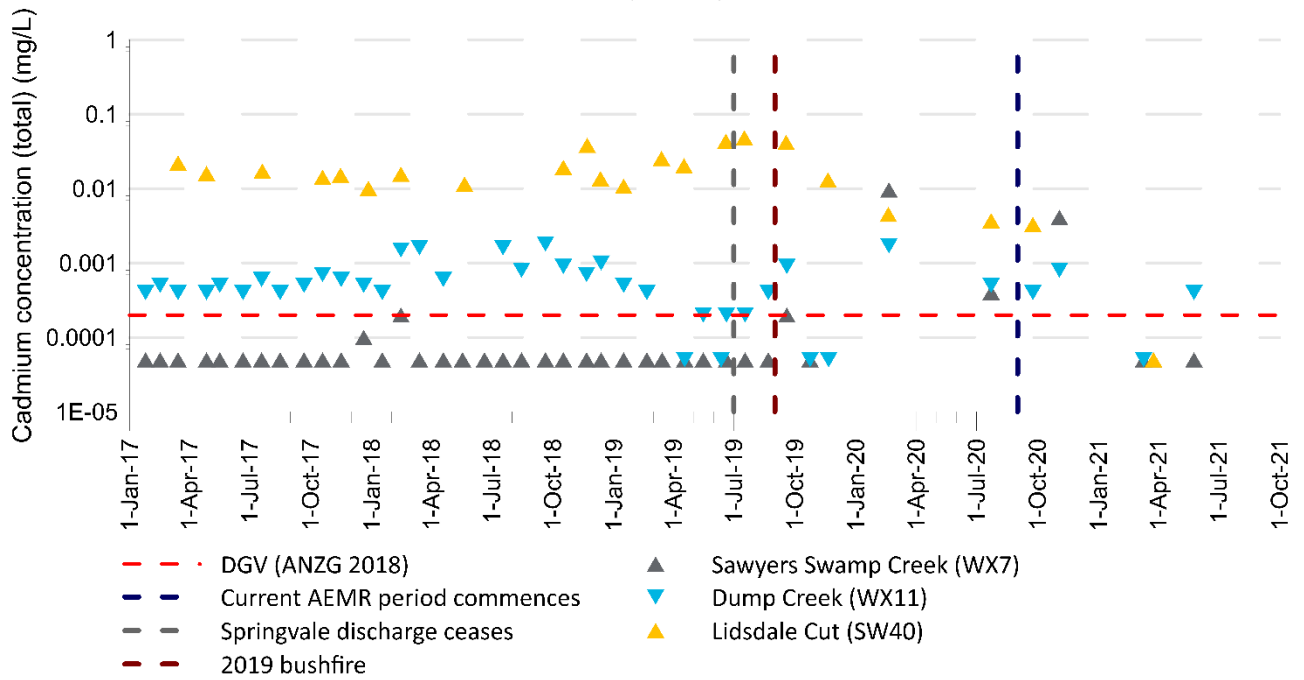
Surface water quality - Aluminium



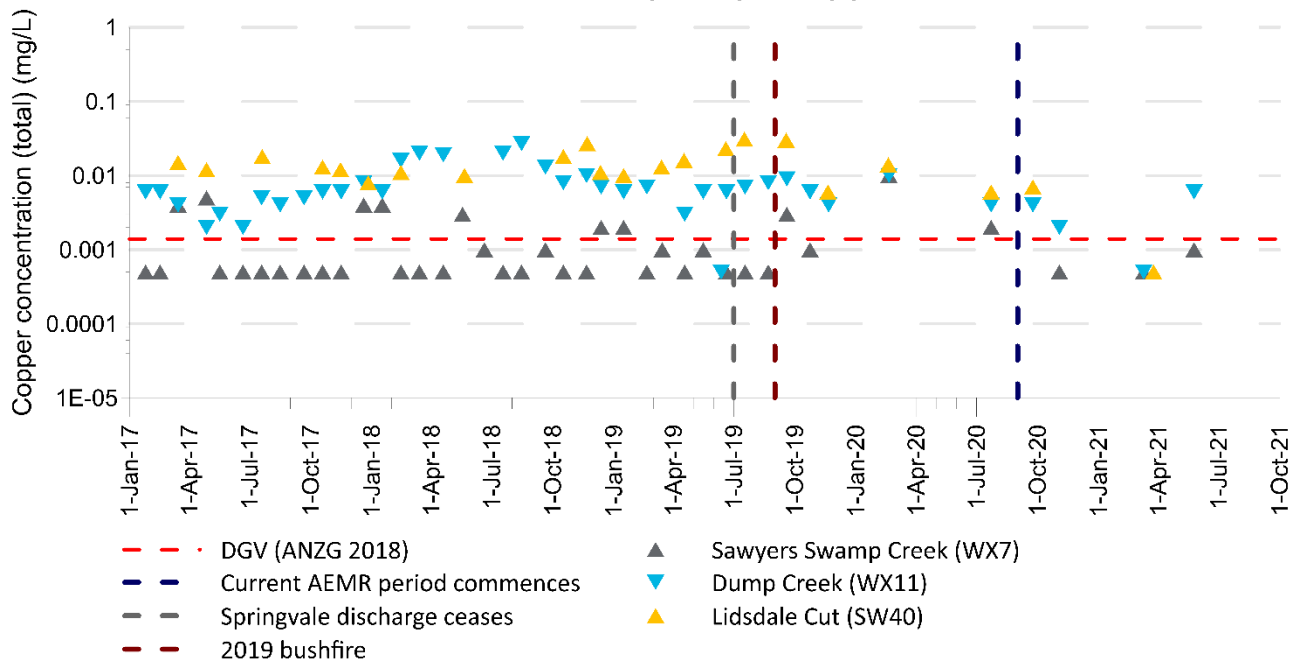
Surface water quality - Boron



