

Origin Energy Eraring Pty Limited

Rehabilitation Management Plan

Eraring Ash Dam

January 2024

Public



Rehabilitation Management Plan Eraring Ash Dam

Origin Energy Eraring Pty Limited

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WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Abbreviations

CCP	Coal Combustion Products
DPE	Department of Planning and Environment
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
EPS	Eraring Power Station
ERAD	Eraring Power Station Ash Dam
HIL	Health Investigation Level
LMCC	Lake Macquarie City Council
MOD 1	Modification 1
MOD 2	Modification 2
MW	Megawatt
NSW	New South Wales
NVRM	Native Vegetation Regulatory Map
POEO	Protection of the Environment Operations Act
RFS	Rural Fire Services
RMP	Rehabilitation Management Plan

1 Introduction

As part of an asset portfolio that generates electricity for the National Electricity Market, Origin Energy Eraring Pty Limited (Origin) operates the Eraring Power Station (EPS) and the associated coal combustion product (CCP) management facility, the Eraring Ash Dam (ERAD). The EPS and ERAD are located approximately 40 kilometres southwest of Newcastle between the towns of Morisset and Toronto on the western foreshore of Lake Macquarie in the New South Wales (NSW) Central Coast region. The EPS commenced operations in 1982 and its total generating capacity is 2,922 megawatts (MW) consisting of four 720 MW black coal fired units and one 42 MW diesel fuelled gas turbine. Origin acquired EPS from the NSW State Government in August 2013. On 17 February 2022, Origin submitted a notice to the Australian Energy Market Operator indicating the potential retirement of coal-fired electricity generation operations at EPS as early as August 2025. Origin will continue to assess the market over time, and this will inform the final timing for closure of all four coal-fired units at Eraring.

The ERAD is a critical component of the EPS as it provides storage for CCPs, or ash, generated as a by-product of coal combustion from coal-fired electricity generation. The ERAD is located within Lots 1, 2, and 11 on Deposited Plan (DP) 1050120 and currently occupies approximately 250 hectares (ha) within the 1,200-ha footprint of the power station. The land use classification under the Lake Macquarie Local Environmental Plan 2014 is Special Purpose (SP) 2 – Infrastructure (Electricity Generating Works).

Ash produced from the EPS is reused/recycled via onsite ash processing facilities. Excess ash is stored within the ERAD where it can be reclaimed for further ash recycling projects. Re-used/recycled fly ash is primarily used in construction materials including the cement and concrete industries. Bottom ash (furnace ash) is a separate ash stream recovered by Boral Recycling for use in light weight aggregates. Origin remains committed to minimising the quantity of ash that is stored in the ERAD, and ongoing ash re-use remains a priority.

Origin has prepared this Rehabilitation Management Plan (RMP) for all land disturbed by the ERAD as triggered by Condition 4.9 of Project Approval 07_0084 Modification 1 (the Project Approval) issued by the New South Wales Department of Planning and Environment (DPE). The Project Approval defines the project as “*The development to which this approval applies*”. Schedule 2 of the Project Approval defines the development as described in the Environmental Assessment being:

- Environmental Assessment – *Upgrade and Expansion of the Coal Combustion Management System, Eraring Power Station*, dated November 2007, and prepared by HLA – ENSR as amended by:
 - Upgrade and Expansion of the CCP Management System, Eraring Power Station – Submissions Report, dated 15 February 2008, and prepared by HLA – ENSR.
 - Modification application (MOD 1) – Ash Dam Augmentation Project Environmental Assessment, dated 15 August 2018, prepared by AECOM and Origin Eraring Power Station – Ash Dam Expansion MOD1 – Response to Submissions dated 3 December 2018, prepared by AECOM; and
 - Modification Report (MOD 2) – Ash Recycling Facilities, Eraring Power Station, dated 20 August 2021, prepared by AECOM and Response to Submissions Report – Ash Recycling Facilities, Eraring Power Station, dated 19 November 2021, prepared by AECOM, and additional information provided by the applicant to support the modification application and included in Appendix A of the Departments assessment report on Modification 2.

This RMP, relates to the rehabilitation of the domains within the boundary of the ERAD identified in Figure 1.1, as required by Modification 1 of the Project Approval. All other infrastructure outside the boundary of the ERAD, unless identified within the domains depicted in Figure 4.1, will, where necessary, be decommissioned and rehabilitated as part of the EPS closure.

