Mt Piper Ash Placement Project Lamberts North

Annual Environment Management Report

September 2018 – August 2019

Lamberts North Annual Environment Management Report

Name of Operation	**Mt Piper Ash Placement Lamberts North**
Name of Operator	**EnergyAustralia NSW**
Development Consent / Project Approval #	**09_0186**
Environment Protection Licence (EPL) #	**13007**
Water Access Licence (WAL) #	**10AL116411**
Water Supply and Water Use Approval #	**10CA117220**
AEMR start date	**1st September 2018**
AEMR end date	**31st August 2019**

I, Ben Eastwood, certify that this report is a true and accurate record of the compliance status of Mt Piper Ash Placement – Lamberts North for the period 1st September 2018 to 31st August 2019 and that I am authorised to make this statement on behalf of EnergyAustralia NSW.

Note:

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

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

Name of authorised reporting officer	**Ben Eastwood**
Title of authorised reporting officer	**NSW Environment Leader**
Signature of authorised reporting officer	
Date	**30/12/2019**

This report may be cited as:

EnergyAustralia NSW (2019) Lamberts North Annual Environmental Management Report September 2018 – August 2019. EnergyAustralia NSW, NSW Australia.

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1. Summary of compliance

EnergyAustralia NSW (EA) owns and operates Lamberts North Ash Repository in accordance with Project Approval 09_0186 which was granted by the Minister for Planning on 12 February 2012. The Lamberts North Ash Repository is located approximately 18 kilometres north-west of the city of Lithgow and is situated adjacent to the Mount Piper Ash Repository and 700 meters to the east of the Mt Piper Power Station.

Built over two stages in 1992 and 1993, the Mt Piper Power Station comprises two 700 MW coal-fired steam turbine generators which have the capacity to meet the energy needs of approximately 1.18 million homes in New South Wales every year. Mt Piper Power Station is fuelled using black coal sourced from mines in the local area. The power station's furnaces are designed to utilise the characteristics of the locally available coal to improve its efficiency and help keep the power station's emissions below statutory requirements. Ash is produced during coal combustion by the transformation of the non-combustible mineral matter present in coal.

The Lamberts North Annual Environment Management Report (AEMR) has been prepared pursuant to Schedule 2, Condition E21 of the Project Approval 09_0186. 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.

A summary of the Lamberts North Repository compliance achieved during the reporting period is provided in Table 1. No non-compliance was identified during the reporting period. An extended review of compliance with the Conditions of Approval (CoA) presented in Appendix A.

The AEMR contains a summary of all monitoring carried out under the Conditions of Project Approval 09_0186 during the reporting period. It is noted that the ground and surface water monitoring carried out during the reporting period identified some exceedances of the surface water and groundwater environmental goals identified in the relevant sub-plans contained in the approved Lamberts North Ash Placement Project Operation Environmental Management Plan dated May 2013 (CDM Smith, 2013) triggering the contingency measures contained in the Lamberts North OEMP. These contingency measures require the carrying out of a further surface water and groundwater investigation, which is currently in progress.

Table 1 Statement of compliance

Were all conditions of the relevant approval(s) complied with	
Project Approval #09_0186	**YES/~~NO~~**
Environment Protection License (EPL) #13007	**YES/~~NO~~**
Water Access License (WAL) #10AL116411	**YES/~~NO~~**

Table 2 Details on Non-Compliance

Relevant Approval	Condition No.	Condition Summary	Compliance Status	Comment	Section where addressed within AEMR
			Nil		

In assessing compliance with CoAs, the key for compliance assessment provided in Table 3 was used, in accordance with the NSW Government's Independent Audit Guideline.

Table 3 Compliance Status Key

Risk Level	Colour Code	Description
High		Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence.
Medium		Non-compliance with: • Potential for serious environmental consequences, but is unlikely to occur; or • Potential for moderate environmental consequences, but is likely to occur.
Low		Non-compliance with: • Potential for moderate environmental consequences, but is unlikely to occur; or • Potential for low environmental consequences, but is likely to occur.
Administrative non-compliance		Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. 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 Lamberts North Ash Repository site was inaudible at sensitive receivers during the reporting period.
- Air quality monitoring results were well below the OEMP assessment criteria for PM_{10} annual average of 30ug/m^3 and 24-hour maximum of 50 ug/m^3.
- Water monitoring results were compliant with Environment Protection Licence
- There were no incidents that caused or threatened material harm to the environment during the reporting period.

2. Introduction

2.1 Background

The Mt Piper Power Station comprises of two 700 MW coal-fired steam turbine generators, built over two stages in 1992 and 1993. The power station is located approximately 17 km northwest of Lithgow and five kilometres east of Portland (Figure 1). In 1990 Lithgow City Council granted Delta Electricity (now EnergyAustralia NSW) consent for ash placement in the former Western Main open cut mine void adjacent to the power station. The ash placement area is near the Mt Piper Power Station and is identified as Area 1 (Figure 2) in the Mt Piper Power Station Ash Placement Project Environment Assessment (SKM, 2010). EnergyAustralia acquired Mount Piper Power Station and associated land holdings and infrastructure from the state-owned Delta Electricity in September 2013.

Ash from the power station is placed in a dry ash repository, and approximately 680,000 m3 of ash has been placed in this area on an annual basis. Based on the rate of ash emplacement, it was anticipated that this area would reach capacity by 2015. A proposal to create a new ash placement area in the Lamberts Gully area was submitted to the Department of Planning and Infrastructure (now Department of Planning and Environment) in 2009 and was approved in February 2012. The approved emplacement area includes former coal workings, and was also used for coal washery operations by the previous landholder.

Subsequent to Project Approval, it was proposed to increase the area of ash placement within the Northern section of the Lamberts Gully site and to change the direction and location of the drainage line proposed to take clean water from the south west boundary (SKM, 2012). At this point the Project was essentially divided into two parts - Lamberts North and Lamberts South; this was in response to the uncertainty of Lamberts South becoming available in the future for ash placement.

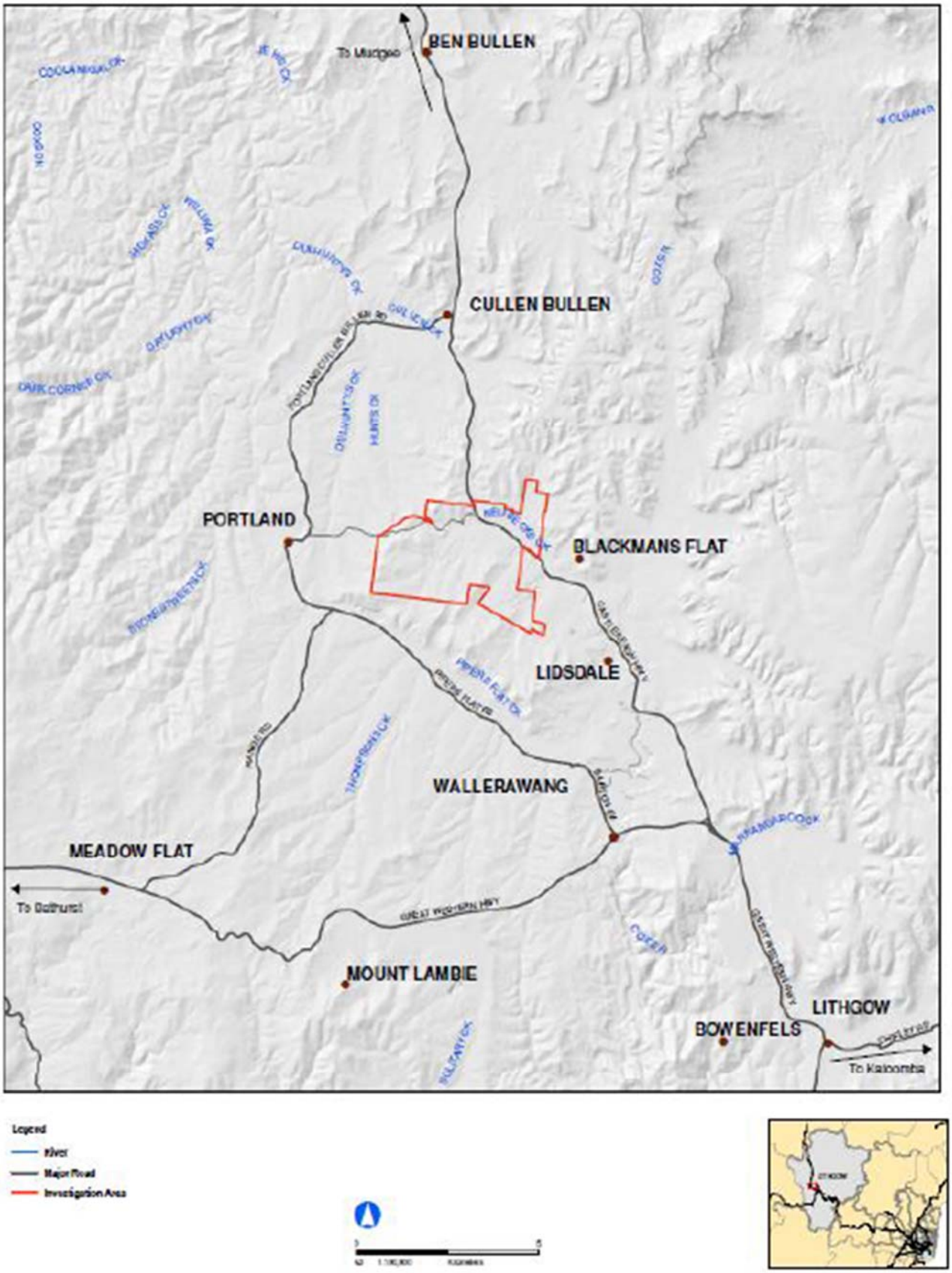

Figure 1 Regional context map

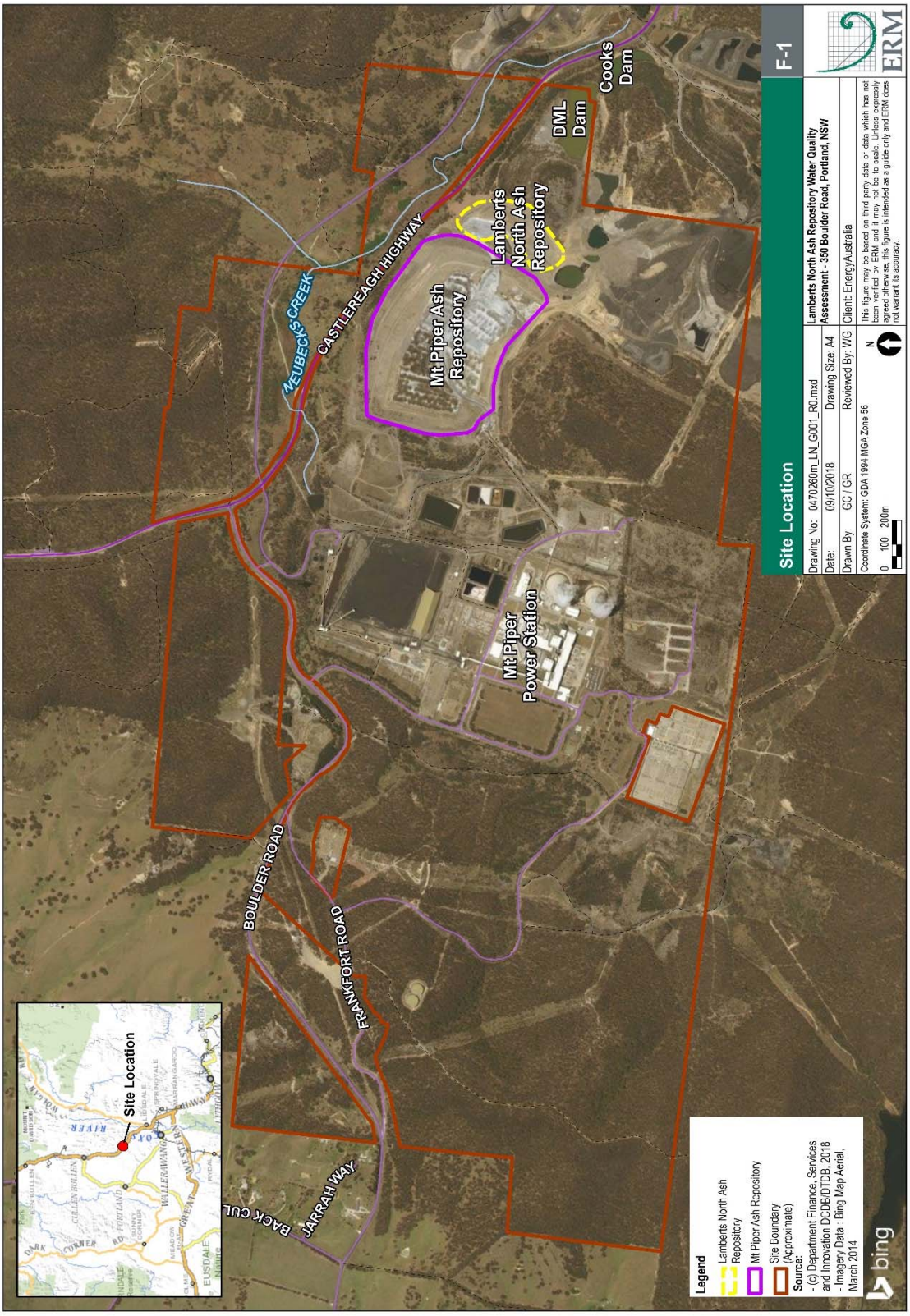

Figure 2 Site location

2.2 Purpose of the AEMR

The Project Approval contains a number of conditions that need to be complied with by EnergyAustralia NSW, as the proponent, at different stages of the Project (Section 3). Condition E21 of the Project Approval (DPI, 2012) requires that EnergyAustralia NSW prepare and submit an Annual Environmental Management Report (AEMR) for the approval of the Secretary (formerly the Director-General), Department of Planning, Industry and Environment (DPIE).

The AEMR is to include, but not necessarily be limited to:

- Review of project performance against the Operation Environmental Management Plan (OEMP) (Conditions of Approval (CoA) D2) and the Conditions of this Approval;
- Details of compliance with CoAs;
- A copy of the Complaints Register (refer to CoA B11) for the preceding twelve-month period (exclusive of personal details), and details of how these complaints were addressed and resolved;
- Identification of any circumstances in which the environmental impacts and performance of the project during the 12-month period have not been generally consistent with the environmental impacts and performance predicted in the documents listed under CoA A1, with details of additional mitigation measures applied to the project to address recurrence of these circumstances;
- Results of all environmental monitoring required under CoA, including interpretations and discussion by a suitably qualified person; and
- 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.

This AEMR has been prepared in order to satisfy Condition E21 of the Project Approval 09_0186 **(DPI, 2012)**. This report covers the operations, environment and community performance of the Lamberts North Ash Repository from September 2018 to August 2019 (reporting period).

The report has been prepared in accordance with the NSW Government's *Post-approval requirements for State significant mining developments Annual Review Guideline.*

2.3 Project contacts

The contact details for Lamberts North Ash Repository are listed in Table 4

Table 4 Lamberts North Ash Placement Contact

Contact Person	Position	Telephone
Skye Zorz	Lamberts North Environment Representative	(02) 63548111

3. Consents, Leases and Licences

This AEMR has been prepared to address the relevant conditions of the project approval and the Statement of Commitments which have been triggered during the reporting period. The operation of the Lamberts North project must comply with the following statutory requirements (Table 5):

Table 5 Key Consents, Leases, Licenses and Permits

Approval/Lease/Licence	Issue Date	Expiry Date	Details/Comments
Project Approval 09_0186	16 February 2012	-	Granted by Minister for DPE, under Section 75J of the EP&A Act.
Environment Protection License (EPL) No. 13007	29 June 2019 (licence version date)	01 Jan 2024 (Anniversary Date)	EPL held by EnergyAustralia NSW for Mt Piper Power Station
Water Access Licence No. 27428	28 February 2014	-	Granted by DPI Water, under the Water Management Act 2000
Water Supply Work and Water Use Approval 10CA117220	28 February 2014	-	Granted by DPI Water, under the Water Management Act 2000

During the 2018-19 reporting period, EnergyAustralia NSW submitted an application to vary EPL 13007 to the NSW EPA to excise the portion of land and associated pipeline infrastructure from the premises that is now occupied by the Springvale Mine Water Treatment Facility. This application was approved by the EPA in June 2019. A summary of compliance against the applicable statutory requirements is provided in Section 1.