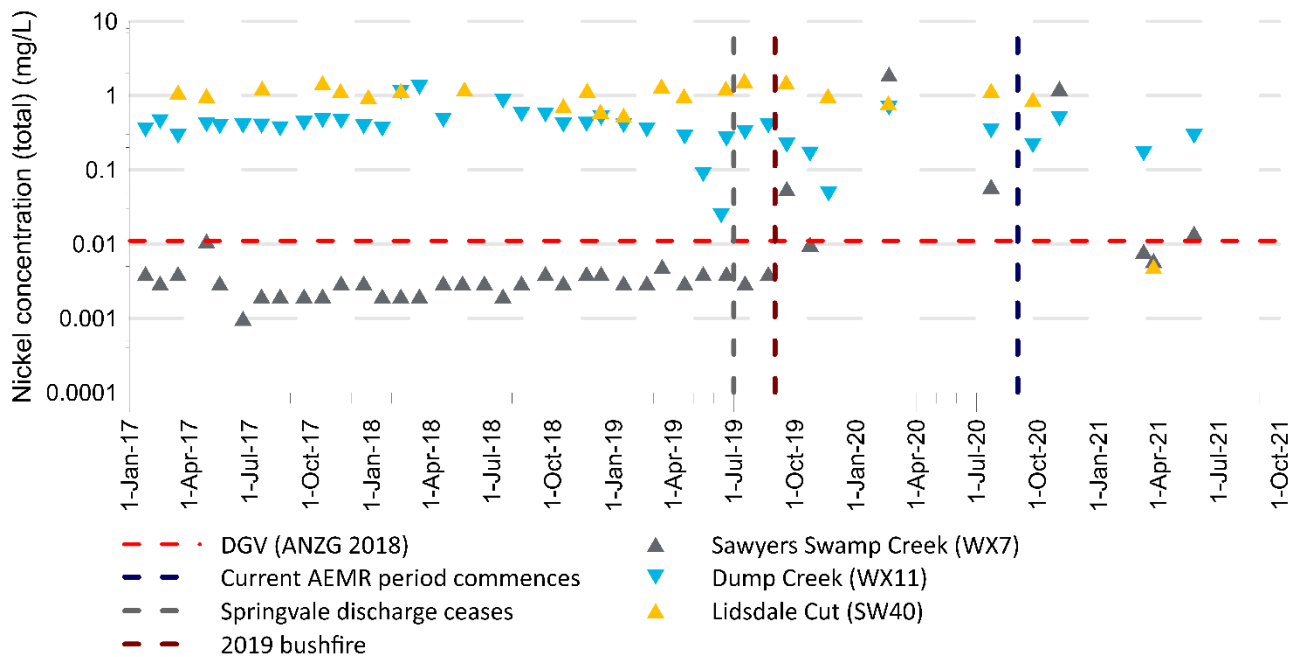
Surface water quality - Cadmium



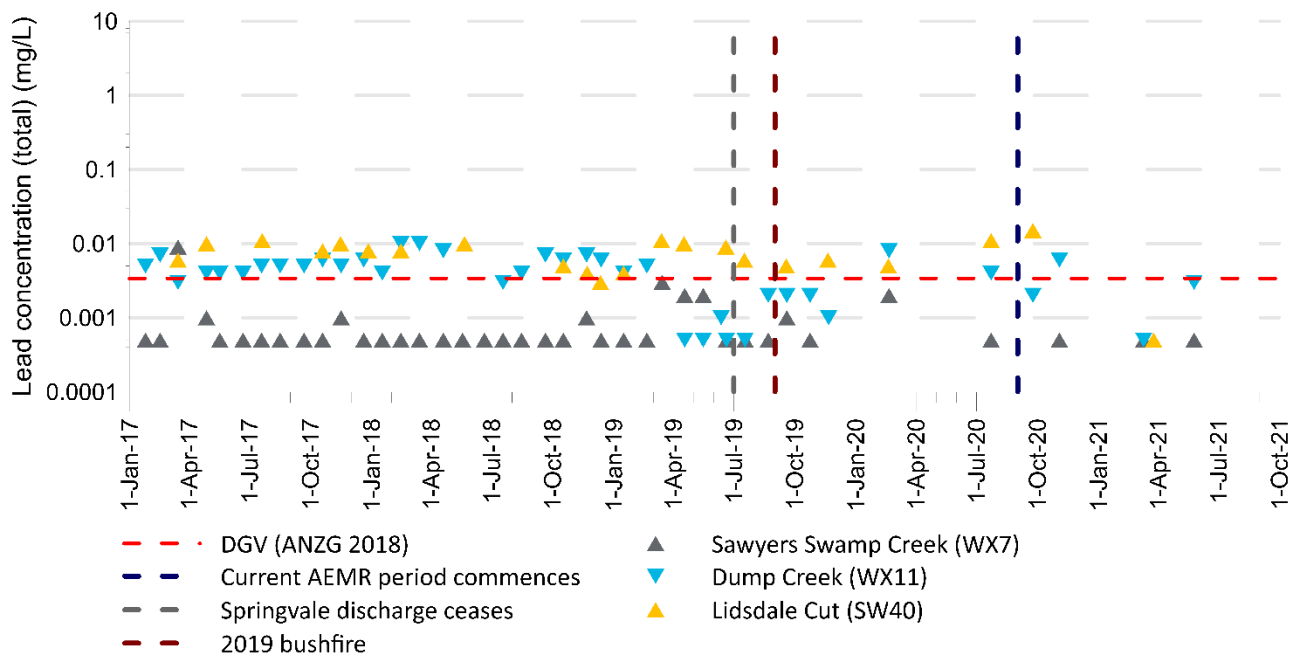
Surface water quality - Copper