This RMP has been developed and will continue to be refined in alignment with the Long-Term Ash Management Strategy for EPS as required by Condition 4.A1 of the Project Approval. As the rehabilitation strategy of the ERAD is further defined, the Long-Term Ash Management Strategy will continue to be aligned through the annual review of the strategy required by Condition 4A.2 of the Approval.



Eraring Ash Dam

Figure 1.1

ERAD boundary

- Major Waterbodies
- Waterways

Constraints

- Ash Dam Boundary



Coordinate system: GDA2020 MGA Zone 56

Scale ratio correct when printed at A3

1:12,000

Date: 26/07/2023

Author: AUJB505996 | QA: -

Data sources:

World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS
Light Gray Canvas Base: Esri, HERE, Garmin, FAO, NOAA, USGS
Nearmap WMS Server: NearMap

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Origin's vision for the ERAD following cessation of ash deposition is to achieve a landform that is safe, stable, mitigates environmental harm and addresses community expectations, meets regulatory requirements, and promotes potential land re-purposing and/or re-use. The potential option for re-purposing or re-use of the ERAD area following completion of ash deposition will align with the closure vision for the greater Eraring site: *"Origin will deliver a repurposed Eraring site, inspiring and accelerating the energy transition to maximise value and opportunity. We will create sustainable, innovative and just outcomes, leaving a positive legacy for the region."*

In support of the vision for the ERAD, the rehabilitation principles guide the basis of the rehabilitation plan and the establishment of the rehabilitation objectives and completion criteria. The principles relevant to this rehabilitation management plan and the objectives and completion criteria are as follows:

- Principle 1: To make the ERAD facility physically safe for humans and wildlife.
- Principle 2 To create a physically stable landform that minimises the safety threat or risk to personnel or the environment due to excessive movement of the landform while also limiting long-term erosion potential and environmental degradation.
- Principle 3: To ensure that impacts on the environment are minimised as far as is reasonably practicable.
- Principle 4: To ensure that community expectations are understood and considered.
- Principle 5: To ensure that regulatory requirements are understood and complied with.
- Principle 6: To transition from operations to the future land use considering opportunities for providing socio-economic benefits to the local and regional economy. Where practicable the net socioeconomic impact on the affected region should be beneficial.
- Principle 7: Closure activities are implemented with the most efficient use of required resources.
- Principle 8: Closure risks are understood and controlled to an acceptable level.

This RMP for the ERAD focuses on placing a cover system over the ash following completion of ash deposition and transitioning the area to a safe and stable landform that provides an opportunity for potential re-purposing or re-use of the land. The potential for re-purposing or re-use of the ERAD land will support Origin's future land use identified during the closure vision and project for the greater Eraring site.

Cover systems are installed to provide an interface between the deposited ash and the environment. Covers can range from a single layer of earthen material to several layers of different material types, including but not limited to native soils, clays, and other earthen material; non-reactive waste materials; and geosynthetic materials. Cover systems can perform a variety of functions depending on the type of waste being contained, ash in this case. Functions range from the isolation of the ash, dust lift-off control, controlling the infiltration and capillary rise of water through the ash, providing a trafficable surface over the ash, and providing a growth medium for establishing vegetation at the surface.

Origin will continue to monitor market conditions and trends for ash re-use that will inform any future direction for the rehabilitation/re-use of the ERAD. Investigations into other opportunities for ash reuse and recycling are ongoing and may include post-EPS closure extraction from the ERAD.

Regulatory Requirements

The ERAD currently operates under the following approvals and licences issued under the *Environmental Planning and Assessment Act 1979* and *Protection of the Environment Operations Act 1997* (POEO Act):

- Project Approval (07_0084) as modified in June 2022, and issued by the NSW DPE.
- Environmental Protection Licence (EPL) No. 1429 issued by the Environment Protection Authority (EPA), licence version date 23 October 2023.

Condition 4.9 of the Project Approval (07_0084) requires the preparation and implementation of an RMP for all land disturbed by the project to the satisfaction of the Planning Secretary. As the ERAD transitions to closure and the

knowledge base expands through the identified further works in Section 7, the RMP will be updated to further define and refine the performance indicators, completion criteria, implementation measures, methodologies, and monitoring requirements.

Modification 1 to Project Approval 07_0084 was approved in December 2019 requiring the RMP to originally be submitted to the Planning Secretary for approval within three years of this approval. On 15 September 2022, an alternative timeframe was agreed by the Planning Secretary and approval was received from the DPE confirming extension for the submission of the RMP to 23 December 2023.