3.1 Operations Environmental Management Plan

The Operations Environmental Management Plan (OEMP) provides the framework to manage the environmental aspects associated with the operation of Lamberts North. The OEMP outlines the requirements associated with the project as stipulated in the relevant provisions of the Project Approval 09_0186 issued by the now DPIE, the EPL 13007 issued by the NSW EPA, and the Statement of Commitments (SoC) presented in the Submissions Report (SKM, 2011).

The scope of the OEMP covers the operations involving the movement and placement of ash from Mt Piper Power Station (MTPPS) to Lamberts North Ash Repository. The environmental performance against the OEMP is provided in Sections 6 - 10. The OEMP (CDM Smith, 2013) was reviewed by EnergyAustralia NSW during the 2018-19 reporting period to ensure that it reflects the current activities and management. The OEMP (EANSW, 2019a) has been prepared in consultation with the EPA, WaterNSW, DPI-Water, DPI-Fisheries. The OEMP was approved by the DPIE on the 1 October 2019.

3.2 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) for Lamberts North was developed in consultation with EnergyAustralia NSW's Western Environment Section and approved by the then DPI in November 2012. The CEMP meets the requirements of CoA B4, providing the framework to manage the environmental aspects associated with construction works during Lamberts North operations. The CEMP has been prepared to address the requirements associated with the project as stipulated in the relevant provisions under Project Approval 09_0186 issued by the DPE (CDM Smith, 2012a).

4. Operations during reporting period

Ash placement operations for Mt Piper Power Station, including Lamberts North Ash Repository, are undertaken by a contracted specialist in the handling and management of ash. Lend Lease is the current service provider for EnergyAustralia NSW in regard to ash and dust management associated with the repository. The Lamberts North ash repository is currently managed under an 'operate and maintain' contract.

A summary of operations at Lamberts North within the reporting period can be found in Table 6.

Table 6 Operations Summary

Activity	Previous reporting period	This reporting period	Next reporting period*
Ash delivered to site (T)	555,354	153,217	~500,000
Total ash produced at Mt Piper (T)	840,498	741,094	~800,000
Ash reused for cement production (T)	202,385.82	209,856	~200,000
Total reclaimed furnace bottom ash and fly ash (T)	6,216.96	11,133	~7,500
Total Ash Footprint (ha)	12.2	12.2	13 ha
Area of repository capped (ha)	Nil	2	2

*Figures are based on average of previous years.

4.1 Normal operating hours

The normal hours of operation for the Project are between 6 am and 8 pm Monday to Friday, and 6 am to 5 pm Saturday and Sunday in accordance with Condition E1. Operations outside these hours are defined as abnormal or emergency operating conditions and are subject to specific requirements in accordance with E2 (Section 2.2.2 OEMP).

4.2 Abnormal or emergency operating conditions

Conditions under which operations outside the normal hours of operation can occur have been specified in the Project Approval and can be described as follows:

- Where it is required to avoid the loss of lives, property and/or to prevent environmental harm; or
- Where a breakdown of plant and/or equipment at the repository or the Mt Piper Power Station and the proposed Mt Piper Power Station Extension project with the effect of limiting or preventing ash storage at the power station outside the normal operating hours Condition E1 (Section 3.1 OEMP).
- Where a breakdown of an ash haulage truck(s) or the conveyor belts prevents haulage during the operating hours stipulated under Condition E1 combined with insufficient storage capacity at Mt Piper Power Station to store ash outside of the normal operating hours; or

- In the event that the National Electricity Market Management Company (NEMMCO), or a person authorised by NEMMCO, directs EnergyAustralia NSW (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 Mt Piper Power Station to allow for the ash to be stored.

Under these circumstances, EnergyAustralia NSW is required to notify the EPA, and nearby sensitive receivers prior to any emergency ash haulage or placement operations outside of the '*normal operation'* hours, and the Director-General of the DPI within 7 days after the emergency operations have occurred.

No abnormal or emergency operating conditions occurred during the reporting period that required activities to be undertaken outside of the normal operating hours during the reporting period.

4.3 Activities conducted during the current reporting period

The following activities were undertaken during the reporting period:

- Ongoing placement of water conditioned ash within approved project area.
- Progressive construction of the 937-m external layback along the current works perimeter for Lamberts North
- Construction of two, 25 ML lined water storage ponds for managing surface water runoff has been completed.
- Two workshops were held with government representatives from DPIE, Water NSW and EPA on the progress of the independent groundwater investigation in the vicinity of the Mt Piper and Lamberts North ash repositories.
- The conceptual site groundwater model approach has been determined, which will support the development of the numerical groundwater model for the independent groundwater investigation.

5. Actions required from previous AEMR review

Table 7 Actions required from last AEMR

Item	Action required from 2018 AEMR	Requested by	Action taken	Status	Where discussed in AEMR
1	*A copy of the complaints register for the site to be appended to the AEMR*	DPE	A copy of the complaints register forms Appendix I of the AEMR.	C	Appendix I
2	*Detail is to be provided regarding the complaint that was received during the 2017-18 reporting period, i.e. the outcome of the investigation by the EPA*	DPE	2017-18 AEMR Section 9.3 updated to include the outcome of the EPA's investigation of the complaint.	C	2017-18 AEMR Section 9.3
3	*In Section 1 Table 2 of the 2017-18 AEMR, there is an identified surface water quality non-compliance, however in Section 7.1.2 it states that the water quality results do not represent non-compliance with the project approval. This is inconsistent and needs to be amended.*	DPE	Section 1 Table 2 of the 2017-18 AEMR has been amended.	C	2017-18 AEMR Section 1 Table 2
4	*The calculated contribution of noise from the facility is to be provided in the report, in addition to the measured noise level.*	DPE	The calculated contribution of noise from the facility is provided in Section 6.2.2 of the AEMR.	C	Section 6.2.2
5	*Explanations are to be provided for all anomalous data shown on the relevant graphs, particularly for air quality data*	DPE	Explanations for all anomalous data provided within the relevant sections of the AEMR.	C	Sections 6.2-7.2

Item	Action required from 2018 AEMR	Requested by	Action taken	Status	Where discussed in AEMR
6	*The graphs for PM_{10} and $PM_{2.5}$ air quality should also be included in the main body of the AEMR*	DPE	PM_{10} and $PM_{2.5}$ air quality graphs have been included in Section 6.4.2.2 of the AEMR.	C	Section 6.4.2.2
7	*2017-18 LN AEMR uploaded onto the project website.*	DPE	The 2017-18 Lamberts North AEMR has been uploaded onto the project website.	C	Section 5
8	*Lamberts North OEMP to be updated to reflect changes to the water management on site and submitted for assessment by the Department.*	DPE	The Lamberts North OEMP has been updated and submitted to the Department on 1 May 2019. The OEMP was approved by the DPIE on 1 October 2019.	C	Section 3.1

6. Environmental management and performance

Environmental monitoring for the operations at Lamberts North Ash Placement Area is designed to comply with the regulatory requirements specified in Section 3 of the AEMR, and to provide an ongoing analysis of the condition of the environment surrounding the operations. Environmental monitoring is performed at the sites indicated within Figure 3 and the results are used as indicators of the effectiveness of the environmental controls and management practices at the Lamberts North Ash Repository.

Detailed procedures outlining the environmental monitoring responsibilities of key stakeholders and the impacts to be mitigated are described in the relevant sub-plans of the OEMP. Details regarding the environmental responsibilities, key stakeholders and the impacts to be mitigated regarding construction activities are described in the CEMP. A summary of the environmental management measures and associated performance are provided in Table 8.

Table 8 Environmental Performance

Aspect	Approval Criteria / EIS prediction	Performance during reporting period	Trends / Management Implications	Management Actions
Noise	Criteria Day 42 dB(A) Evening 38 dB(A) Night 35 dB(A)	Compliant	No change from previous years	1 per reporting period undertaken: Reduction in monitoring frequency from previous years.
Air Quality	PM10 annual <30ug/m3 24 hour <50ug/m3 Depositional dust Increase in total 2g/m2/month to maximum of 3.5g/m2/month	Compliant	No change to PM_{10} trends for last 4 years , Minor increase in depositional dust trends	No additional action required.
Biodiversity	Submit a biodiversity offset plan for approval	Compliant	Tree planting conducted in December 2017. Review of revegetation program undertaken in 2018-19 reporting period.	Direct seeding to occur in 2019-20 reporting period as per recommendation from revegetation program review.

Performance against contract requirements is 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 (6.1 – 6.7) and in Appendices B – E.

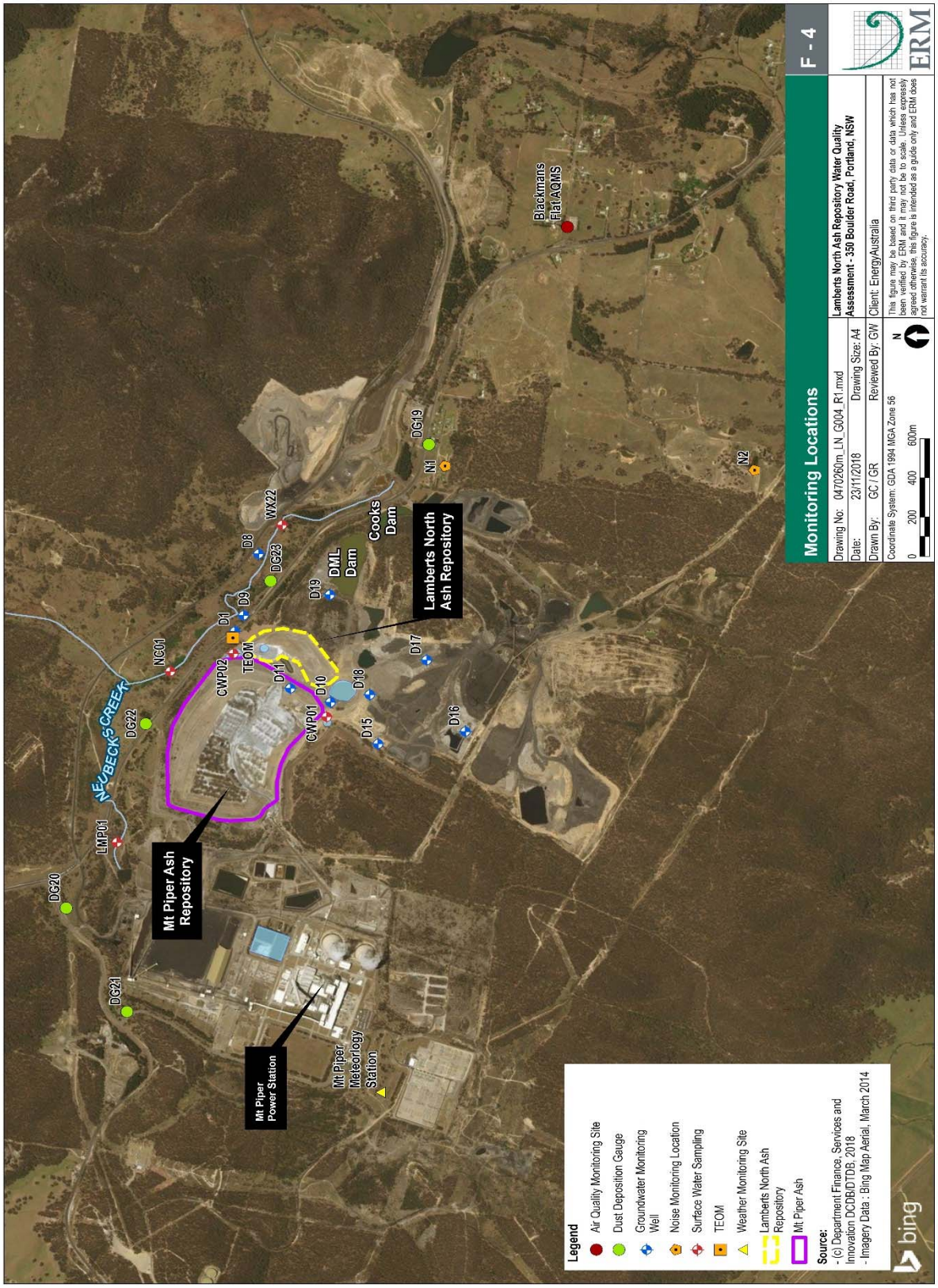

Figure 3 Environmental monitoring locations

6.1 Ash delivery and placement

6.1.1 Environmental Management

Ash generated as a by-product from the operation of Mt Piper Power Station is transported by conveyer from the Station to ash silos at the Mount Piper Ash Repository as part of the existing approved operations. Ash is then transported by heavy haulage vehicles (generally one to two trucks) from the silos to either the previously established Mt Piper Ash Repository, or to Lamberts North Ash Repository (Lamberts North). Transport to Lamberts North is facilitated via the southern boundary haulage road in the existing ash repository. On delivery to the Lamberts North Ash Repository, the water conditioned ash is deposited at the working face where compactors and bulldozers are then used to place the ash in stable landforms with appropriate drainage infrastructure. Ash placement can be broadly described as including the following processes:

- Identifying the current operational location for placement of ash.
- Placing ash at the existing face using truck and shaping of ash with a bulldozer.
- The ash is treated to achieve an average compaction of 95%, relative to its maximum standard compaction, through controlled combination of water addition and machine compaction with the use of rollers and rubber-tyred vehicles.
- Ash is placed in layers and stepped to produce an overall batter slope of approximately 1(V):4(H), with benches added every 10 m in vertical height change. This process of ash placement produces an average batter length of 40 m.
- The sequence of ash placement will entail initially placing ash across the site starting from the most northerly part, then towards the east and south of Lamberts North, working to reach a final design height of 960 m AHD through abutment with Mount Piper Area 1 ash placement.
- Boundary faces are sequentially covered with material to be sourced from locally available material and commence replanting and restoration activities. The process is repeated until Lamberts North is filled to its maximum permissible height and extent.
- Ash will be placed to the desired height (0.5 m to 1 m lifts) in pads, with materials that have been moisture-conditioned with water placed in the lower layers to an elevation as specified in approved design drawings, with corresponding heights of 10 m.
- Methods for the placement of ash materials to optimise compaction and stability of the emplacement areas include target moisture contact, compaction density, and progressive capping and vegetation.

Capping of exposed ash areas has been undertaken progressively as Lamberts North reaches the approved design height of 940 m AHD. Progressive revegetation of batters will commence once the final perimeter batters are constructed and keyed into the adjoining Mt Piper Ash Repository.