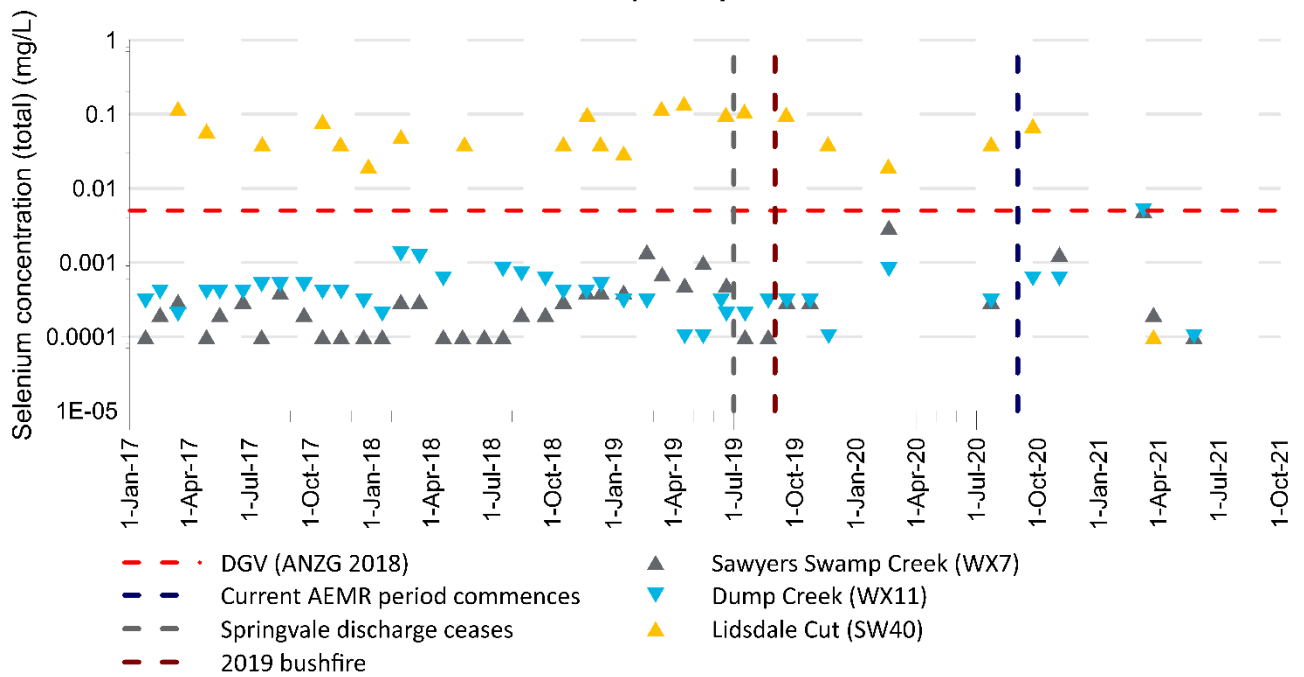
Surface water quality - Nickel



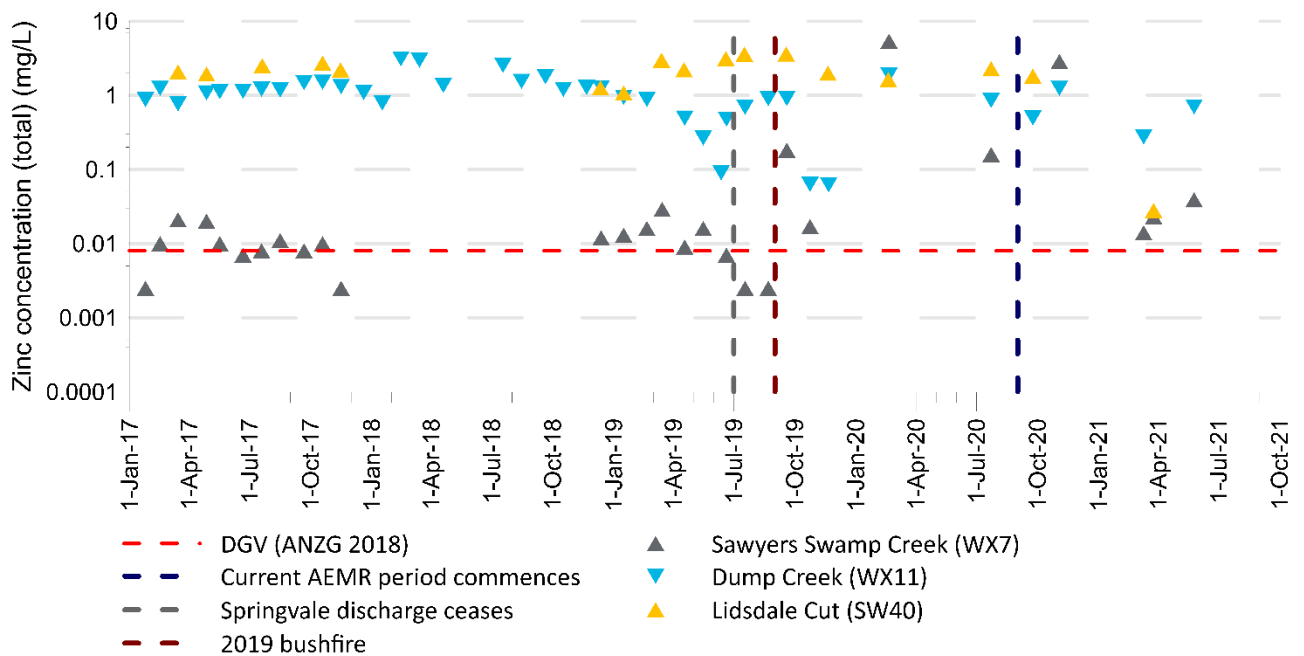
Surface water quality - Lead