The requirements of Condition 4.9 are provided in Table 1.1 below, along with a reference to the section of the RMP where the requirements have been addressed.

Table 1.1 Requirements of Condition 4.9 of Project Approval 07_0084 for the RMP development

Condition Requirement	RMP Section
<i>4.9 The Applicant must prepare a Rehabilitation Management Plan for all land disturbed by the project to the satisfaction of the Planning Secretary. This plan must:</i>	This plan
<i>a) Be prepared by a suitably qualified and experienced person/s;</i>	Appendix C
<i>b) Be prepared in consultation with the Department and Council;</i>	Appendix A
<i>c) Be submitted to the planning Secretary for approval within 3 years of approval of Modification 1 or other timeframe agreed by the Planning Secretary;</i>	23 December 2023 (extension approved on 15 September 2022)
<i>d) Be consistent with the Long-term Ash Management Strategy required under section 4A of this approval</i>	Section 1 Introduction
<i>e) Include detailed performance indicators and completion criteria for each rehabilitation domain, and triggers for remedial actions;</i>	Table 4.1 and Table 6.2.
<i>f) Describe the measures to be implemented on the site to achieve the criteria in paragraph e);</i>	Table 5.1
<i>g) Include a program to monitor, independently audit and report on progress against the criteria in paragraph e) and the effectiveness of the measures in paragraph f); and</i>	Table 6.1 and Section 6
<i>h) Describe any further studies, work, research or consultation that will be undertaken to expand the site-specific rehabilitation knowledge base, reduce uncertainty and improve rehabilitation outcomes.</i>	Refer to Section 7
<i>The Applicant must implement the approved Rehabilitation Management Plan.</i>	Refer to Section 5

Where other regulatory conditions have been identified which relate to the rehabilitation of the ERAD (for example, surface and groundwater limits and monitoring locations), these have been considered in the completion criteria in Section 4 until such time as criteria specific to the rehabilitated landform are established. Other regulatory requirements that may be relevant to be considered in the rehabilitation of the ERAD are identified in Table 1.2.

Table 1.2 Other regulatory requirements relevant to the rehabilitation of the ERAD

Legislation/Guideline	Relevance to ERAD
<i>Biodiversity Conservation Act 2016</i>	Any vegetation clearing required as part of rehabilitation activities must be in accordance with this Act and associated approvals.
<i>Biosecurity Act 2015</i>	Maintenance of rehabilitated lands will require control of all biosecurity risks including pest animals, plant diseases and priority weeds.

Legislation/Guideline	Relevance to ERAD
<i>Coastal Management Act 2016</i>	The environment downstream of the ERAD includes a coastal wetland protected under this Act. Rehabilitation of the ERAD will need to consider impacts on the receiving environment, including the coastal wetland and the requirements of this Act
<i>Dams Safety Act 2015</i>	The ERAD is classified as a Declared Dam under this Act.
<i>Dams Safety Regulation 2019</i>	Subordinate legislation to the Dams Safety Act 2015, which sets out the operational details for the Dams Safety Act 2015, and safety standards that Declared Dam owners must comply with.
<i>Environmental Planning and Assessment Act 1979</i>	The ERAD currently operates under Project Approval 07_0084 (as modified) issued under the <i>Environmental Planning and Assessment Act 1979</i> .
<i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	Any vegetation clearing required as part of rehabilitation activities must be in accordance with this Act.
<i>Eraring Power Station Act 1981 (EPS Act)</i>	The ERAD was originally developed under the <i>Eraring Power Station Act 1981</i> . The Act enabled the entering into agreements, arrangements and understandings relating to the Eraring Power Station and to exercise and perform certain functions in relation to that power station, and for associated purposes.
<i>Fisheries Management Act 1994</i>	Seagrasses, which are protected in NSW under this Act in their quality of key fish habitat, are known to occur in Lake Macquarie and Myuna Bay. Any stormwater released from the ERAD following rehabilitation will need to consider impacts on the receiving environment, including local seagrass populations.
<i>Heritage Act 1977</i>	Any clearing or additional disturbance required as part of rehabilitation activities must be in accordance with this Act.
Lake Macquarie City Council Development Guidelines	Lake Macquarie City Council (LMCC) have several development guidelines available. Origin will consider relevant LMCC guidelines in the planning, development and implementation of rehabilitation of the ERAD as appropriate.
<i>Local Land Services Act 2013</i>	This Act is not applicable, provided vegetation clearing meets the definition of allowable activities. The Native Vegetation Regulatory Map (NVRM) identifies land that is regulated under the land management framework of this Act. According to the NVRM, the EPS is categorised as 'Land Excluded from this Act'.
<i>Pesticides Act 1999</i>	For pest control, only registered, approved pesticides are to be used in accordance with manufacturer's instructions. Records of pesticide use are to be maintained.
<i>Protection of the Environment Operations Act 1997</i>	The ERAD currently operates under Environment Protection Licence 1429 issued under the <i>Protection of the Environment Operations Act 1997</i> Rehabilitation activities and measures, as well as any expected discharges from the ERAD following rehabilitation must consider this Act. Where relevant to the ERAD rehabilitation, the EPL conditions are applied as interim criteria. Resource Recovery Exemptions (RREs) and Resource Recovery Orders (RROs), which have been in effect since 2014, are regulated by the NSW EPA. The RREs and RROs are identified as a strategy for the promotion of beneficial and safe reuse, recycling, and recovery of waste, and are relevant to ash as well as the importation of fill for capping or growth medium.