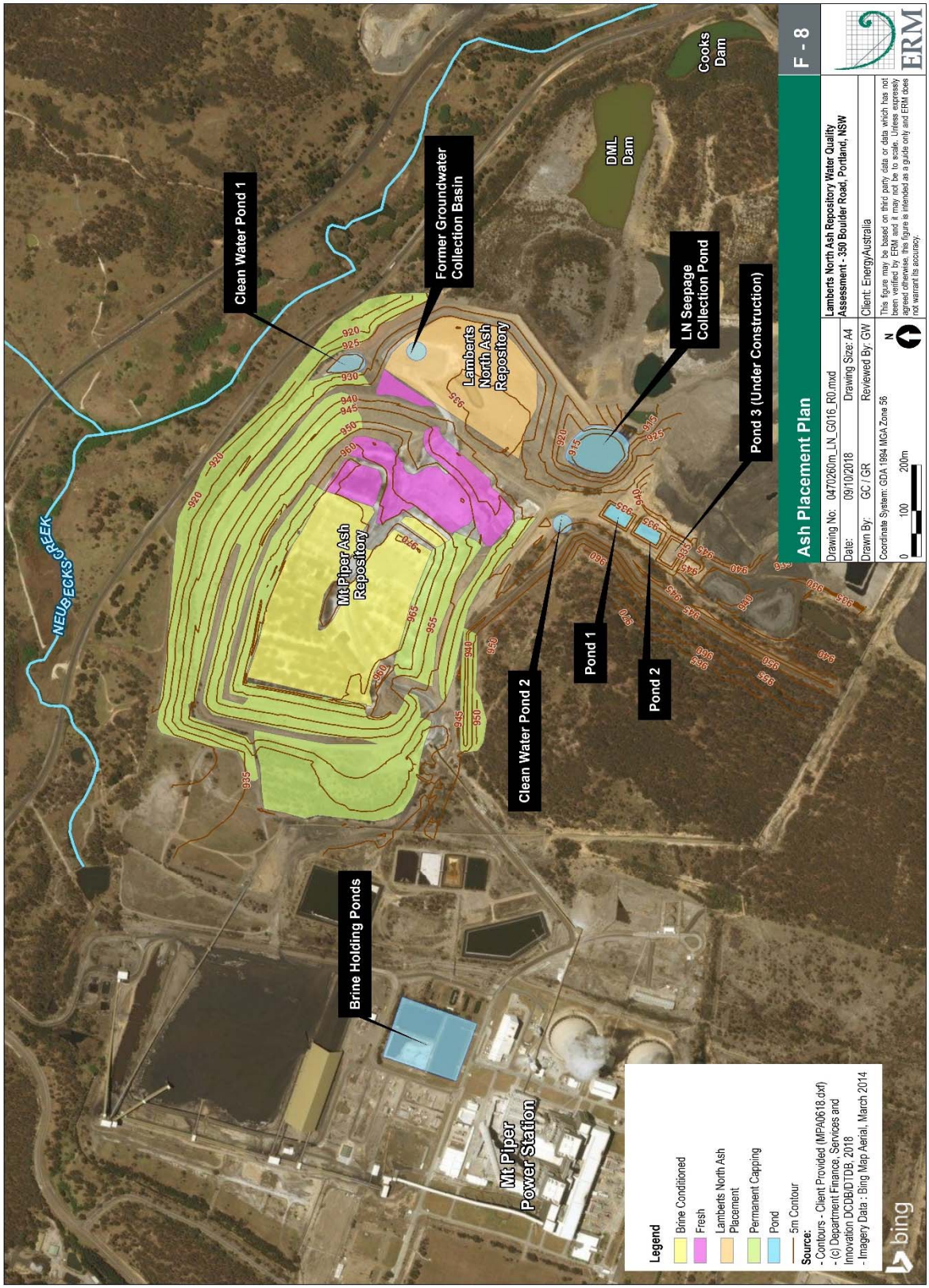

Figure 4 Ash Placement Plan

6.1.2 Environmental Performance

During the reporting period, a total of 153,217 tonnes of ash has been placed in Lamberts North Ash Repository. The ash placement and compaction works were conducted during the approved working hours for the operation. An average compaction rate of 99% has been achieved, exceeding the target of 95% dry density compaction. Up to 209,856 tonnes of fly ash has been diverted from landfill for recycling and use in cement production, with a further 11,133 tonnes of furnace bottom ash and fly ash reclaimed for alternative use.

NuRock have completed a pilot plant testing of the Mt Piper ash as the main constituent for their products and are moving into the first production phase, they have a contract until 31 March 2020 to be able to produce up to 30,000 tonnes per year. NuRock have an approved Development Application from Lithgow City Council and have been granted an Environment Protection License from the EPA.

Inspections on the ash repository are performed on a monthly basis by the contractor (Lend Lease, 2018; 2019) and the results are summarised in Appendix B. The management and mitigation measures specified in the approved OEMP were found to be complied with.

6.1.3 Reportable Incidents

No reportable incidents have been recorded against ash delivery and placement for the reporting period.

6.1.4 Further Improvements

- Support NuRock with the development of its business onsite to reuse fly ash.
- Continue to market the reuse of fly ash to cement manufacturers.
- Support initiatives where practical for alternative uses of fly ash.

6.2 Operational Noise Monitoring

6.2.1 Environmental Management

The Lamberts North Operational Noise Monitoring & Management Plan (ONMMP) has been developed to address the specific requirements of the Conditions of Approval (CoA) D3 (a) and E7 to E14 for the Project. The ONMMP provides the framework to manage operational noise emissions and minimise potential noise impacts to sensitive receivers during the operation of the Project. The level of noise received by a sensitive receiver during the proposed works program will depend on the location of the receiver, the type and duration of works and intervening topography, and existing building structures between the noise emission source and receiver.

The residential community of Blackmans Flat is located to the east of the private haul road and ash repository site. The following residential properties, located within 1100 m from Lamberts North, have been identified as the nearest potentially affected sensitive receivers to noise from the repository site (Table 9):

Table 9 Representative noise measurement locations

Sensitive Receiver	Distance to Haulage Road (m)
1. Blackmans Flat (east of Lamberts North)	1100
2. Blackmans Flat (west of Castlereagh Highway)	1100

During the reporting period compliance monitoring was conducted in September 2018 and June 2019 during the early morning and evening periods as per the requirements outlined in the ONMMP. The applicable operational noise criteria are outlined in the Project Approval (No. 09_0186), the OEMP and ONMMP. The criteria are summarised as follows:

The cumulative operational noise from the ash placement area and ash haulage activity shall not exceed a $L_{Aeq\ (15\ minute)}$ dB(A) as defined in condition E7 and identified in Table 10.

Table 10 Operational Noise Criterion (LAeq(15 minutes) dB(A))

Location	Day (7 am – 6 pm)	Evening (6 pm – 10pm)	Night (10 pm – 7 am)
All private sensitive receivers within the township of Blackmans Flat	42	38	35
Blackmans Flat (west of Castlereagh Highway)	42	38	35

This criterion applies under all meteorological conditions except for any of the following:

a) Wind speeds greater than 3 m/s at 10 meters above ground;

b) Stability category F temperature inversion conditions and wind speed greater than 2m/second at 10m above ground level; and

c) Stability category G temperature inversion conditions.

6.2.2 Environmental Performance

Aurecon was engaged by EnergyAustralia NSW to carry out independent operational noise monitoring for the Lamberts North Project located in Blackmans Flat, NSW. The noise measurements were performed in September 2018 (Aurecon, 2018) and June 2019 (Aurecon, 2019) (Appendix C & D). Noise monitoring for Lamberts North was performed in accordance with the methods described in the approved ONMMP.

The results of the measured noise levels at the sensitive receivers stipulated in the CoA (Location 1 and Location 2) can be found in Table 11. The maximum 15-minute daytime equivalent sound pressure levels (LAeq) at both the receiver locations were dominated by traffic noise, birds, insects, low industrial hum and noise from nearby coal mines. These measured equivalent sound pressure levels were in excess of the 42 dBA day time noise target, however it is not possible to conclusively determine the noise contribution from operational ash placement activities at Lamberts North at Locations 1 and 2 due to presence of other surrounding simultaneous noise sources and activities.

From site observations at the western boundary of Lamberts North (Location 3A) during attended noise monitoring, noise was clearly audible from the mobile plant operating on Lamberts North. The noise varied and included sources such as engine noise from dump trucks and reverse beeps from dozer/trucks and roller operations.

To quantify the likely noise contribution at Location 1 and Location 2 from the Lamberts North site, calculations were undertaken to estimate the environmental noise emissions from the various identified activities. Based on the worst–case noise modelling predictions undertaken, the noise resulting from the operation of equipment and mobile plant at the Lamberts North site are detailed within Table 12. The predicted noise contribution from Lamberts North Ash Placement are below the LAeq(15min) 42dBA CoA criterion and are therefore deemed to comply with the Lamberts North Ash Placement Project – Operational Environmental Management Plan at the representative residential receivers Location 1 and Location 2.

Table 11 Summary of previous noise monitoring events

Location	Period	Measured Equivalent Sound Pressure Level, LAeq dBA								
		Mar 2015	Sept 2015	Mar 2016	Oct 2016	Apr 2017	Nov 2017	Apr 2018	Sept 2018	Jun 2019
Location 1 (Blackmans Flat)	Day	53	52	52	56	56	56	56	55	51
	Evening	50	50	49	53	52	51	51	51	50
	Night	49	47	47	51	50	48	49	49	46
Location 2 (Wallerawang)	Day	41	45	45	49	60	42	49	46	49
	Evening	42	41	45	46	46	40	44	42	45
	Night	41	41	43	51	44	44	43	49	46
Location 3 (South eastern boundary of Lamberts North)[+]	Day	54	57	52	54	56	57	66	50	67

^ No operational activity during evening and night time periods

[+] Location 3 changed to north-western boundary of Lamberts North site in June 2019 Operational Noise Assessment

Table 12 Predicted Noise Impact of Lamberts North Ash Placement

Equipment at Lamberts North	Sound Power Level (dBA)		Predicted Noise Levels (dB(A)$L_{Aeq(15min)}$)			
	Sept 2018	Jun 2019	Location 1		Location 2	
Dozer / Crawler tractor	105	105	32	31	27	26
Roller	108	108	34	34	29	29
Dump Truck x 2	102	101	35	28	30	22
Water cart	102	105	27	31	22	26
Light commercial vehicle	100	98	26	23	21	<20
Cumulative predicted noise levels			**38**	**37**	**33**	**31**

6.2.3 Reportable Incidents

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

6.2.4 Further Improvements

No further improvements have been identified for the next reporting period.

6.3 Ecological Monitoring

6.3.1 Environmental Management

The Ecological Monitoring Program (EMP) of the OEMP seeks to address the specific requirements of the CoA. The EMP provides for the requirements for the monitoring of aquatic ecology, in particular macro-invertebrates and aquatic habitat in accordance with CoA B7. EnergyAustralia will maintain the EMP for a minimum of five years after the final capping of the Lamberts North Ash Repository in accordance with approval conditions.

The EMP was implemented in November 2012 prior to construction activities and then during construction in April 2013. In December 2018, the sample sites included in the program were, NCR1 downstream of surface water discharge point, NCR2 which is downstream of the gauging site (WX22), NCR3 on Neubecks Creek upstream of Lamberts North and Control A16 on the Cox River downstream of the confluence with Neubecks Creek. Control site CR0, Coxs River upstream of the confluence with Neubecks Creek, was not sampled during the Autumn and Spring 2018 monitoring events due to low water level (Cardno, 2019). The EMP aims to monitor and quantify the impacts on the ecology of Neubecks Creek and the associated riparian environment.

The specific objectives of the 2017-2018 study were to:

- Sample indicators of the ecological health in Neubecks Creek potentially affected by the Project and at unaffected control sites there and on the Coxs River in Spring 2018. These include the upstream control sites at NCR1 and NCR3 on Neubecks Creek, the downstream site at A16 on the confluence of the Neubecks and Coxs River and a further control site CR0 that is situated on the Coxs River upstream of the confluence of the Coxs and Neubecks Creek. The impact site NCR2 is situated on the Neubecks Creek adjacent to the Project area.
- Compare the findings with those of previous studies undertaken in autumn as part of the EMP;
- Assess whether any impacts to the aquatic ecology of Neubecks Creek occurred in 2018 and determine whether any such impacts were attributable to the Project; and
- Provide recommendations on any actions, if any, that may be required to minimise, mitigate or ameliorate any impacts to aquatic ecology that may have occurred and on any refinements to subsequent monitoring events that would improve the efficacy of the EMP.

6.3.2 Environmental Performance

EnergyAustralia engaged Cardno to conduct the ecological monitoring program in accordance with the requirements of the OEMP (Refer to Appendix E). The assessment of aquatic habitat, water quality and macroinvertebrate assemblages was undertaken on 11 December 2018 during the spring sampling season (Cardno, 2019). Several biotic indices derived from the macroinvertebrate data collected in previous surveys performed in 2013 and 2014 were used to determine whether any changes to macroinvertebrates due to the Project have occurred.

There was no evidence of any change in spring 2018 data that would suggest an impact due to the Project. None of the statistical tests indicated any change through time at NCR2 that could be due to an impact. The apparent elevations in EC and concentrations of some metals that occurred in 2018 (following relatively low rainfall and flow) do not appear to have affected macroinvertebrate indicators sampled in the December 2018 study. The capture of a native mountain galaxid in the AUSRIVAS dip net at one of the control sites in autumn and spring 2018 indicates Neubecks Creek provides habitat for at least one native species of fish.

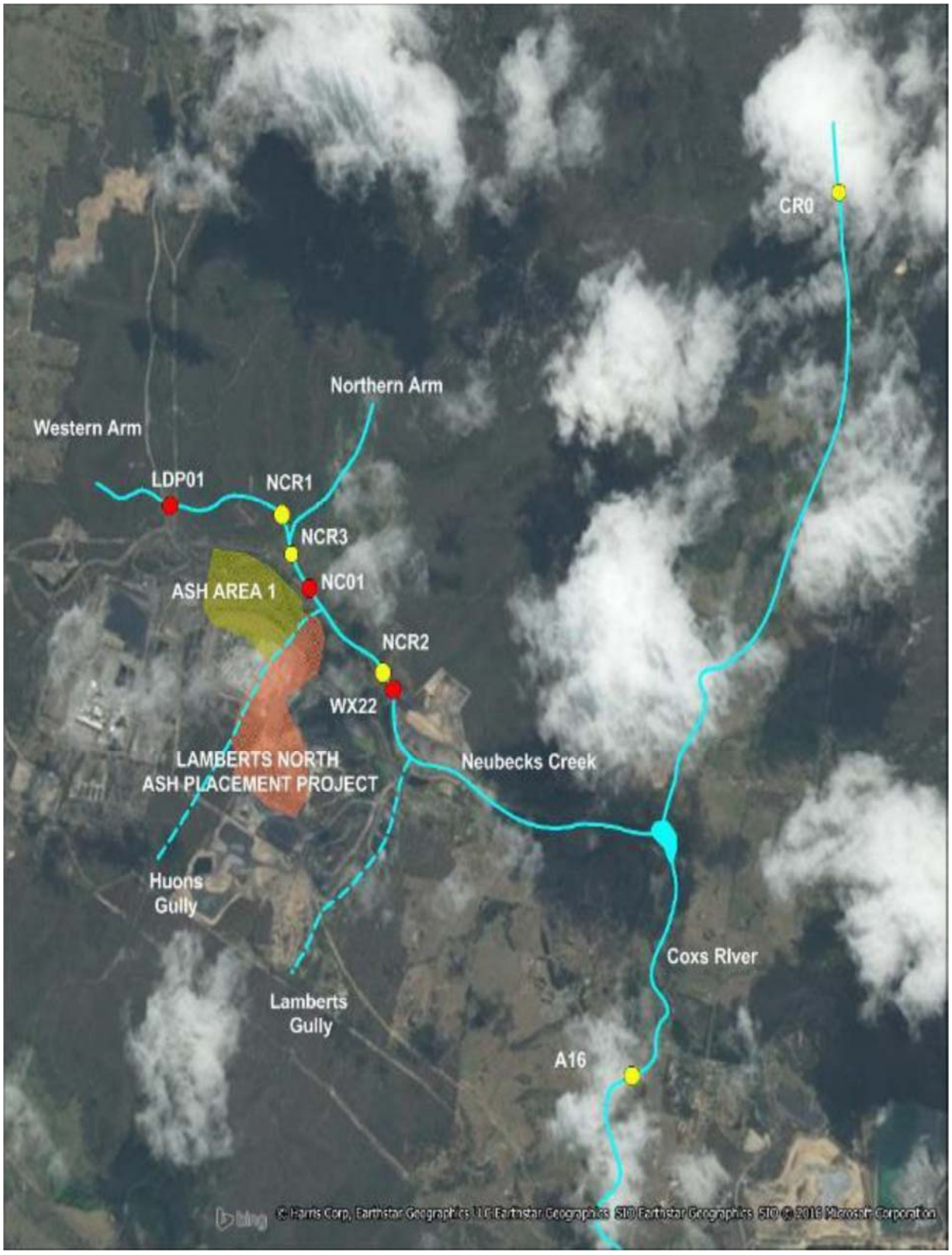

Figure 5 Aquatic ecology monitoring sites and long-term water quality monitoring sites.