Surface water quality - Selenium



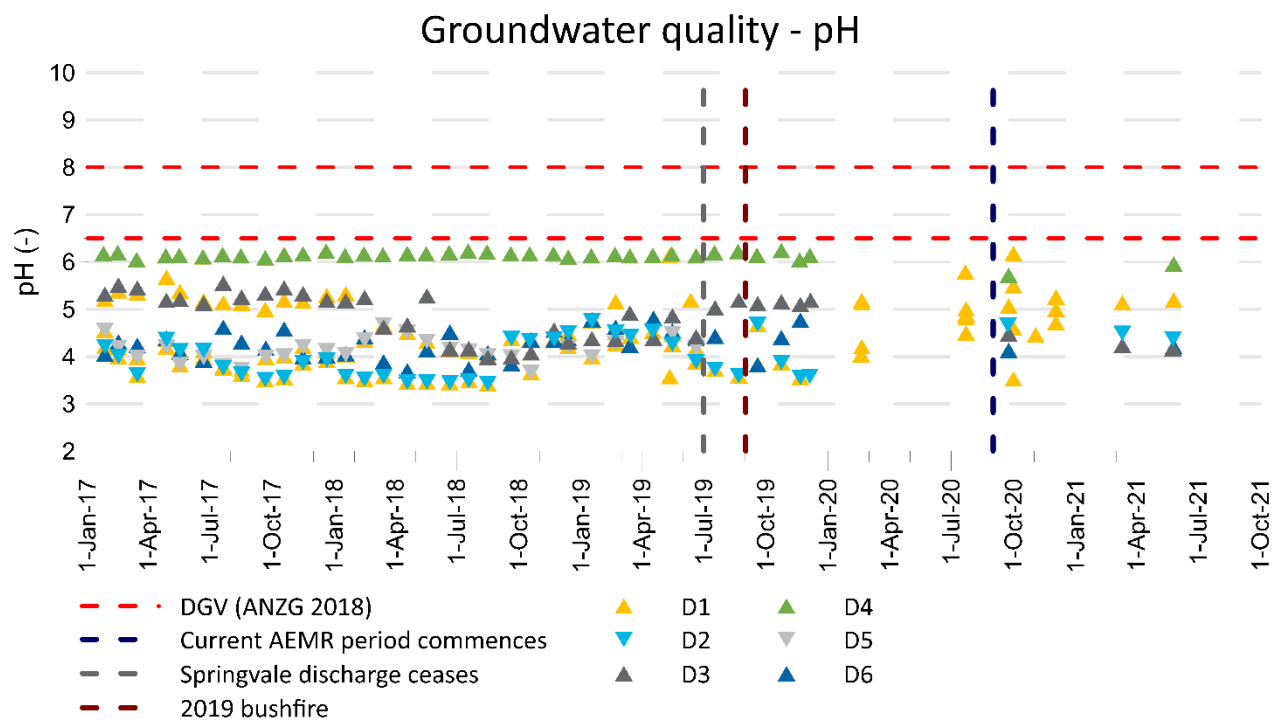
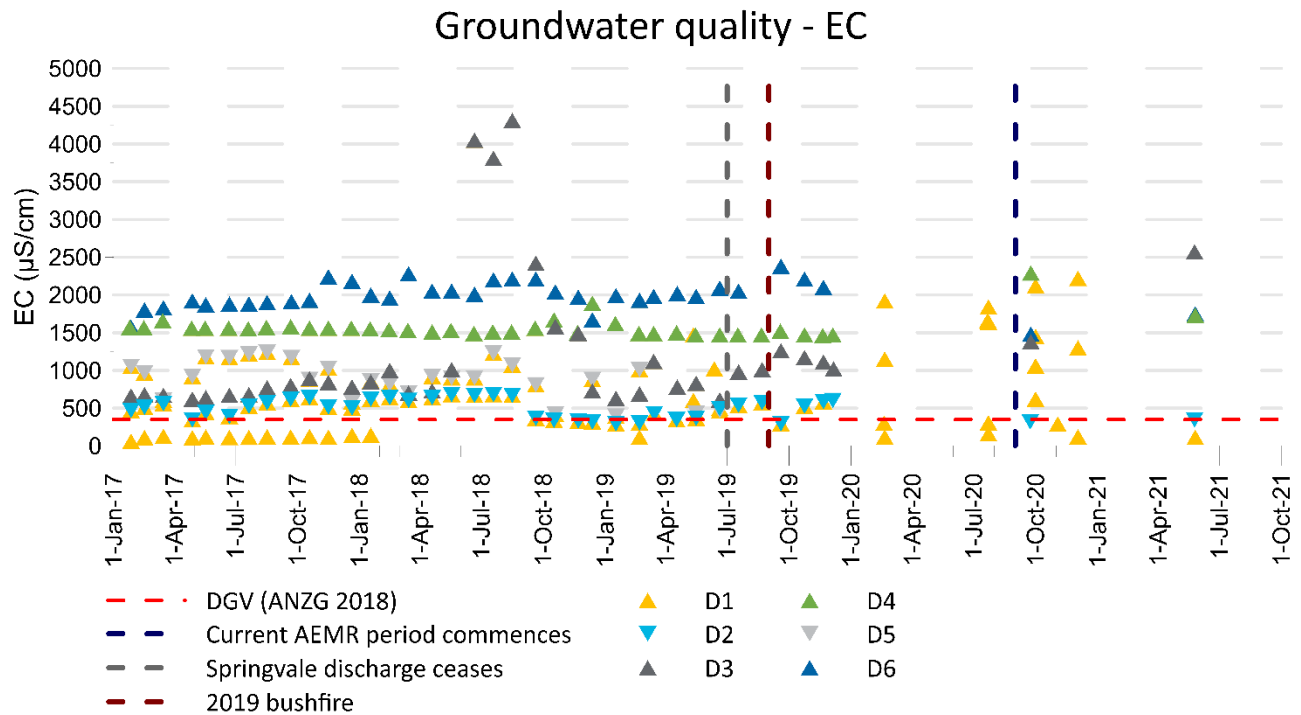
Surface water quality - Zinc