Legislation/Guideline	Relevance to ERAD
<i>Rural Fires Act 1997</i>	Rehabilitation activities and measures including post-rehabilitation maintenance activities must consider fire risk and adequate management practices.

2 Risk assessment

To identify risks associated with the successful achievement of the ERAD rehabilitation, as well as to identify preventative or mitigatory controls required to manage these identified risks, a dedicated rehabilitation-related risk assessment will be undertaken. A site-specific rehabilitation risk assessment will be undertaken that includes:

- identification of events that could influence achievement of the completion criteria and performance indicators;
- a risk analysis to quantify the significance of the identified risks in terms of the likelihood of occurrence and associated impact;
- risk evaluation of the level of acceptability of occurrence and associated impact of the identified risk; and
- appropriate mitigations or controls that should be implemented to prevent or reduce the impact of the identified risk.

The outcomes of the rehabilitation risk assessment will inform the further development and refinement of the completion criteria, performance indicators, implementation measures, and monitoring program of this RMP. The rehabilitation risk assessment will be reviewed annually.

Risks that have been identified through the rehabilitation planning process to date that, without appropriate mitigation or controls, have the potential to impact upon the successful rehabilitation of the ERAD are:

- 1 The level of regulatory guidance relating to ash dam rehabilitation and/or changes in regulatory guidance as rehabilitation planning and implementation progresses.
- 2 The quality and volume of seepage and surface water run-off from the rehabilitated landform.
- 3 The availability and suitability of rehabilitation cover material to achieve a rehabilitated landform.
- 4 Natural events including but not limited to seismic activity, bushfires and extreme weather.
- 5 The presence and introduction of pests and weeds.

3 Stakeholder consultation

In line with the principle to ensure that regulatory requirements are understood and complied with, consultation with the DPE and LMCC was undertaken in the development of this RMP. Records of the consultation are provided in Appendix A. To ensure that community expectations are understood and considered, the closure of the ERAD will be conducted in alignment with a dedicated ERAD Stakeholder Engagement Plan that will be reviewed annually.

Consultation with relevant stakeholders on the future land use, the performance indicators, and completion criteria will be conducted as the rehabilitation planning process progresses and the further works identified in Section 7 are completed. Further refinement and development of rehabilitation performance indicators and completion criteria will consider inputs from stakeholders throughout consultation. Details of how stakeholder inputs have been considered may be included in future revisions of the RMP.

Relevant stakeholders identified with an interest in the future land use, the performance indicators, and completion criteria for the ERAD include the following:

- Local Government.
- State Government including regulatory bodies and support services.
- Community groups and local landholders.
- Traditional owners and indigenous organisations.
- Environmental groups.
- Economic development and transition groups.

On-going consultation will occur with relevant stakeholders in accordance with the ERAD Stakeholder Engagement Plan to discuss rehabilitation objectives and/or rehabilitation completion criteria. Origin will utilise existing forums to conduct consultation as well as targeted consultation as required.

4 Rehabilitation objectives, completion criteria, and performance indicators

Rehabilitation activities for the ERAD are guided by Origin's vision for the ERAD and may also align with the closure vision for the greater Eraring site.