The OE50 taxa Score at NCR1 for Spring sampling has ranged from 0.47 to 0.95, 0.43 to 1.04 at NCR2, 0.38 to 0.85 at NCR3 and 0.36 to 0.91 at A16. OE50 Scores from 0.20 to 0.51 indicate severely impaired habitat (Band C), those from 0.52 to 0.83 indicate significantly impaired habitat (Band B) and those from 0.84 to 1.16 indicate habitat equivalent to reference condition (Band A). These results indicated that on all but one occasion (NCR2 in spring 2012) the macroinvertebrate assemblages sampled were less diverse than predicted (i.e. OE50 Taxa Score < 0.82).

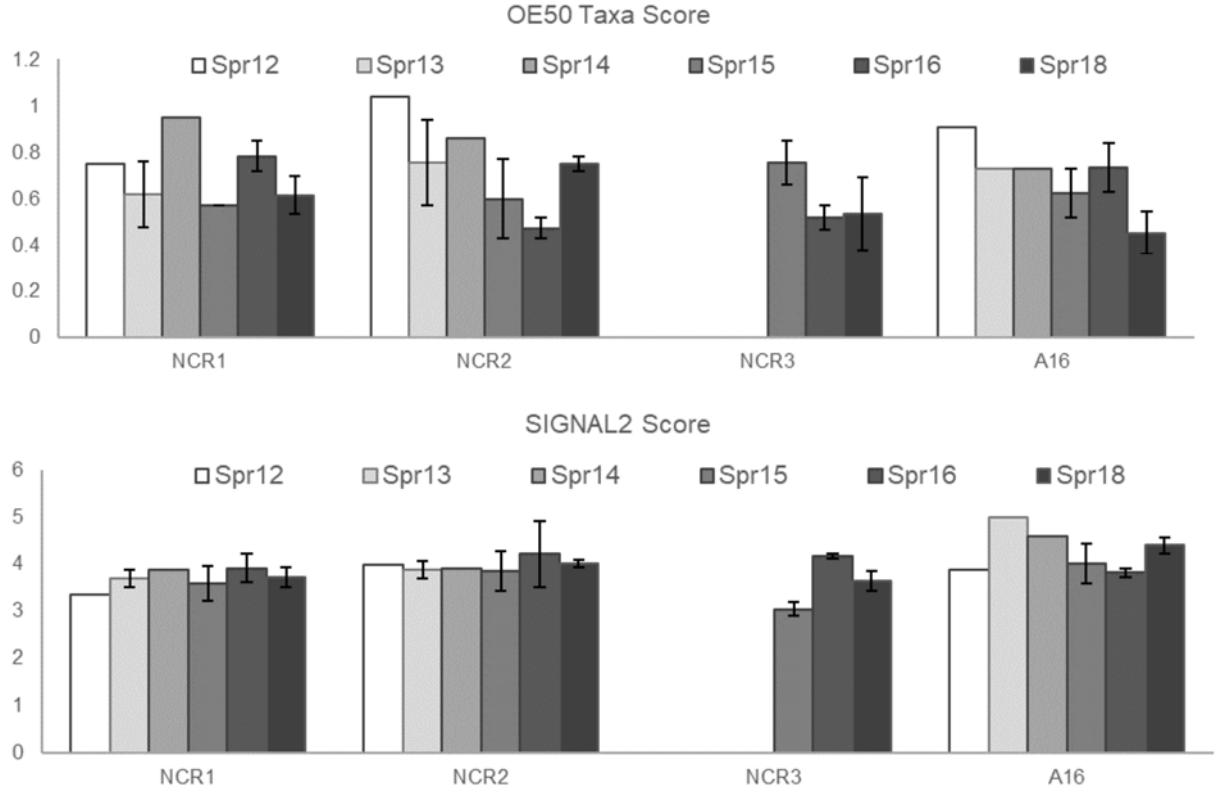

Figure 6 OE50 TAXA Score & Signal2 Score results for impact and control site for the period of 2016-2018

The SIGNAL2 indices recorded during spring 2018 at NCR1 ranged from 3.3 to 4.2, 3.7 to 4.9 at NCR2, 2.9 to 4.1 at NCR3 and 3.6 to 5.0 at A16. These are indicative of severe to moderate pollution (or severe to mild pollution at A16) and suggest that Neubecks Creek and the Coxs River at these sites experience some degree of environmental stress due to poor water quality.

The relative contribution of taxonomic groups in edge samples was consistent among sites and monitoring surveys. As such, there was little evidence of any substantial changes in the relative contribution of taxonomic groups occurring at NCR2 to indicate an impact by the Project.

Overall, data collected over the course of the Ecological Monitoring Program does not suggest any impact to macroinvertebrates in Neubecks Creek has occurred as a result of the project.

6.3.3 Reportable Incidents

No reportable incidents have been recorded against ecological monitoring for the reporting period.

6.3.4 Further Improvements

- Further monitoring should be undertaken during operation of the Project and for at least five years after completion of all activities that could impact aquatic ecology.
- Three replicate AUSRIVAS samples should continue to be collected from each site during all future surveys. This will provide a measure of the variation present in each indicator at each site, thereby, improving the ability to detect any future impact by enabling the use of appropriate statistical analysis.

- Sampling should continue at the additional control sites established on Neubecks Creek (NCR3). While no baseline data is available from this site, control data collected here during future surveys would improve the power of statistical tests and aid in the detection of an impact occurring in the future.
- Sampling should be discontinued at control Site CR0 as this site has been found dry on more than one occasion and is thus unlikely to provide suitable control data. The two control sites on Neubecks Creek (NCR1 and NCR3) will provide suitable control data during future surveys.

6.4 Air Quality Monitoring

6.4.1 Environmental Management

The Repository Site Management Plan (Lend Lease, 2015) for Lamberts North operations contains an Implementation Strategy in accordance with the Air Quality Monitoring Program, as required under the CoA as stipulated by Department of Environment and Planning and as outlined in the OEMP. These conditions include CoA D3 (d) and E18. The strategy includes specific site management pertaining to the transport and emplacement of ash, managing dust within the ash repository using an extensive sprinkler system and water cart applications, and continuous monitoring for dust/airborne particulates. Sprinklers and compaction are used to minimise fugitive dust from the Lamberts North ash placement area. Water trucks are used to manage fugitive dust from the haul roads.

Dust management at Lamberts North is included in the responsibilities of all activities, including:

- Daily monitoring from weather station.
- Fly ash conditioning.
- Mobile sprinkler system
- Use of perimeter sprays at the ash placement area
- Wash-down of security roadways, haul road/s and vehicle access roads – water carts
- Static dust monitors
- Ash placement operations
- Final and temporary capping of ash; and
- General maintenance of the ash placement area (Lend Lease, 2015)

6.4.1.1 Sprinklers and Pumps

Dust suppression is a key performance objective for ash placement activities. Dust suppression concerns all aspects of exposed ash and ancillary aspects of vehicular traffic during permanent capping and other activities. The main dust suppression method on exposed ash is the use of sprinklers with water sourced from wash down ponds and the blow down towers from Mount Piper's cooling water system – no clean water is used in this application. Water application (measured in sprinkler hours) is based on wind velocity, humidity and temperature. Sprinklers are also used for haul roads. Water source, volumes and sprinkler numbers are monitored daily by Lend Lease and reported to EnergyAustralia NSW monthly.

The Repository Management Plan (Lend Lease, 2015) provides a guide for sprinkler hours at an optimum of 4 hours per day during low evaporation at less than 3 mm per day to ensure that a target of 5 mm by irrigation application is not exceeded Table 13.

Table 13 Water use guideline

Water use guidelines	Water use guidelines
>25o >20km/hr (10hrs/day)	15o <20km/hr (<4 hours/day)
15-24o <20km/hr (8 hrs/day)	
15o <20km/hr (4 hours/day)	
Evaporation 3 – 7 mm per day*	**Evaporation < 3 mm per day**
Oct, Nov, Dec, Jan, Feb, Mar	April, May, June, July, Aug, Sept
*Operation of sprinklers in extreme hot and dry conditions requires extended irrigation hours	

6.4.1.2 Air quality monitoring

Air quality impacts at Lamberts North are managed pursuant to Development Consent 09_0186 and the approved Air Quality Management Plan (AQMP). The AQMP provides the assessment criteria for the Lamberts North air quality impacts which are monitored through a network of dust monitors.

The monitoring network consists of

- 5 dust deposition gauges
    - Dust Gauge 19, 20, 21, 22 and 23 at five locations
- 1 High Volume Air Sampler (HVAS) measuring particulate matter <10 µm (PM_{10}) and 2.5 µm ($PM_{2.5}$)
- 1 Tapered Element Oscillating Microbalance (TEOM) measuring <10 µm (PM_{10}) as shown on Figure 3.
- Air Quality Monitoring Station (AQMS). The AQMS is located at Blackmans Flat.

Dust monitoring results are recorded monthly with colour and textural observations.

Performance indicators recommended in the OEMP for air quality monitoring are as follows:

- Increase in Total Suspended Particulates (TSP) by > 2g/m^2/month to a maximum of 3.5g/m^2/month at dust deposition gauges outside the ash placement area
- PM10 annual average is <30µg/ m^3 and 24 hour maximum does not exceed 50µg/m^3

A review of the depositional dust monitors was performed at the end of March 2017. The review found that the gauges meet the requirements for the methods for sampling and analysis of ambient air (AS/NZS 3580.10.1:2003).

6.4.2 Environmental Performance

6.4.2.1 Dust suppression – Lamberts North Sprinkler system

Figure 7 reflects a relationship between sprinkler application and evaporation to identify that the target or maximum application rates for irrigation at 5 mm / day was achieved. Net irrigation was calculated by subtracting the daily evaporation from the daily sprinkler irrigation rate.

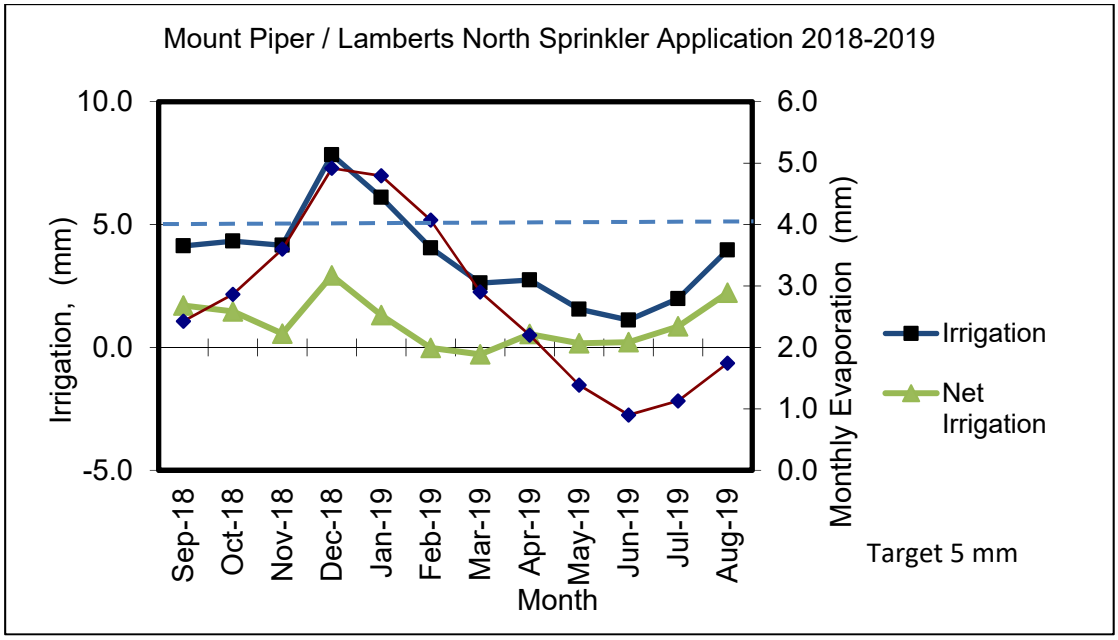

Figure 7 Efficacy of irrigation operations September 2018 - August 2019

6.4.2.2 Air quality monitoring

Comparative annual average depositional dust data for the combined average over the previous four-year period is presented in Table 14. Additional comparative annual average depositional dust data for each of the five OEMP dust deposition gauges are presented in Figure 8 – Figure 12.

All depositional dust results are shown to be considerably lower than the concentrations predicted in the Environmental Assessment (predicted annual average of 3.5 g/m2/month deposited dust), with the exception of the occasional peak. Annual averages for all gauges have increased in the reporting period but remain within the nominated criteria (Table 14).

Historical elevated recordings have generally been the result of fires, dust storms and hazard reduction burning occurring in the Central West, Blue Mountains, Hawkesbury and even the Sydney Region. These events are known to affect particulate levels by increasing the levels above the standard requirements across the state. As such, to account for natural events, the national goal for particulates excludes exceptional events such as these (OEH, 2016). Hazard reduction burns are generally performed in the vicinity starting from July through to September, with the bushfire season commencing in October (NSW RFS, 2016). Conversely, peaks in the combined averages of the 5 depositional dust gauges generally align within the hazard reduction or bushfire season.