Appendix B

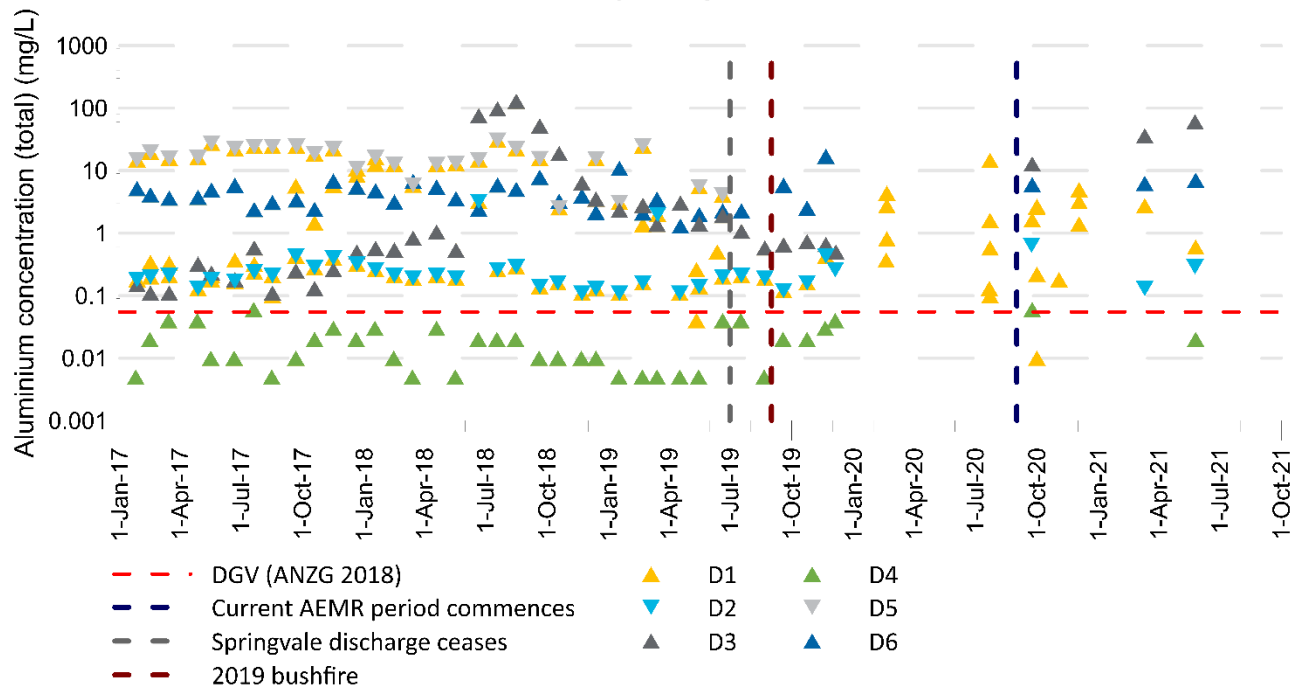
Groundwater quality charts

B.1 Physico-chemical paramater charts