Rehabilitation domains are defined by particular areas or infrastructure within the ERAD in which a stated future land use and associated rehabilitation objectives will apply. The future land use, rehabilitation objectives, and completion criteria may be specific to each specified domain.

The nominated rehabilitation domains for the ERAD include the:

- 1 Ash deposition domain – this domain includes all the current and previous ash deposition areas and includes current operational drainage, bunds, and access roads within the domain.
- 1 Southern embankment domain – this domain includes the southern embankment and stabilisation works.
- 2 Water management domain – this domain includes water management infrastructure and areas including the decant pond, the return water pond, spillways, Crooked Creek weir, seepage collection, and the associated pipelines and infrastructure.

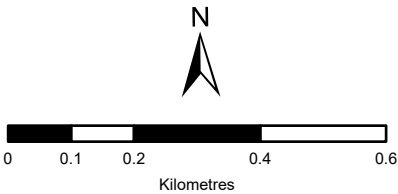
The indicative boundaries of the nominated ERAD domains are depicted in Figure 4.1.



Eraring Ash Dam

Figure 4.1
Indicative boundaries of
the nominated ERAD domains

- Major Waterbodies
- Waterways
- Constraints**
- Ash Dam domain
- Water management domain
- Southern embankment domain



Coordinate system: GDA2020 MGA Zone 56

Scale ratio correct when printed at A3

1:12,000 Date: 13/10/2023

Author: AUJB505996 | QA: -

Data sources:

World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS
Light Gray Canvas Base: Esri, HERE, Garmin, FAO, NOAA, USGS
Nearmap WMS Server: NearMap

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Rehabilitation objectives, guided by the closure principles, are site specific and typically measurable statements that indicate what is to be achieved through the implementation of the activities associated with the rehabilitation of the ERAD to meet the future land use. As such, rehabilitation objectives provide a defined end point, at which point in time rehabilitation can be deemed successful. Table 4.1 includes the rehabilitation objectives that are aligned with Origin's ERAD rehabilitation principles. The development of the rehabilitation objectives has considered the identified risks in Section 2 and will be further refined following the completion of the rehabilitation risk assessment, so that all identified risks and opportunities are considered. Additional objectives may also be required following the determination of the future land use.

Completion criteria and rehabilitation performance indicators provide site-specific, measurable, achievable end points for rehabilitation relevant to meeting the objectives in time-bound steps. Successful achievement of the completion criteria and meeting the performance indicators denote the success of the rehabilitation objectives. There are several additional studies and further works that will be undertaken to inform the completion criteria and performance indicators. Although these further works are not specific criteria or indicators for meeting an objective, they have been included in the objectives and completion criteria/performance indicators in Table 4.1 to represent that these steps are critical for the development of refined objectives and criteria. As rehabilitation planning progresses, the timing of the completion criteria will be identified and defined. The specifics for the performance indicators will be further refined as studies and designs progress. Completion criteria and performance indicators also consider requirements of relevant legislation and guidelines identified in Table 1.2. Specific implementation measures and monitoring may be linked to the completion criteria and performance indicators. Where relevant, these are presented in Table 5.1 and Table 6.1.

.

Table 4.1 Rehabilitation objectives, completion criteria and performance indicators for the ERAD

Principle	Rehabilitation objective No.	Rehabilitation objectives	Completion criteria and performance indicators ¹
Principle 1: Physically safe for humans and wildlife.	1	Removal of all connected services (power, water, communications) and ERAD infrastructure (e.g., roads, tracks, pumps, ash pipelines, concrete structures etc) that are not required for the future land use (excludes third party services).	— All services not required for the future land use are disconnected. — All infrastructure not required for the future land use is decommissioned. — All ash slurry and return water pipes flushed and removed. — Ash removed from surface of pipeline corridor and disposed of to the ERAD. — All infrastructure not required for the future land use is removed. — Areas where infrastructure has been removed are ripped and reshaped. — Area where infrastructure has been removed are seeded with target vegetation (species and seed rates to be determined).
	2	Apply fire management regimes appropriate to the future land use and in accordance with the <i>Rural Fires Act 1997</i> .	— Fire management activities on site are undertaken (and documented) as advised by NSW Rural Fire Service (RFS).
	3	Concentrations of contaminants within the final cover system are below the specified contamination level applicable to the land use scenario; or If a specified contamination level is exceeded, further appropriate investigation and evaluation is carried out to determine the risk of any specified contamination level exceedance.	— Concentrations of contaminants within the final cover system are below the specified contamination level applicable to the land use scenario; or, — If specified contamination level is exceeded, a site-specific assessment is undertaken to determine the risk, extent and whether mitigation measures are required.