Table 14 Annual depositional dust summaries

Date	Total Insoluble solids (g/m2/month)				
	19	20	21	22	23
	Insol.	Insol.	Insol.	Insol.	Insol.
Sep-18	1.5	4.5	1.3	No sample	1.2
Oct-18	0.7	2.2	7.2	1.9	2.6
Nov-18	3.7	4.3	4.3	3.7	3.7
Dec-18	2.9	3	2.4	3.8	7.7
Jan-19	2	1.7	2.9	2.4	2.4
Feb-19	2.7	1.4	1.9	2.3	4
Mar-19	1.4	1	1.9	3.2	3.9
Apr-19	No Sample	1.1	2.4	2.2	1.9
May-19	1.2	0.7	1.5	1.2	1.5
Jun-19	0.5	0.3	0.7	0.4	0.5
Jul-19	1.1	0.9	1.4	1.3	1.1
Aug-19	1	1	1	2.2	2.4
Annual averages					
2019	1.7	1.8	2.4	2.2	2.7
2018	0.9	1.4	1.4	1.1	1.0
2017	0.4	0.7	1.1	1.4	1.0
2016	0.6	0.7	1.5	0.6	0.7
2015	1.1	0.8	1.4	0.8	0.8
2014	0.8	0.9	1.5	0.9	0.8

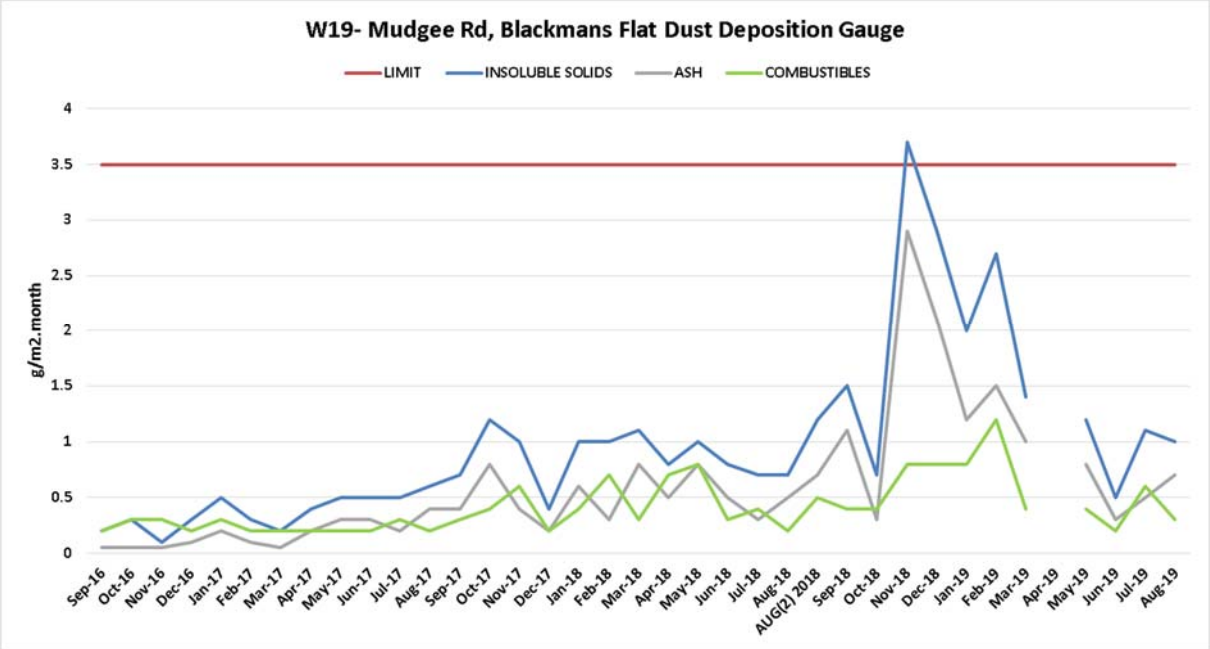

Figure 8 Depositional Dust Summary for Dust Gauge 19

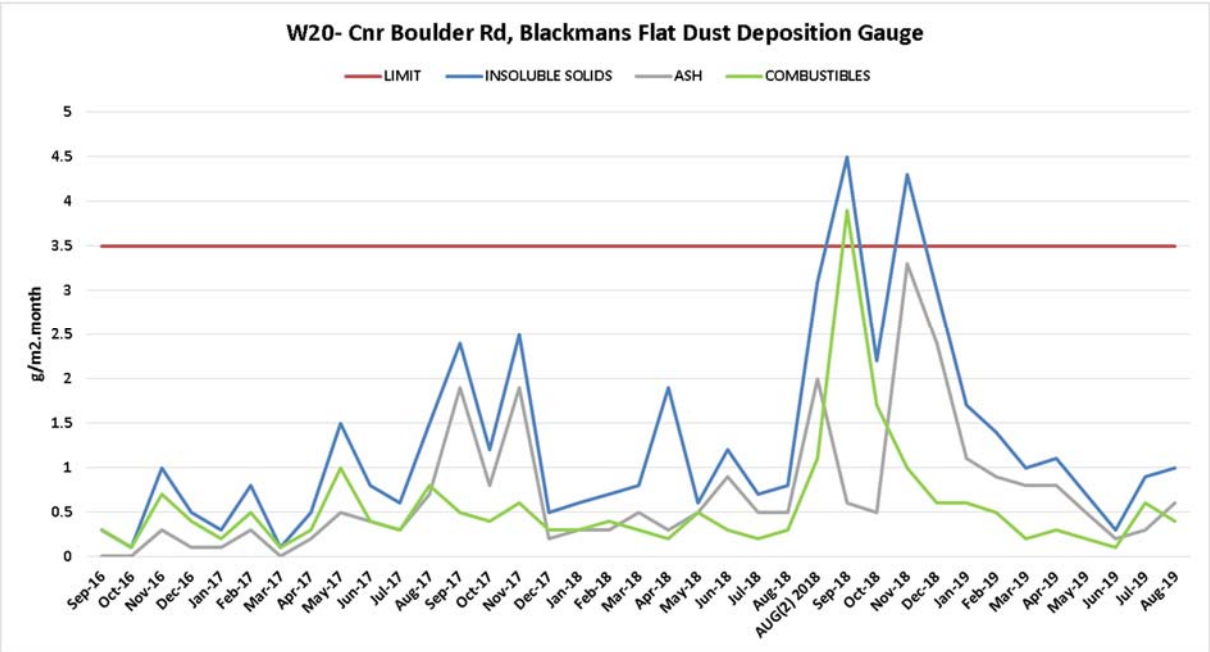

Figure 9 Depositional Dust Summary for Dust Gauge 20

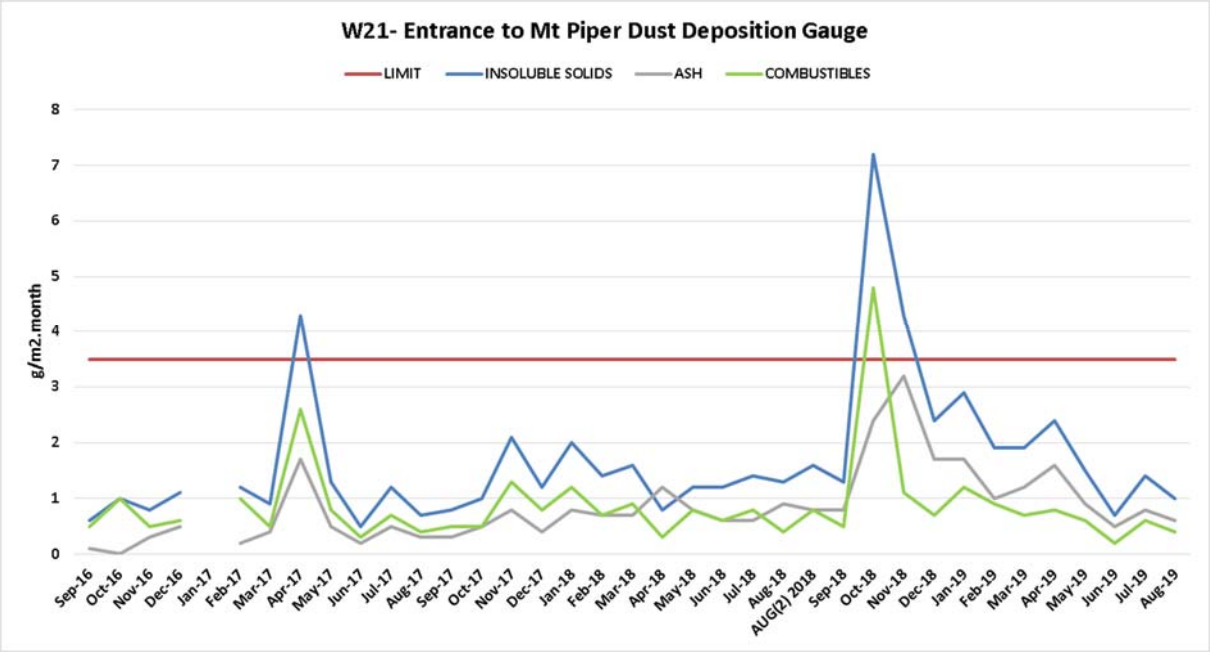

Figure 10 Depositional Dust Summary for Dust Gauge 21

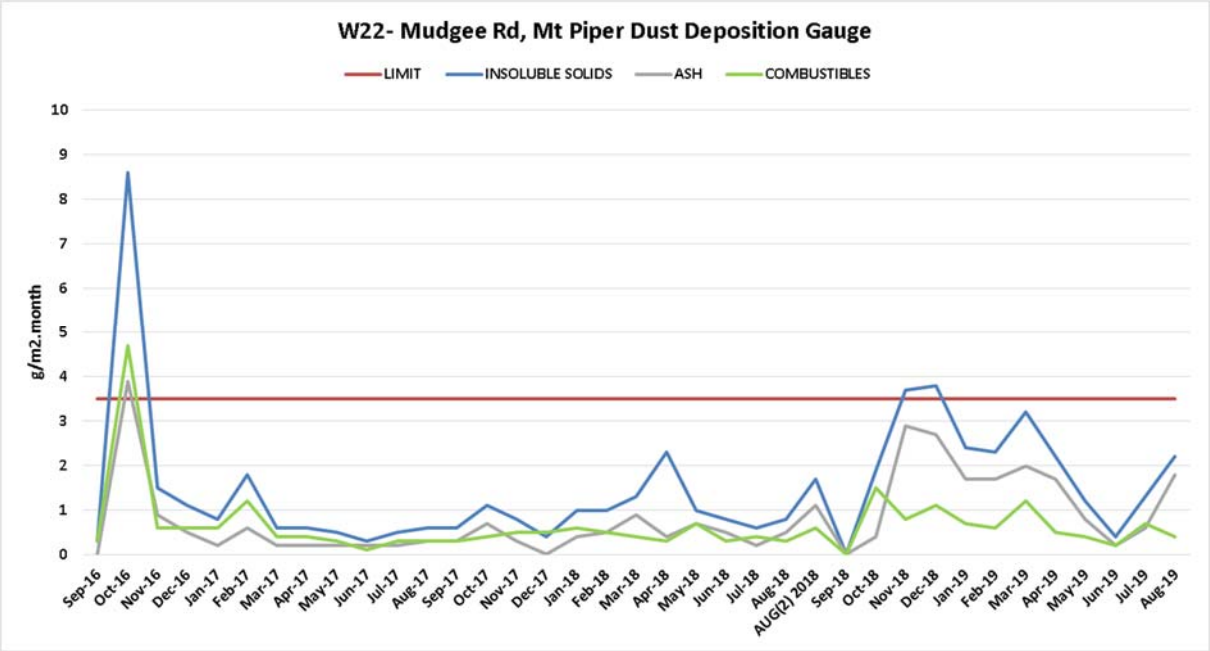

Figure 11 Depositional Dust Summary for Dust Gauge 22

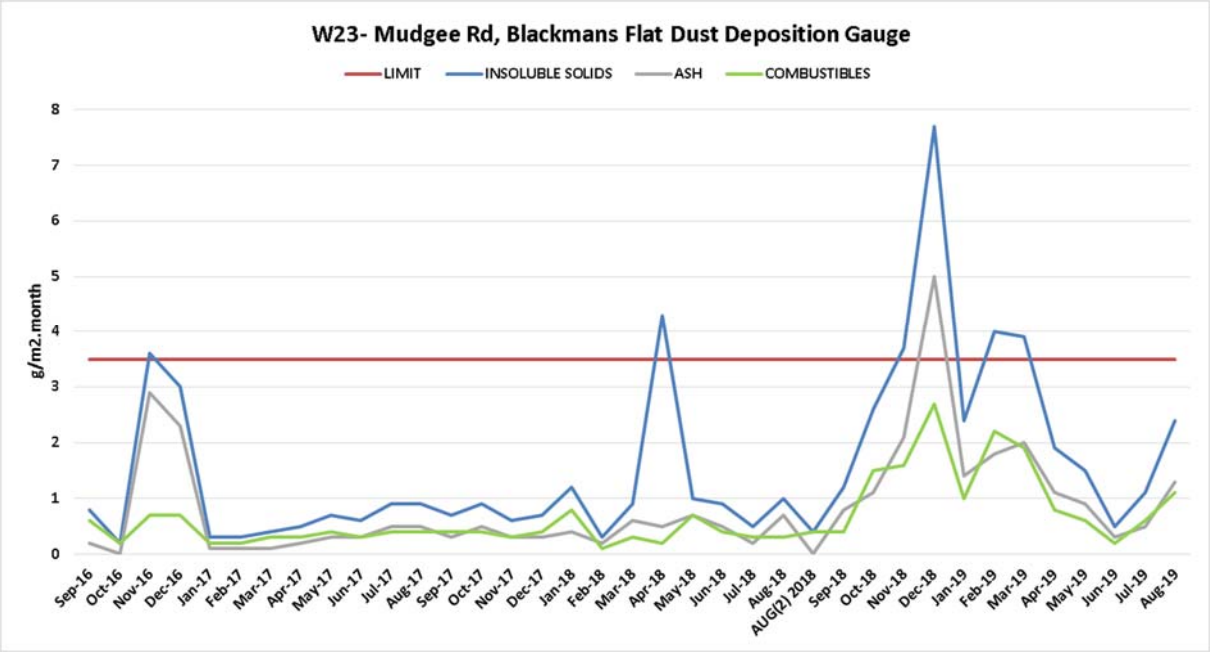

Figure 12 Depositional Dust Summary for Dust Gauge 23

Peaks recorded in all depositional dust gauges in November 2018 (Figure 8-Figure 12) are associated with major dust events that occurred around 2 November and 21 November. The latter event started to the west of Broken Hill and picked up additional dust as it headed east, reaching Sydney the following morning (NSW Gov., 2019). However, anomalously high depositional dust results were recorded in depositional gauge 20 in September 2018 (Figure 9), gauge 21 in October 2018 (Figure 10), gauge 22 in December 2018 (Figure 11) and gauge 23 in December 2018, February 2019 and March 2019 (Figure 12).

Operations at Lamberts North Ash Repository were determined to not be attributable to the elevated results recorded in depositional gauges 20, 21 and 23 for September 2018, October 2018 and February 2019 respectively, as the wind was predominantly blowing in the opposite direction to where the depositional gauges are situated relative to the Lamberts North Ash Repository. Operations at Lamberts North Ash Repository were also determined to not be attributable to the elevated results recorded in depositional gauge 23 in March 2019 as the ash placement activities were not focused in Lamberts North Ash Repository and the dust control measures were operational including the sprinkler system.

No sample was recorded for depositional dust gauge 22 for the month of September 2018 and gauge 19 for the month of April 2019 as the bottles were discovered broken at the time of sampling.

The PM_{10} and $PM_{2.5}$ results recorded by the Blackmans Flat Air Quality Monitoring Station (AQMS) indicated the annual averages were below the 30 ug/m^3 and 8 ug/m^3 limits. The annual average PM_{10} result was 11.7µg/m^3 and the annual average $PM_{2.5}$ result was 3.8 µg/m^3, which is well below the statutory limits (refer to Figure 13 and Figure 14). The highest PM_{10} result recorded was 89.4ug/m^3 and was recorded on the 15 December 2018, coinciding with peaks in depositional dust gauges number 22 and 23.