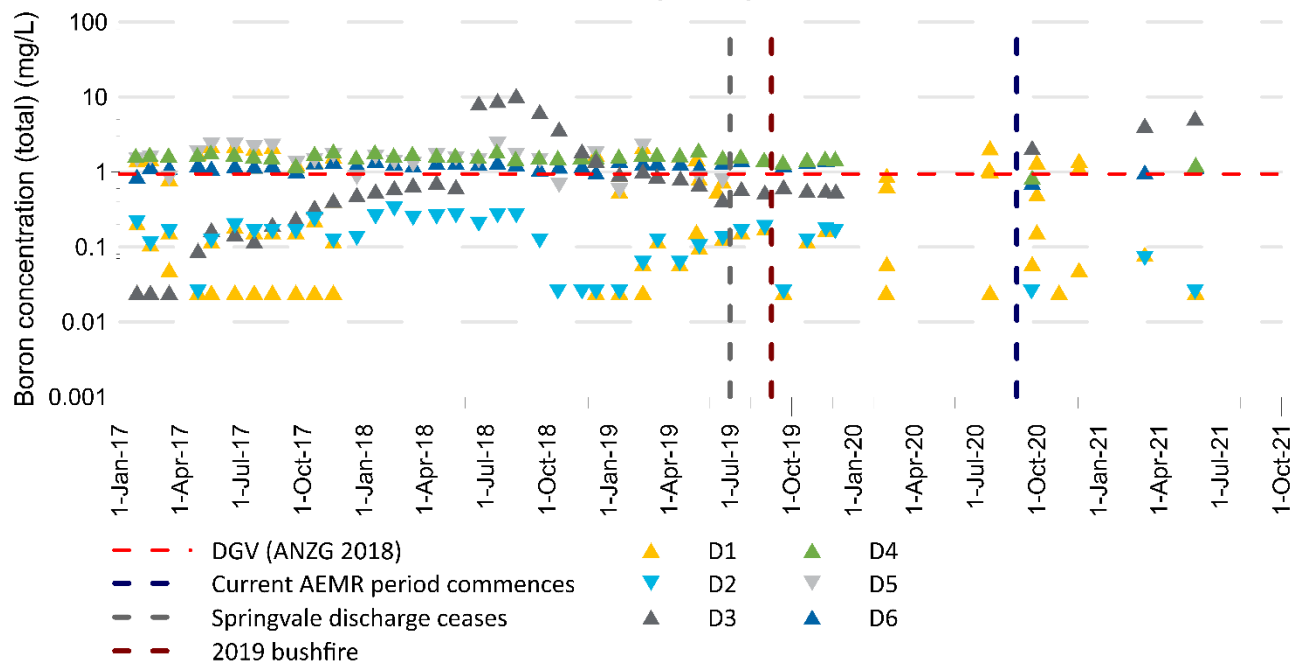


B.2 Metals charts

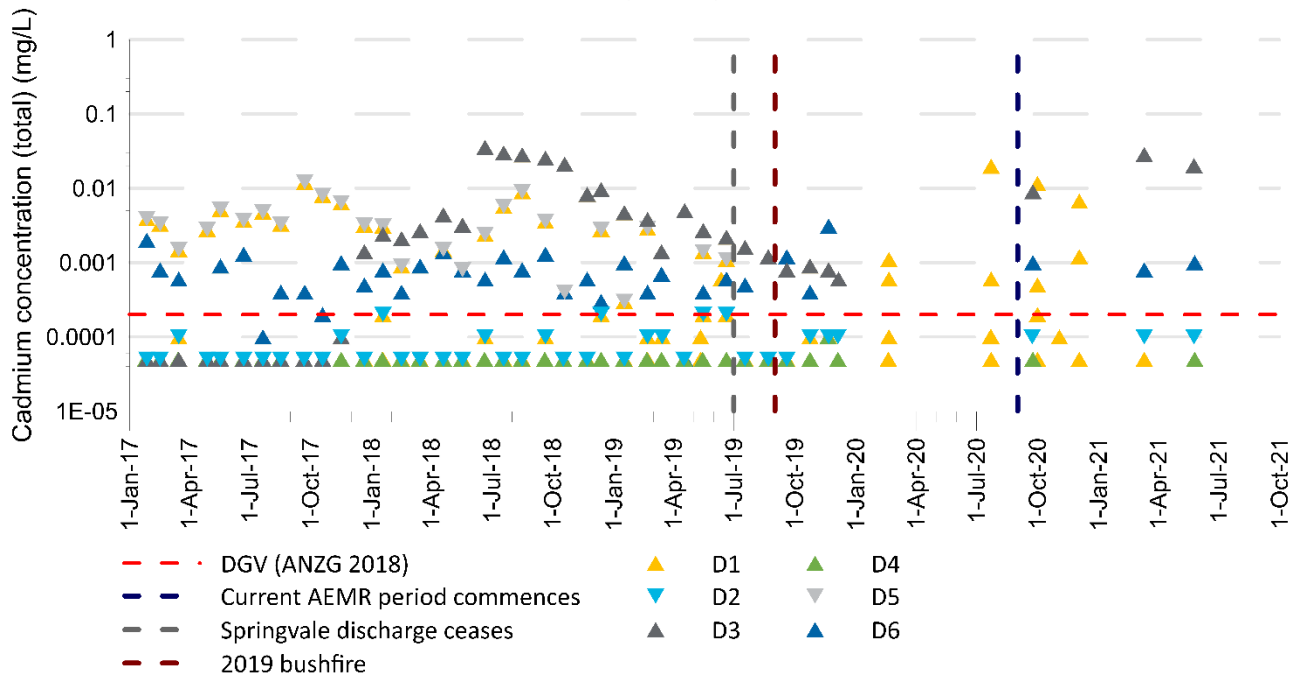
Groundwater quality - Aluminium



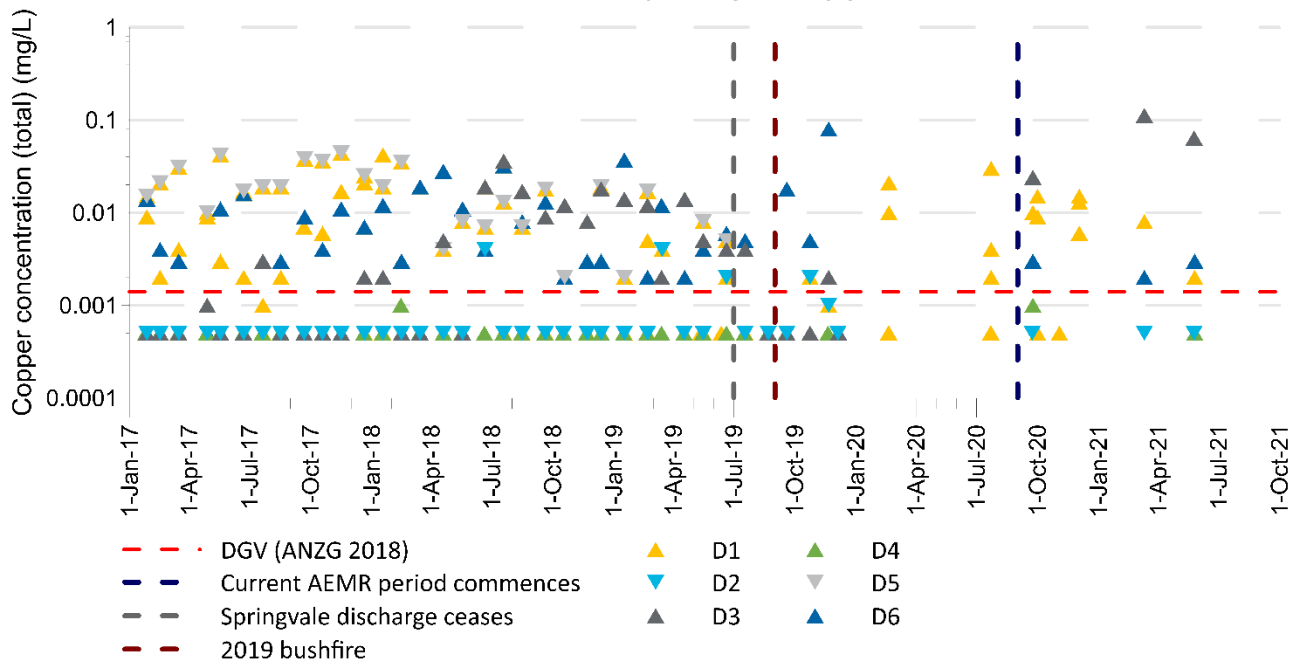
Groundwater quality - Boron

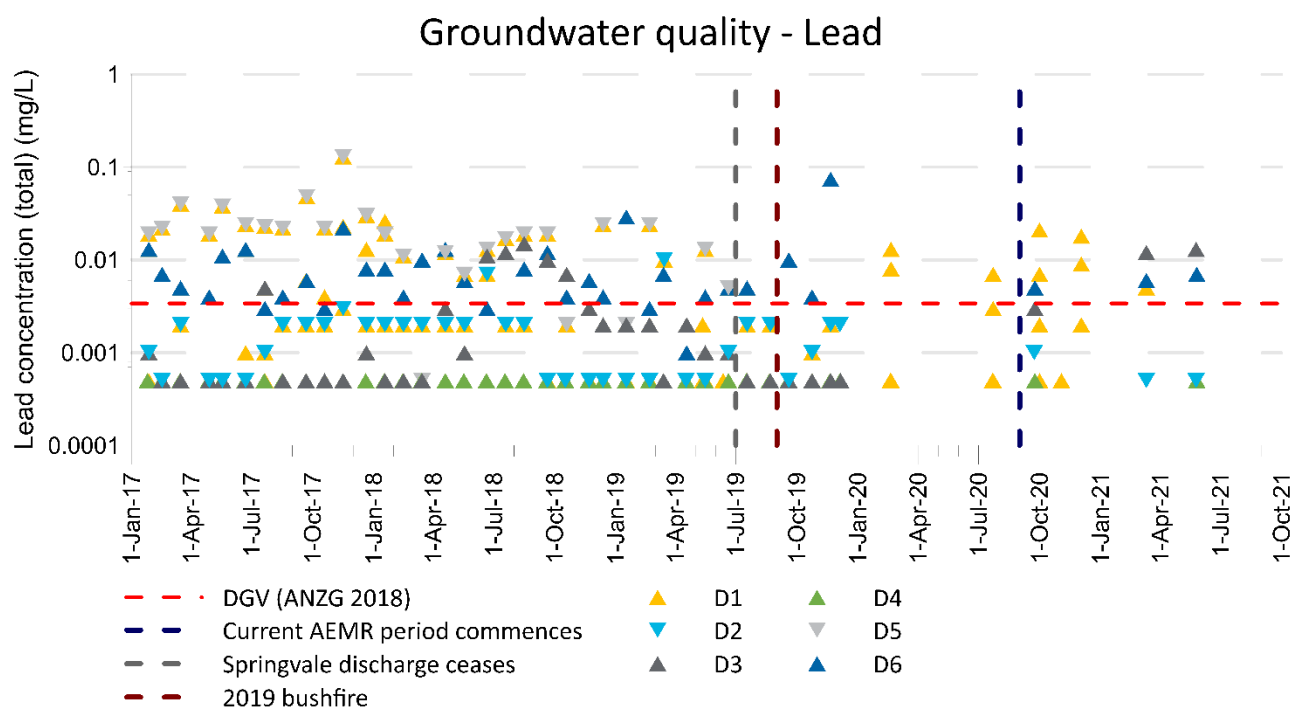
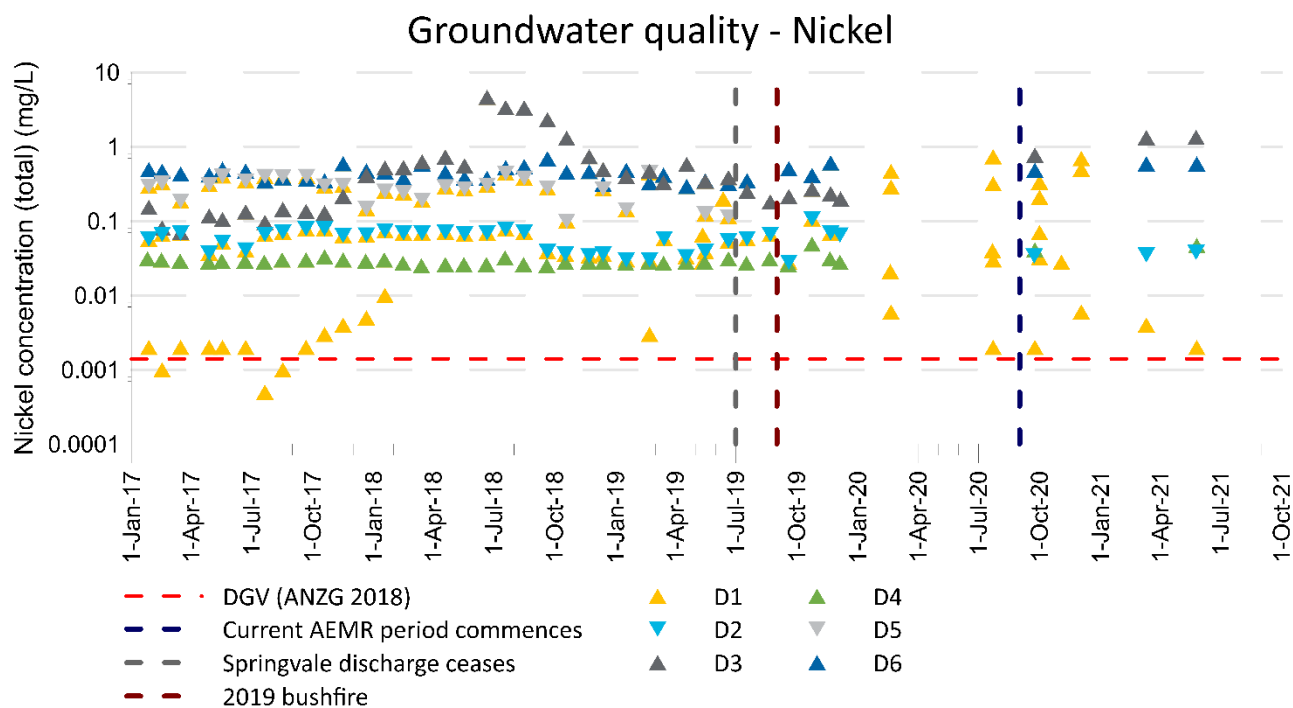