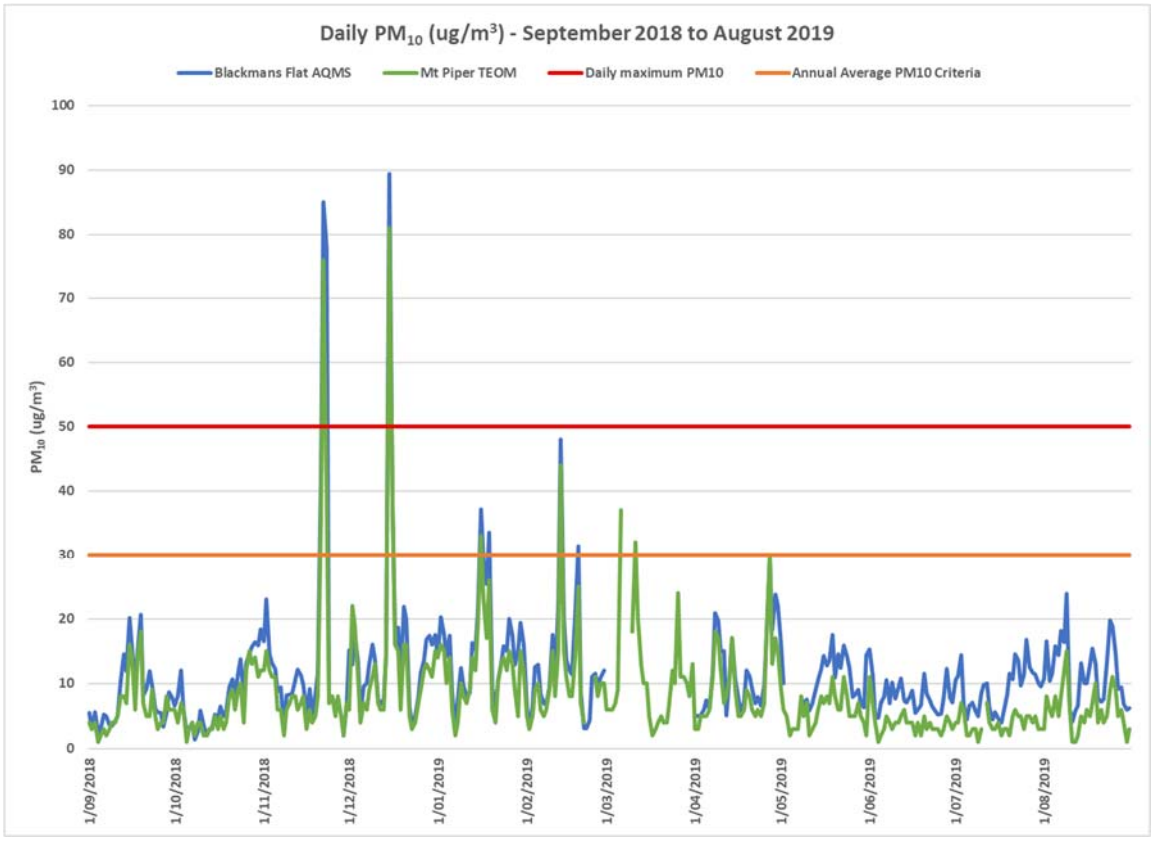

Figure 13 Daily PM10 for Blackmans Flat AQMS and Mt Piper TEOM from September 2018 to August 2019

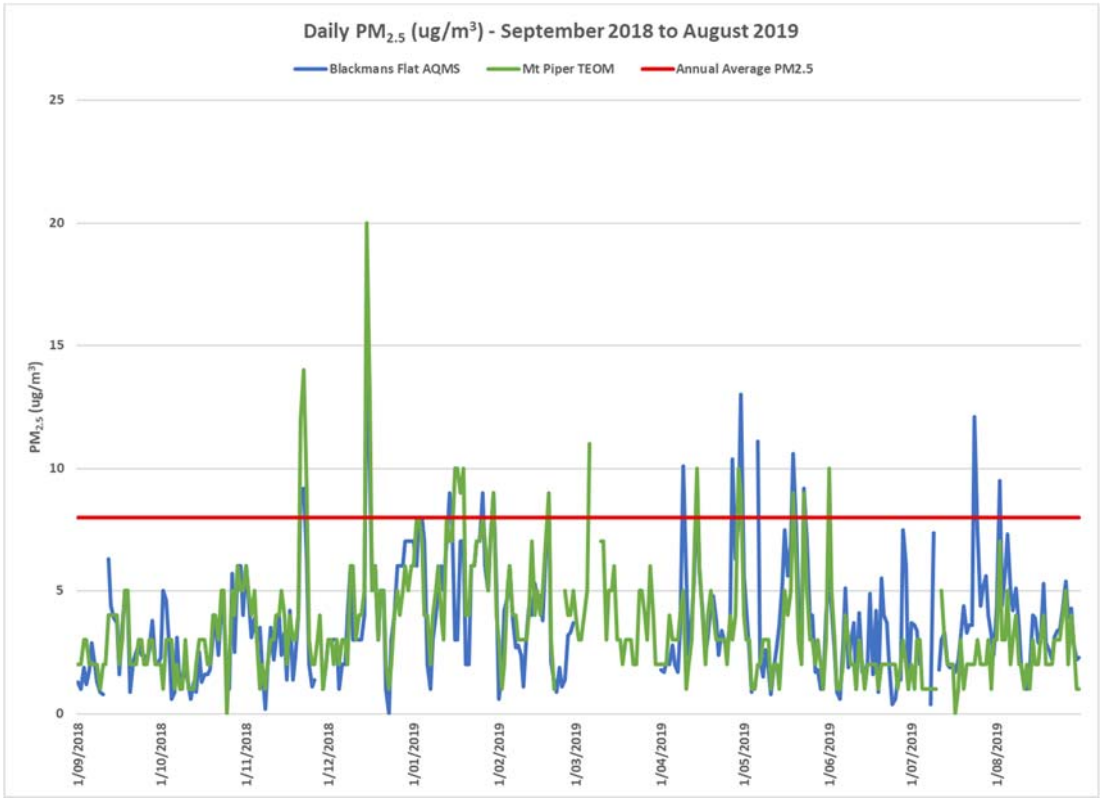

Figure 14 Daily $PM_{2.5}$ for Blackmans Flat AQMS and Mt Piper TEOM from September 2018 to August 2019

On 22nd November 2018, elevated particulate matter (PM_{10} and $PM_{2.5}$) was recorded, as shown in Figure 13 and Figure 14, coinciding with the aforementioned major dust event and peaks recorded in the depositional dust gauges for the month of November 2018. On 15 December 2018, elevated particulate matter was recorded in association with the elevated results within depositional gauges 22 and 23. The NSW Government, historically Office of Environment & Heritage, state that December 2018 saw the highest dust activity of any of that month since 2005 (NSW Gov., 2019) and that the dust was predominantly from thunderstorm downdrafts. Although depositional gauges 22 and 23 were the only dust gauges to have elevated results above the predicted annual average, the remaining three gauges did also record slightly higher than normal results for the month of December 2018. Therefore, Lamberts North Ash Repository is not determined to be attributable to the elevated results.

The results for the reporting period indicate that air quality emissions from the Lamberts North Ash Repository have been managed effectively during the reporting period and comply with CoA D3 (d) and E18.

6.4.3 Reportable Incidents

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

6.4.4 Further Improvements

The air quality management controls have been effective and will continue to be implemented for the Lamberts North Ash Repository, as such no further improvements have been identified for the next reporting period.

6.5 Waste Management

6.5.1 Environmental Management

Waste disposal practices at the Lamberts North Ash Repository are managed in accordance with Environmental Protection Licence 13007 and the Waste Management Sub-Plan (OEMP Section 6.8). 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, 2014). The WMP addresses waste management on site, an satisfies CoA D2 (g), E23, E24 and E25.

The WMP provides a framework for EnergyAustralia NSW, its contractors and vendors to manage waste and to minimise the potential for adverse impacts to sensitive receivers during the operation of the Project and is comprised of the following targets:

- To ensure waste at the Lamberts North Ash Repository is managed in accordance with the conditions of EPL 13007.
- To ensure that all Staff and associated contractors involved in the Lamberts North operations are made aware of the waste management measures (OEMP Section 6.8), that waste generated on Lamberts North is recycled or disposed of in accordance with this OEMP Sub Plan.

EnergyAustralia NSW 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 except as permitted by the licence or an exemption certificate.
- Waste generated by site personnel (including maintenance wastes such as oils and greases) are collected on a regular basis to be recycled or disposed of at an appropriate facility.
- Evidence of a recycling system in use and site-generated waste being disposed of to an appropriate facility.
- Waste management details are recorded in the monthly environmental report.

Waste-related documents and records reflect adherence to these protocols, thereby providing the foundations for a transparent approach to waste management. The OEMP provides further guidance and detail on specific waste streams and applicable management measures (OEMP Section 6.8).

6.5.2 Environmental Performance

No settling pond sediments were co-placed at the ash repository during the reporting period. However, fabric filter bags were co-placed at the ash repository during the reporting period as approved. Fabric filter bags are sourced from the fabric filter plant located within the licenced premises at the Mt Piper Power Station and are permitted to be disposed of at the ash repository in accordance with Mt Piper's Environment Protection Licence 13007.

The activities at the Lamberts North Ash Repository were deemed to have met the OEMP targets for waste management for the 2018-2019 reporting year. There were no non-conformances identified and the OEMP requirements with respect to waste management, were found to be compliant.

6.5.3 Reportable Incidents

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

6.5.4 Further Improvements

- Newly designed and installed vibrational cleaning mechanism, shaker arms, resulting in a reduction in wastage and bag replacement

6.6 Heritage Management (Aboriginal & non-Aboriginal)

6.6.1 Environmental Management

Project Approval 09_186 contains CoA's concerning heritage management in Part B - Prior to Construction (B5 (f)) and Part C – During Construction (C8 – 9). These conditions are managed under Section 5.6 of the CEMP. The Project has progressed into the operational phase and CoA Part B and C no longer apply.

Whilst there are no specific CoAs for Project Approval 09_0186 for Part E – During Operations, regarding Heritage Management, contract personnel are educated on their due diligence duties in respect of the protection of Aboriginal and non-indigenous heritage sites and items.

6.6.2 Environmental Performance

No additional sites have been recorded within the vicinity of the Lamberts North Ash Repository.

6.6.3 Reportable Incidents

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

6.6.4 Further Improvements

No further improvements have been identified for the next reporting period.

7. Water management

7.1 Surface Water Quality Monitoring.

7.1.1 Environmental Management

The Soil and Surface Water Quality Management Plan (SSWMP) is a sub-plan as outlined in the OEMP and addresses the specific requirements of the CoA D3 (c) and E16. The SSWMP addresses soil and water cycle management on site, including a surface water monitoring program at receiving waters that is comprised of the following targets:

- The water quality at Neubecks Creek is not impacted by Lamberts North ash placement operations;
- Zero environmental incidents that relate to pollution of waters at Neubecks Creek.
- Erosion to be effectively managed on site and not have an influence and/or impact on surrounding lands outside the boundary of Lamberts North.

Performance criteria:

- The Environmental Goals adopted have taken into consideration local baseline surface water conditions in Neubecks Creek prior to the commencement of ash placement in the Stage I area (eastern side) of the Mt Piper Ash Repository (referred to as pre-placement). Baseline conditions were specifically established based on the 90th percentiles of the water quality dataset from monitoring site WX22 in Neubecks Creek. An early warning is triggered when the post-ash placement 50th percentiles for the various water quality indicators at each of the surface water monitoring sites, exceed the pre-placement 90th percentiles (Aurecon, 2017).
- Ecological results at Neubecks Creek will indicate no significant variation from historical baseline data.
- No visual evidence of erosion and sedimentation impacts on Neubecks Creek following significant rainfall events.

Runoff water from Lamberts North is contained in clean and dirty water sediment ponds and forms the primary source of water for dust suppression on exposed ash and capped areas as well as irrigation of the revegetated areas. The CoAs stipulate that a monitoring program must be implemented to record and observe water quality and potential impacts from repository operations on regional surface waters. The Operational Environment Management Plan for Lamberts North requires sampling at three locations (Figure 3 & Table 15).

Table 15 Location of Surface Water Monitoring Points

Site ID	Location Description	Monitoring Frequency
LMP01	Final Holding Pond Weir – historically the Licence discharge/monitoring point, located north-west of the Mt Piper Ash Repository. This monitoring site is located in an upstream position relative to the Lamberts North Ash Placement Area.	Monthly for first 12 months then quarterly thereafter[1, 2]
NC01	Located in Neubecks Creek. This monitoring site is located upstream to the Lamberts North Ash Placement Area and to the north of the Mt Piper Ash Repository and is an aquatic life background site.	Monthly for first 12 months then quarterly thereafter[1, 2]
WX22	Located in Neubecks Creek at a stream gauge to the east/down-stream of the Mt Piper and Lamberts North Ash Repositories and monitoring site LDP01. This monitoring site is also situated down-stream of monitoring bore D8.	Monthly for first 12 months then quarterly thereafter[1, 2]

1. Selected field parameters monitored on a weekly basis
2. Monitoring undertaken by analytical laboratory Nalco Water – Ecolab

Changes in the water quality and trace metals at Neubecks Creek receiving water site (WX22), from pre-ash placement (October, 2012 to August, 2013) to the post-ash placement period (September, 2013 to August, 2017) was examined in the past by Aurecon Water Quality Monitoring Report (Aurecon, 2017). For the 2018-19 reporting period ERM was commissioned by EnergyAustralia NSW to carry out the Water Quality Monitoring Report (WQMR) (ERM, 2019) refer to Appendix F.

7.1.2 Environmental Performance

ERM was commissioned to carry out the surface water monitoring program required by Project Approval 09_0186 during the reporting period. A copy of the Water Quality Monitoring Report is contained in Appendix F. The surface water monitoring carried out during the reporting period identified a number of exceedances of water quality goals contained in the SSWMP and this triggered contingency measures requiring the commencement of a surface water investigation. This investigation is currently under way.

Exceedances of the Environmental Goals were recorded during the reporting period with respect to surface water. Elevated concentrations of various constituents above the water quality criteria (Environmental Goals) were identified. Concentrations for the last 12 months, including those that exceeded the Environmental Goals, are presented in the tabulated surface water results in Appendix F.

Based on the surface water quality data, reported in ERM Annual Water Quality Report, the exceedances are generally considered to be the result of influences from background sources or may be associated with effects of seasonality. However, based on these results, EnergyAustralia NSW is undertaking further assessment and an independent investigation of groundwater and surface water in the vicinity of the Mt Piper and Lamberts North ash repositories.

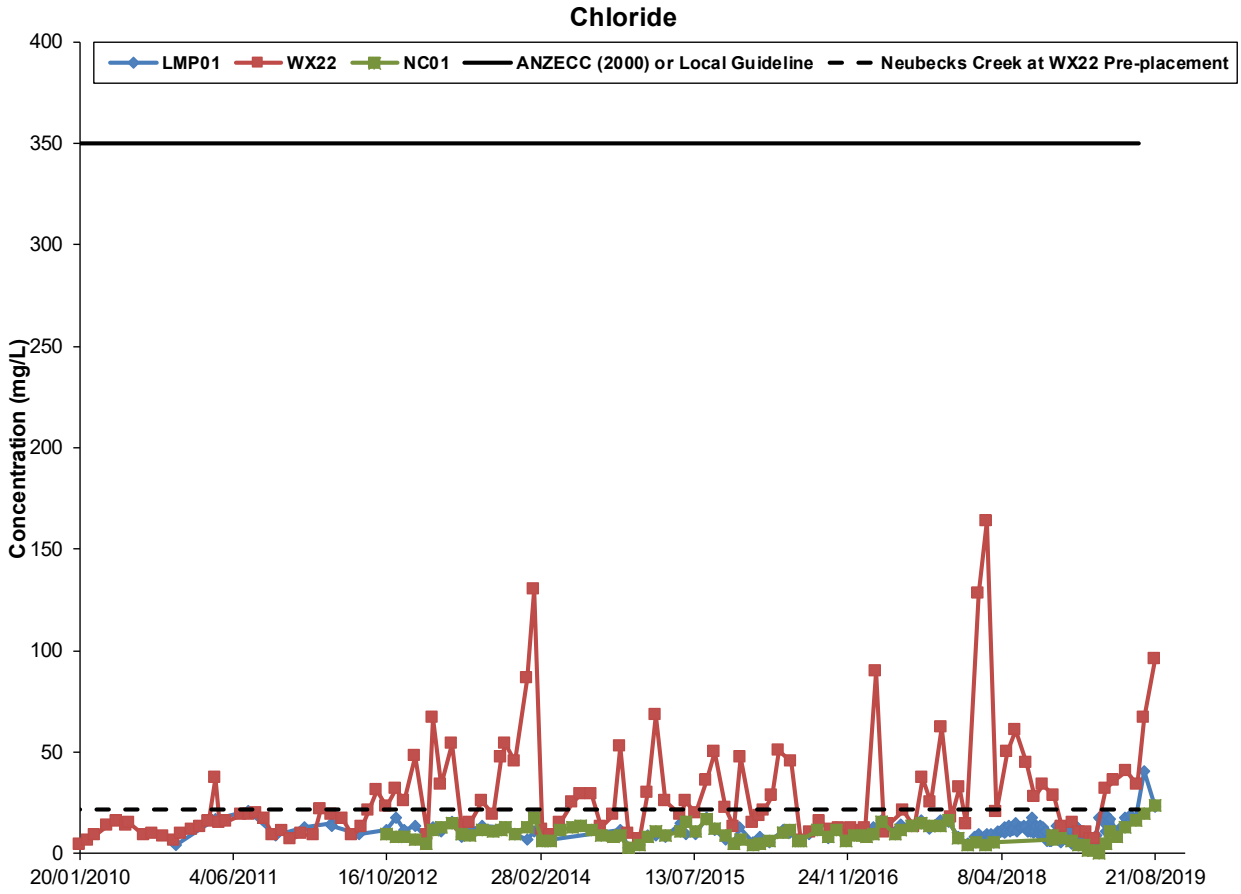

Figure 15 Chloride Concentrations in Surface Water

A review of concentration trends in surface water with respect to key indicators including chloride and nickel is presented below. These indicators were selected based on their exceedances of ANZECC (2000) Trigger Values and/or the potential increase in concentration observed down-stream of the ash repository. Additional graphs generated and reviewed as part of the trend analysis are presented in Appendix F.

Chloride concentrations were consistently below the Environmental Goal of 350 mg/L throughout the monitoring period 2010-2019. Chloride concentrations in some samples at WX22 during the 2018/19 monitoring period appear to be generally comparable with previous years, with the last few sampling events in the reporting period exhibiting an upward trend. Spikes in concentrations recorded at this location in February 2018 (164 mg/L) and February 2014 (130 mg/L). Chloride concentrations at LMP01 have remained relatively stable and low since 2010. At location NC01, chloride concentrations have followed a similar low, stable reading as at location LMP01.

Chloride concentrations (50th percentile) were found to be at least 4 times higher in down-stream monitoring location WX22 compared to the background chloride 50th percentile results at LMP01 and NC01.

Nickel concentrations at LMP01 and NC01 have been generally stable since 2012, with one exceedance at LMP01 above the adopted Environmental Goal of 17 µg/L. Concentrations of 115 and 136 µg/L were reported in surface water samples from WX22 in January and February 2018, at a similar magnitude to a peak of 150 µg/L reported in February 2014. These peaks are potentially associated with low flows. Nickel concentrations in surface water from WX22 exceeded the pre-placement trigger level in all 12 months of the monitoring period. During the 2018-19 reporting period, nickel was recorded at concentration above the Environmental Goal in September 2018, March 2019, April 2019, July 2019 and August 2019.

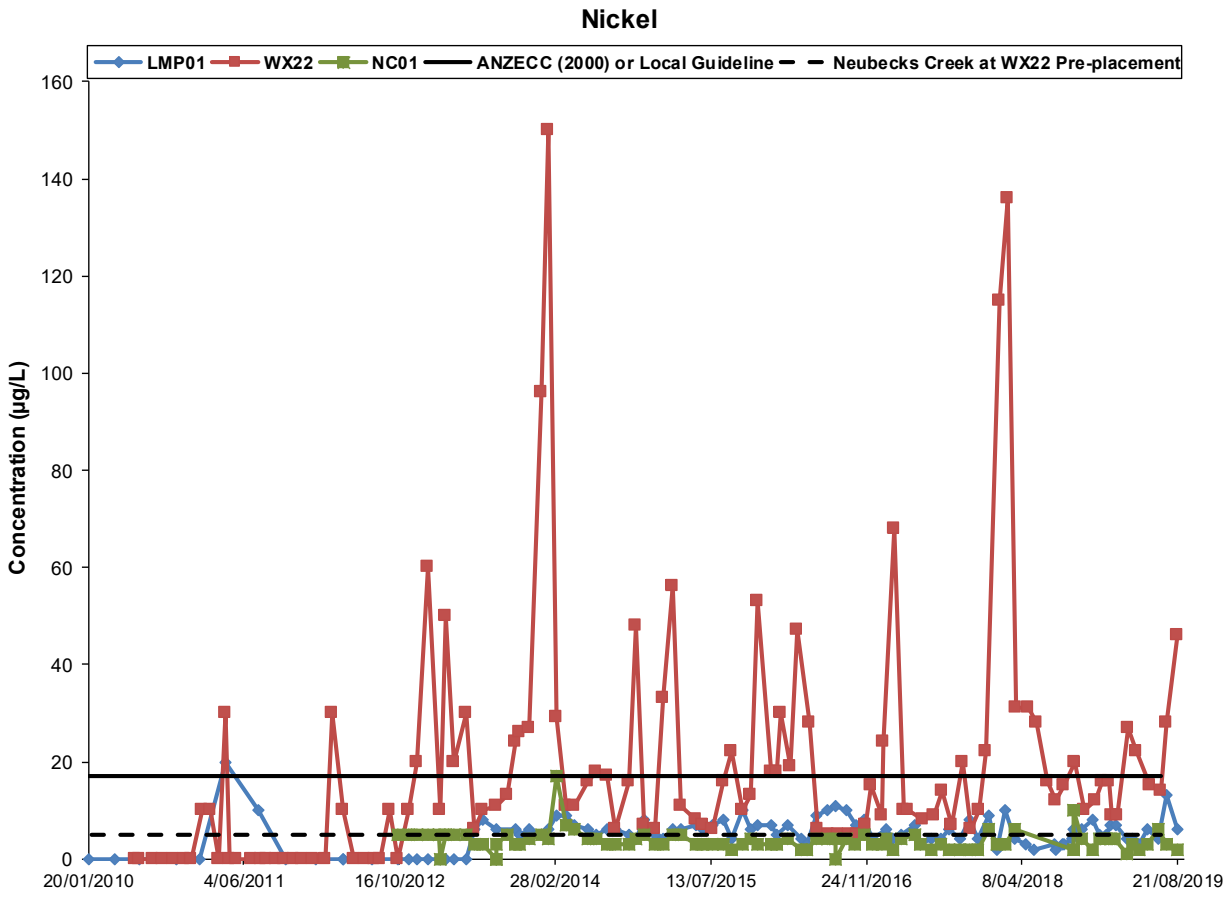

Figure 16 Nickel Concentrations in Surface Water

The comparison of 50th percentile chloride and nickel results may indicate a potential change in the surface water quality down-stream of the ash repository. This is the "early warning trigger" and does not represent non-compliance with project approval. However, these concentrations have triggered the implementation of an independent assessment of groundwater and surface water conditions at the site.

7.1.3 Reportable Incidents

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

7.1.4 Further Improvements

- Surface water will continue to be monitored and appropriate action taken to mitigate potential impacts to Neubecks Creek.
- Mitigation controls will be informed following the completion of the independent groundwater investigation.

7.2 Groundwater Monitoring

7.2.1 Environmental Management

The Groundwater Management and Monitoring Plan (GMMP) is a sub-plan of the OEMP and seeks to address the specific requirements of the CoA D3 (b), E15 and E17. The objective of the GWMP is to assess compliance with the Site's Conditions of Approval. The GMMP provides for the requirements for the ongoing groundwater monitoring program in accordance with CoA E15. The GMMP was established and implemented in October 2012 prior to construction activities and in addition to the existing monitoring regime for Mt Piper ash repository. A summary of the groundwater monitoring site locations is presented in Figure 3.

Performance criteria: Water quality trigger values set out in the OEMP (EANSW, 2019a) and modified by Aurecon (2017) have been adopted as Environmental Goals for the analytes. In addition to the Environmental Goals outlined above, an early warning is triggered when the post-ash placement 50th percentiles for the various water quality indicators at each of the surface water monitoring sites, exceed the pre-placement 90th percentiles (Aurecon, 2017).

The GMMP provides the procedures and protocols that apply to the monitoring and testing of water quality and involves monthly sampling of existing long-term bores associated with Mt Piper ash repository and new bores located south of Huon Gully.

- Bore D9: East of Huon Gully and south of Neubecks Creek, located outside the ash placement area. Used to monitor groundwater quality and potential influence on Neubecks Creek
- Bore D8: North of Neubecks Creek. Used to monitor groundwater quality and potential influence on Neubecks Creek
- Bore D10 & D11: The Mt Piper ash placement area bores, on the western side of the ash placement area are used to monitor inflows from Mt Piper to the Lamberts North placement in Huon Gully.
- Bore D1: North of Huon Gully, used to detect seepage from the north-eastern Mt Piper brine placement and monitor groundwater quality and potential influence on Neubecks Creek.
- BoreD20: North-east of Lamberts North. Used to monitor groundwater quality and potential influence on Neubecks Creek.

Bores D20, D1, and D8 and D9, are used to enable management actions to be undertaken to minimise effects of the Lamberts North water conditioned ash placements. The GMMP also provides a contingency plan for events that have the potential to pollute or contaminate groundwater.

7.2.2 Environmental Performance

ERM was commissioned to carry out the groundwater monitoring program required by Project Approval 09_0186 during the reporting period. A copy of the Water Quality Monitoring Report is contained in Appendix F. The

groundwater monitoring carried out during the reporting period identified a number of exceedances of water quality goals contained in the GMMP and this triggered contingency measures requiring the commencement of a groundwater investigation. This investigation is currently underway.

Exceedance of water quality goals were recorded during the reporting period with respect to groundwater. Concentrations for the last 12 months, including those that exceeded the Environmental Goals, are presented in the tabulated groundwater results in the annual water quality monitoring report (Appendix F).

A review of concentration trends with respect to key indicators including nickel and chloride is presented below. These indicators were selected based on their exceedances above the adopted Environmental Goals. Graphs were generated for selected bores from the areas south/cross gradient of the ash repository (D15), adjacent to Mt Piper and up-gradient of Lamberts North ash repository (D11), the boundary of the ash repository (D20) and south of Neubecks Creek (D9). Additional graphs are presented in the Water Quality Monitoring Report provided in Appendix F.

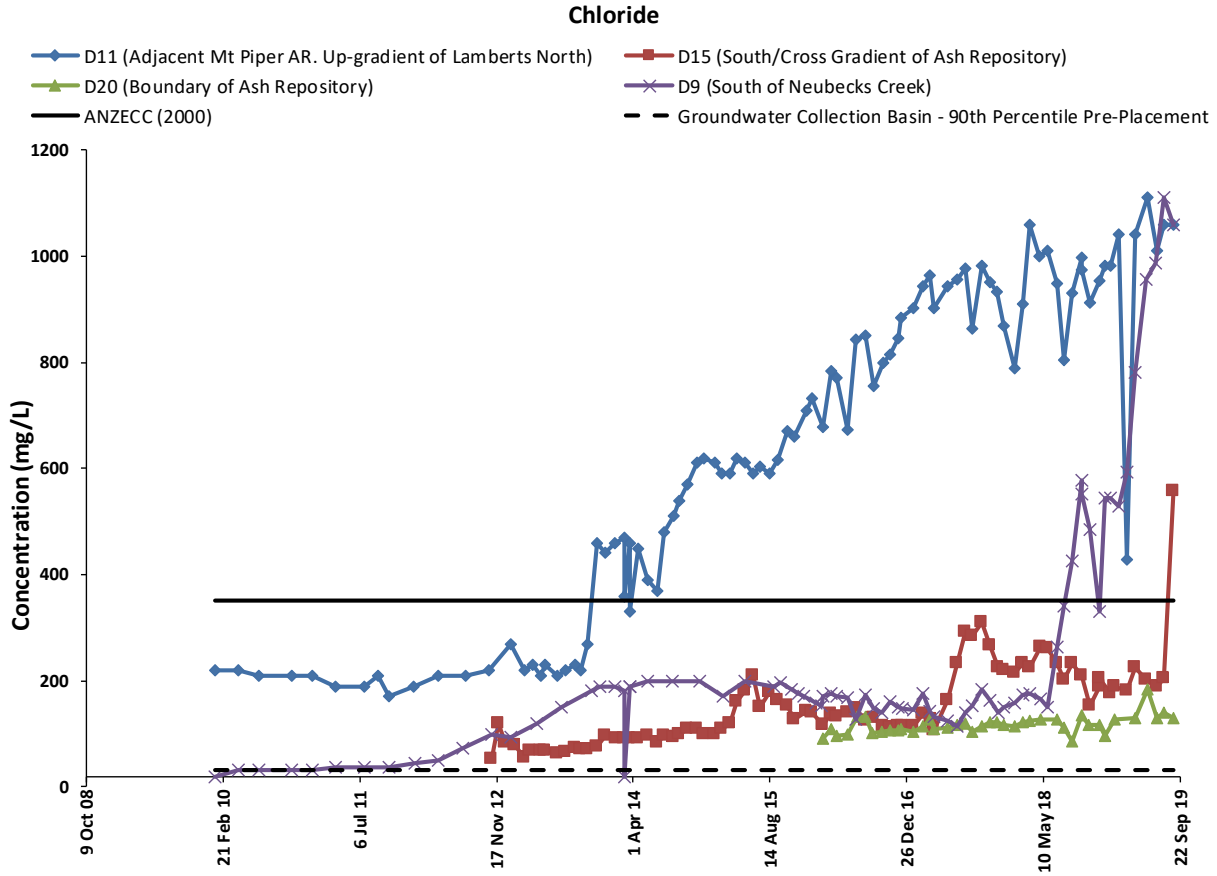

Figure 17 Chloride concentrations in groundwater

In groundwater from bore D9, chloride concentrations were generally stable from November 2013 to May 2018. However, the concentration then increased in June 2018 to the highest value recorded since January 2010. Since the reported peak in June 2018, concentrations dipped to below the Groundwater Environmental Goal in November 2018, before increasing again to above the Groundwater Environmental Goal and the highest reported peak in concentration which was reported in July 2019. Concentrations in D9 are now comparable with concentrations being reported in D11.

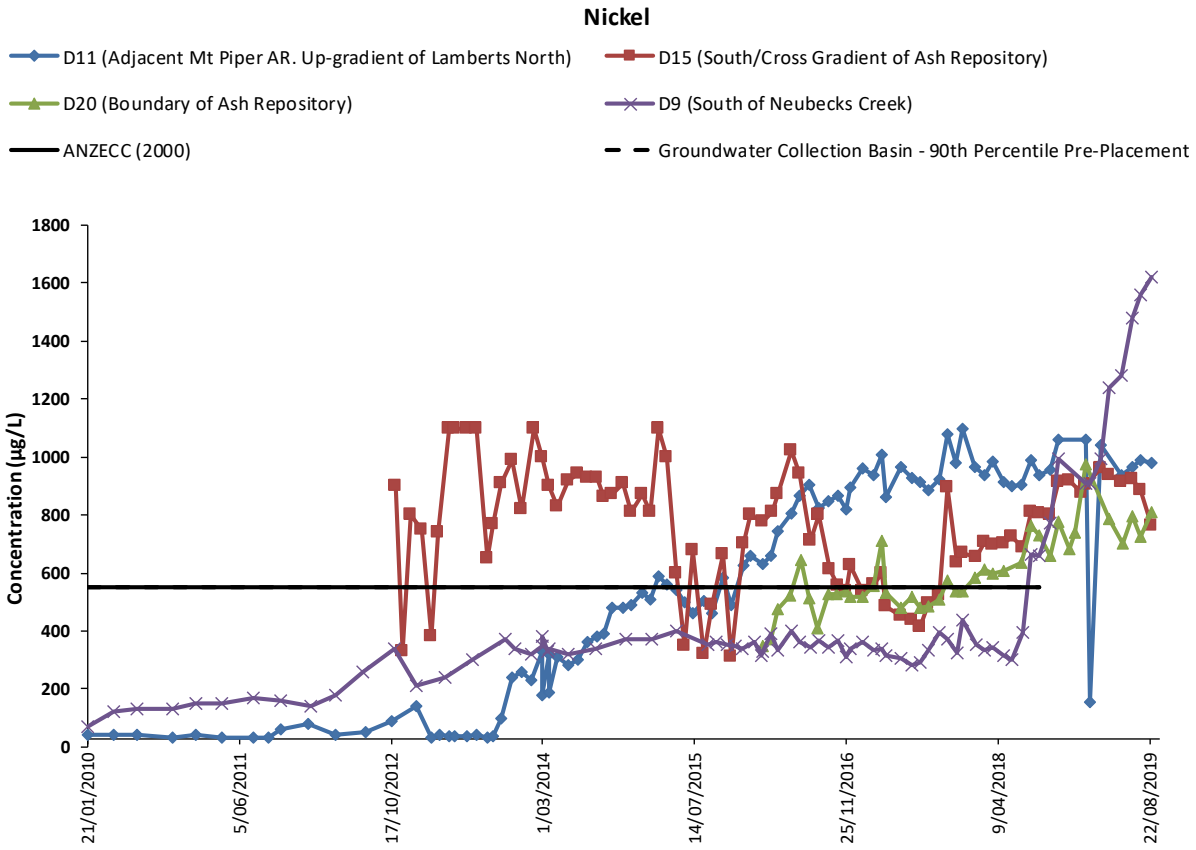

Figure 18 Nickel concentrations in groundwater

Nickel concentrations have generally increased over time in groundwater from bores D11 and D20. The concentration of nickel exceeded the Groundwater Environmental Goal for groundwater collected from bore D20 in January 2018. Nickel concentrations have since remained above the Groundwater Environmental Goal in groundwater from D20.