Groundwater quality - Cadmium

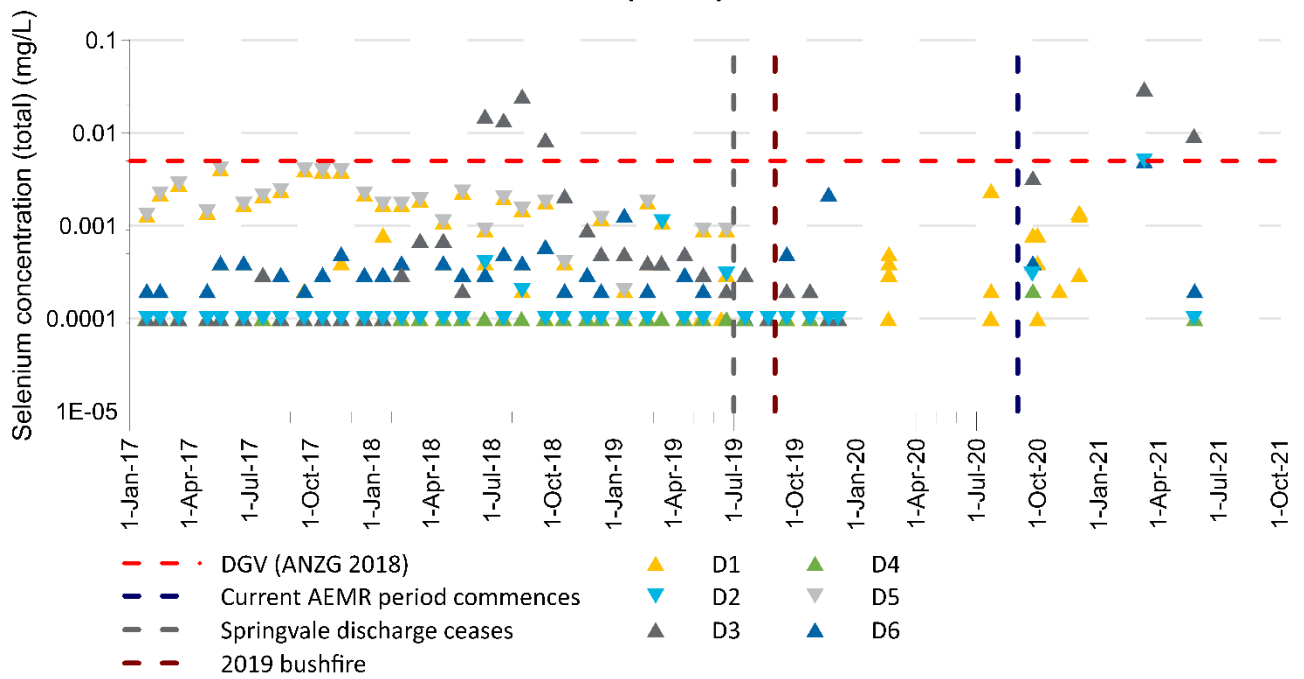


Groundwater quality - Copper

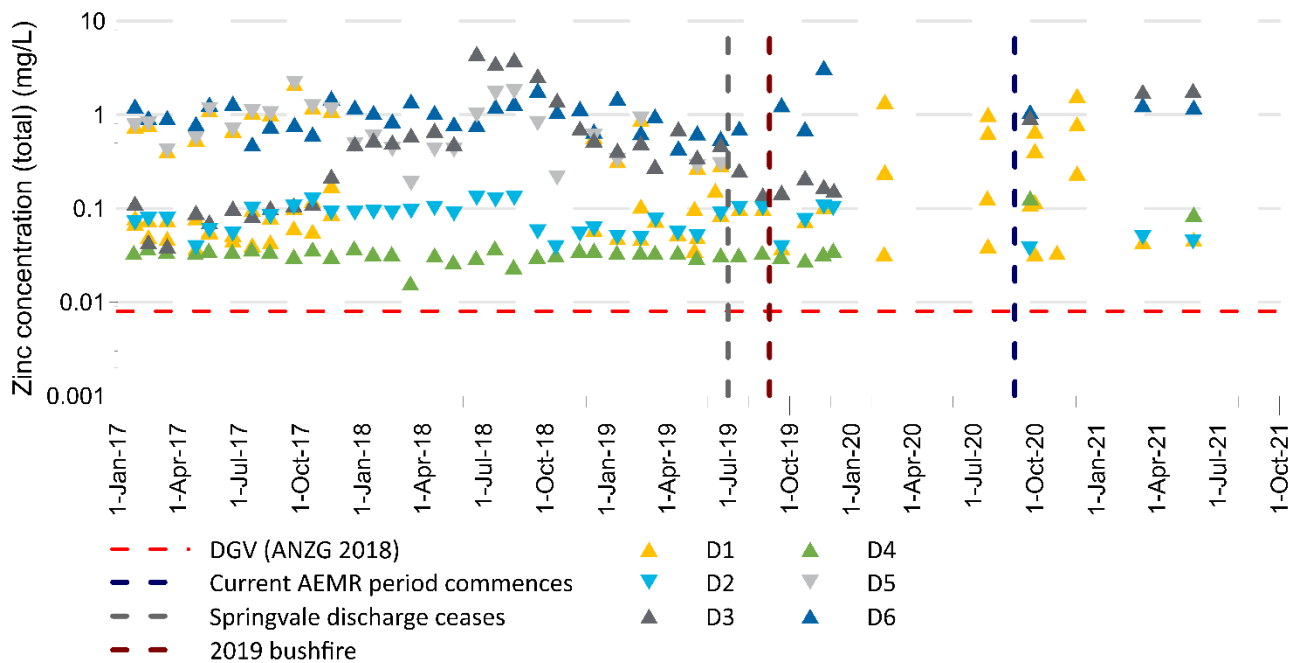




Groundwater quality - Selenium



Groundwater quality - Zinc



Appendix D

Lidsdale Ash Repository site Windrose

D.1 GPM Windrose September 2020 – August 2021