Nickel concentrations in groundwater from bore D9 had been generally stable since October 2013; however, in the July and August 2018 monitoring events, the nickel concentration in groundwater from bore D9 exceeded the Groundwater Environmental Goal and have continued to increase during the 2018/19 monitoring period.

Concentrations of several compounds in groundwater from multiple bores, including bore D9 located towards Neubecks Creek, were reported in exceedance of the Groundwater Environmental Goals (as set out in the OEMP). Groundwater levels have generally remained below the maximum predicted groundwater level of 912.0m AHD from CDM Smith (2012b), with the exception of D11 where water levels peaked at 914.08m AHD in February 2019. It is noted that the reported groundwater levels have remained below the base of the water-conditioned ash placement (at 917m AHD).

Based on groundwater quality data from bores located up gradient (and between the Mt Piper and Lamberts North ash repositories), these concentrations (particularly chloride and nickel) are unlikely to be predominately related to the Lamberts North Ash Repository. Based on these results, EnergyAustralia NSW is undertaking further assessment and an independent investigation of groundwater and surface water in the vicinity of the Mt Piper and Lamberts North ash repositories.

7.2.3 Reportable Incidents

No reportable incidents have been recorded against groundwater managed for the reporting period.

7.2.4 Further Improvements

- An independent groundwater assessment is currently underway to investigate the variation of chloride concentrations in groundwater. This will assist in determining the source and pathway of elevated chlorides to Bore D10 and other sites near the Lamberts North Ash Repository.

7.3 Hydrological Monitoring

The hydrological monitoring program was incorporated into the GMMP because of the change in design to Lamberts North addressed in the Consistency Report (SKM, 2012), as indicated in Section 5.5.

7.4 Erosion and Sediment Control

7.4.1 Environmental Management

The repository catchment area uses external batters and laybacks to stabilise the ash placement and direct runoff to swale drains that are situated parallel to the batters. The swale directs the water towards a controlled point, being an off-flow structure placed approximately every 100m along the batter. The off-flow structure, which is typically a rock-lined chute, directs the water to a containment pond.

The trucks deliver ash to the working face and create a number of piles next to each other, prior to final placement. The piles of ash allow for any runoff to be directed to the dirty water sediment pond(s). The ash is then graded into its final position and compacted by rollers to specific compaction criteria to mitigate erosion and infiltration.

7.4.2 Environmental Performance

Management of the ash benches is with the primary principle of eliminating uncontrolled runoff over any batter. All benches in the Lamberts North area are graded west to ensure security against a breach from any external boundary. All surface water runoff from the ash footprint of Lamberts North is managed within the boundary of the ash placement area.

The location of water retention basins within the Lamberts North Ash Repository has remained unchanged since 2014 in that surface water flow is retained over the original drainage line installed on the base of the placement site. All water collected on the Lamberts North Ash Repository is directed to the west side retention location. Free water is drained through the ash via a furnace bottom ash drainage line previously installed at the original floor level of the North Lamberts North placement area. Seepage is collected and pumped to the lined water storage pond.

Based on site observations and information reviewed potential impacts from the operation of the Lamberts North Ash Repository on erosion and sediment control have been effectively mitigated and managed.

7.4.1 Reportable Incidents

No reportable incidents have been recorded against erosion and sediment control for the reporting period.

7.4.2 Further Improvements

- EA have commenced construction of an additional 25 ML lined water retention pond to assist in the management of surface water resources at the site. The construction of lined sediment ponds for the management of surface water drainage is approved under existing operating licences and approvals.

8. Landscape and Revegetation

8.1.1 Environmental Management

Rehabilitation works at Lamberts North is planned to occur when the 937m contour layback has been constructed around the perimeter of the ash repository. The completion of the 937m contour layback was anticipated to occur during the 2018-19 reporting year.

8.1.2 Environmental Performance

The Lamberts North Ash repository is in the early stages of its development. As such minimal land preparation or rehabilitation work was conducted during the reporting period. The rehabilitation status of Lamberts North is detailed in Table 16. The rehabilitation status of Lamberts North and the adjoining Mt Piper Ash Repository is shown in Appendix G.

Table 16 Rehabilitation Status

Area Type	Prev. Reporting Period Sept 2017 – Aug 2018 Hectares	This Reporting Period Sept 2018 – Aug 2019 Hectares	Next Reporting Period Sept 2019 – Aug 2020 Hectares
Total Footprint	19.8	19.8	19.8
Total active disturbance	12.2	12.2	12.2
Land being prepared for rehabilitation	0	0	2
Land under active rehabilitation	0	0	0
Completed rehabilitation	0	0	0

8.1.3 Reportable Incidents

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

8.1.4 Further Improvements

No further improvements have been identified for the next reporting period.

9. Community

9.1 Community Engagement

During the reporting period quarterly Community Consultative Committee (CCC) meetings were held on 2 October 2018, 3 December 2018, 25 February 2019, 20 May 2019 and 19 August 2019. The CCC comprises representatives from the local community and EnergyAustralia NSW. The CCC meets on a quarterly basis to discuss matters relating to operations at Mt Piper and Wallerawang Power Stations, including activities at the ash repositories. The CCC minutes are made publicly available via the Mt Piper and Wallerawang Community page on the Company's website www.energyaustralia.com.au.

9.2 Community Contributions

The Mt Piper Power Station and the associated Lamberts North Ash Repository has contributed to the economy of the district and State through the purchase of materials and services from local and regional suppliers to the approximate value of $40 million, and by direct and indirect employment. EnergyAustralia NSW continues to support several community groups and organisations through in-kind support and financial sponsorship programs. During the reporting period, EnergyAustralia NSW had the opportunity to support up to 60 different community organisations and events during the reporting period. A comprehensive list of these organisations and events are included in Appendix H.

9.3 Community Complaints

There were no community complaints reported to EnergyAustralia NSW relating to the Lamberts North Ash Repository during the reporting period. EnergyAustralia NSW maintains a 24-hour hotline for the public to report incidents, complaints or enquiries with contact details available on the EnergyAustralia website. EnergyAustralia records the details of all complaints received in a Complaints Register. A copy of the 2018-19 Complaints Register is included in Appendix I.

9.4 Website Information

A project specific webpage has been developed to keep the broader community up to date with recent activities at the Lamberts North Ash Repository in accordance with Condition B10 of the Project's Conditions of Approval. Copies of the following documents are made publicly available on the EnergyAustralia NSW website:

https://www.energyaustralia.com.au/about-us/energy-generation/mt-piper-power-station

- Environment Assessment
- Project Approval 09_0186
- Construction Environment Management Plan
- Operation Environmental Management Plan
- Annual Environmental Management Reports
- Environment Protection Licence 13007
- Pollution Incident Response Management Plan
- Community Reference Group Minutes

10. Independent Environmental Audit

10.1 Independent Environmental Audit

In April 2018, the Secretary directed an Independent Environmental Audit (IEA) be undertaken by 30 June 2019. EnergyAustralia NSW engaged suitably qualified consultants from SLR Consulting Australia Pty Ltd (SLR) to conduct the IEA (SLR, 2018), with the site component completed between 23 and 28 October 2018, inclusive. The IEA found a total of 5 low-risk non-compliances and a further 8 administrative non-compliances. Progress on addressing these findings is provided in Appendix J.

10.2 Environmental Representative Audit

An internal audit for compliance against ISO14001 was conducted on the EnergyAustralia NSW Environmental Management System, and the Lamberts North Ash Repository Project, during the reporting period (EANSW, 2019b). The audit was broad and limited in depth in regard to the Project Conditions of Approval and the details are summarised in the report. The findings showed that there was no non-compliance in relation to the Project Conditions of Approval. The results can be found in Appendix K.

11. Activities Proposed in the next reporting period

Activities to be conducted in the next reporting period will include:

- Ash placement into Lamberts North building to 937m external layback.
- Environmental compliance monitoring for air quality, noise emissions and water quality.
- Maintenance of sediment and erosion control structures.
- Dust suppression activities to minimise potential air quality impacts from the Lamberts North Ash Repository.
- Establish additional water storage ponds for managing surface water runoff
- Continue monitoring the ecological health of Neubecks Creek throughout the life of the Project. The monitoring will continue after final capping of the Lamberts North Ash Repository for a minimum of five years in accordance with approval conditions.
- Continue the independent assessment of groundwater and surface water conditions at the site.
- Review the need for a possible project Modification to allow for the ongoing management of brine waste at the site and other changes to provide for improved environmental outcomes.
- Complete the development of a numerical groundwater model.
- Assess potential receptor controls to manage groundwater leachates.

11.1 Environmental Management Targets and Strategies for the Next Year

Environmental measures to be implemented in the next reporting period are detailed in Table 17.

Table 17 Measures to be implement in the next reporting period

Environment Management Area	Target / Strategy	Timeframe
Water Quality	Review the groundwater management and monitoring plan	Following completion of the independent groundwater investigation.
Water Quality	Implement mitigation and control measures to manage potential groundwater and surface water impacts	2019 onwards.

12. References

ANZECC. (2000). *Australian Water Quality Guidelines for Fresh and Marine Waters.* Australian and New Zealand Environmental Conservation Council, ACT.

Aurecon. (2017). *Lamberts North Water Conditioned Fly Ash Placement Water Quality Monitoring Annual Update Report 2016/17.* NSW: Aurecon.

Aurecon. (2018). *Mt Piper Power Station Ash Placement Lambert North - Operational Noise Assessment September 2018.* Aurecon Australasia Pty Ltd.

Aurecon. (2019). *Mt Piper Power Station Ash Placement Lambert North - Operational Noise Assessment July 2019.* Aurecon Australiasia Pty Ltd.

Cardno. (2019). *Neubecks Creek Ecological Monitoring Program - Spring 2012-Spring 2018.* Cardno Pty Ltd, NSW.

CDM Smith. (2012a). *Lambert North Ash Placement Project - Construction Environmental Management Plan.* CDM Smith Pty Ltd, NSW.

CDM Smith. (2012b). *Lamberts North Ash Placement Project - Groundwater Modelling Report.* CDM Smith Pty Ltd, NSW.

CDM Smith. (2013). *Lamberts North Ash Placement Project - Operation Environmental Management Plan.* CDM Smith Pty Ltd, NSW.

DPI. (2012). *Conditions of Approval for Mt Piper Ash Placement - Lamberts North.* Department of Planning & Infrastructure, NSW.

EANSW. (2019a). *Lamberts North Ash Placement Project - Operation Environmental Management Plan.* NSW: EnergyAustralia NSW Pty Ltd.

EANSW. (2019b). *Internal Environmental Audit Report - Lamberts North Project - June 2019.* NSW: EnergyAustralia NSW Pty Ltd.

EPA. (2014). *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-liquid Wastes.* Environment Protection Authority, NSW.

ERM. (2019). *Lamberts North Placement Project Water Quality Monitoring Report 2018/19.* NSW: Environmental Resource Management Australia Pty Ltd.

Lend Lease. (2015). *Mount Piper & Lamberts North Ash, Dust, Brine Repository Management Plan.* Lend Lease Industrial Pty. Ltd.

Lend Lease. (2018). *E0003 Monthly Contractor Reports - September-December 2018.* NSW: Lend Lease Industrial Pty Ltd.

Lend Lease. (2019). *E0003 Monthly Contractor Reports - January-August 2019.* NSW: Lend Lease Industrial Pty Ltd.

NSW Gov. (2019, November 8). *DustWatch Report September 2018-August 2019.* Retrieved from NSW Government Air publications: https://www.environment.nsw.gov.au/topics/air/air-publications

NSW RFS. (2016). *Bush Fire Bulletin.* NSW Rural Fire Service.

OEH. (2016, December 29). *29 December 2016 Media Release - Air Quality results overall good but continue to be affected by hazard reduction burning.* Retrieved January 10, 2017, from Office of Environment & Heritage: http://www.environment.nsw.gov.au/media/OEHMedia16122901.htm

SKM. (2010). *Mt Piper Power Station Ash Placement Project Environment Assessment - Project 09_0186.* Sinclair Knight Merz Pty Ltd, NSW.

SKM. (2011). *Mt Piper Power Station Ash Placement Project Submissions Report - Project 09_0186.* Sinclair Knight Merz Pty Ltd, NSW.

SKM. (2012). *Mt Piper Power Station Ash Placement Project Consistency Report-Project approval 09_0186.* Sinclair Knight Merz Pty Ltd, NSW.

SLR. (2018). *Lamberts North-Mt Piper Independent Environmental Audit.* NSW: SLR Consulting Australia Pty Ltd.

13. Glossary of Terms

AEMR	Annual Environmental Management Report
AQMP	Air Quality Monitoring Program
AQMS	Air Quality Monitoring Station
AUSRIVAS	Australian River Assessment System
BOMP	Biodiversity Offset Management Plan
BOSO	Biodiversity Offset Strategic Outline
CCC	Community Consultative Committee
CEMP	Construction Environmental Management Plan
CIP	Community Information Plan
CoA	Condition of Approval (also known as MCoA – Minister's CoA)
DECC	Department of Environment & Climate Change
DPE	Former Department of Planning and Environment
DPI	Former Department of Planning and Infrastructure
DPIE	Department of Planning, Infrastructure & Environment
DPI (Fisheries)	Department of Primary Industries (Fisheries)
EPA	Environment Protection Authority
EA	EnergyAustralia
EANSW	EnergyAustralia NSW
EMP	Ecological Monitoring Program
EPL	Environment Protection Licence
GMMP	Groundwater Management & Monitoring Plan
HVAS	High Volume Air Sampler
IEA	Independent Environmental Audit
LN	Lamberts North
mAHD	Metres Australian Height Datum
MW	Megawatts
NEMMCO	National Electricity Market Management Company
NOW	Former NSW Office of Water
NSW RFS	NSW Rural Fire Service
OEH	Office of Environment & Heritage
OEMP	Operation Environmental Management Plan
ONMMP	Operational Noise Monitoring & Management Plan

SCA	Former Sydney Catchment Authority
SSWMP	Soil & Surface Water Quality Management Plan
TEOM	Tapered Element Oscillating Microbalance
WAL	Water Access Licence
WMP	Waste Management Plan
WQMR	Water Quality Management Report

Appendix A Detailed review checklist for Conditions of Approval

Appendix B Summary of Lend Lease Compliance at Lamberts North

Appendix C Lamberts North Operational Noise Assessment – September 2018

Appendix D Lamberts North Operational Noise Assessment – June 2019

Appendix E Neubecks Creek Ecological Monitoring Program Report

Appendix F Lamberts North Ash Repository Water Quality Report 2018–2019

Appendix G Mt Piper Ash Repository & Lamberts North Rehabilitation Plan

Appendix H Annual EnergyAustralia Community Sponsorships and Donations

Appendix I Complaints Register for 2018-19

Appendix J Lamberts North Ash Repository Independent Environmental Audit – October 2018

Appendix K Lamberts North Ash Repository Internal Audit – CoA Schedule 1 – June 2019