¹ Completion criteria and performance indicators also consider requirements of relevant legislation and guidelines identified in Table 1.2

Principle	Rehabilitation objective No.	Rehabilitation objectives	Completion criteria and performance indicators ¹
	4	The Declared Dam consequence category of the ERAD following rehabilitation achieves the lowest practicable level.	— Work is undertaken to reduce the downstream consequences of a Dam Failure as far as is reasonably practicable, whilst addressing the requirements of the <i>Dams Safety Regulation 2019</i>. — The consequence category of the ERAD is assessed in accordance with the requirements of the <i>Dams Safety Regulation 2019</i>, including Dams Safety NSW's 'Declared Dams Consequence Category Assessment and Determination Methodology for <i>Dams Safety Act 2015</i>'.
	5	Final landform (prior to cover system installation) constructed in accordance with the final landform design (design to be determined)	— Final landform (prior to cover system installation) designed by an appropriately qualified person². — Final landform (prior to cover system installation) constructed in accordance with an approved Quality Control Plan. — Final constructed landform (prior to cover system installation) certified by an appropriately qualified person² that it is consistent with the design.
Principle 2: Physically stable landform	6	Final covered landform accounts for settlement and/or natural material loss via erosion.	— Monitoring of the final covered landform indicates settlement and erosion is commensurate with similar landforms and land uses and/or is aligned to modelling conducted or as expected.
	7	Determine target vegetation for the final covered landform that is compatible with the future land use (land use to be determined).	— Target vegetation (species and seed rates) identified. — Target vegetative groundcover and extent determined.

² Unless otherwise specified in relevant legislation, an appropriately qualified person/s means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and/or can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Principle	Rehabilitation objective No.	Rehabilitation objectives	Completion criteria and performance indicators ¹
Principle 3: Impacts on the environment are minimised as far as is reasonably practicable.	8	Dust emissions from the ERAD are minimised as far as is reasonably practicable.	— Cover system is progressively installed as areas are available for rehabilitation. — Dust controls are in place and managed in accordance with the dust management procedure. — Trucks entering or leaving the ERAD that are carrying loads of potentially dust generating material are covered except during loading and unloading.
Principle 3: Impacts on the environment are minimised as far as is reasonably practicable.	9	Cover system constructed in accordance with final cover system design (design to be determined) to support the future land use and minimise infiltration of rainfall through the ash.	— Cover system designed by an appropriately qualified person². — Cover system installed/constructed with an approved Quality Control Plan. — Installed/constructed cover system certified by an appropriately qualified person² that it is consistent with the design. — Settlement monitoring plan developed by an appropriately qualified person².

² Unless otherwise specified in relevant legislation, an appropriately qualified person/s means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and/or can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Principle	Rehabilitation objective No.	Rehabilitation objectives	Completion criteria and performance indicators ¹
	10	Surface water is not retained within the ERAD, is appropriately conveyed from the ERAD surface, and minimises harm to the receiving environment as far as is reasonably practicable.	— Surface water management infrastructure to be designed by an appropriately qualified person². — Surface water management infrastructure to be constructed in accordance with the design. — Surface water management infrastructure certified by an appropriately qualified person² that is consistent with the design. — No unacceptable active areas of rill, gully, or tunnel erosion (acceptable erosion rates to be determined). — Drainage follows appropriate drainage paths. — Settlement and/or material loss is within predicted limits (to be determined) and will not compromise final covered landform drainage via differential settlement. — Surface water monitored in accordance with Environment Protection Licence (EPL) 1429 and EPS Water Management Plan. — Surface water quality discharged from the rehabilitated landform meets specifications in the EPL 1429 and minimises harm to the receiving environment, including the adjacent coastal wetland, as far as is reasonably practicable.
	11	Groundwater quality is consistent with modelled/predicted quality and minimises harm to the receiving environment as far as is reasonably practicable.	— Infiltration through the rehabilitated landform meets groundwater quality specifications in the EPL 1429, when measured at licensed monitoring points. — Groundwater quality minimises harm to the receiving environment, including the adjacent coastal wetland, as far as is reasonably practicable.

² Unless otherwise specified in relevant legislation, an appropriately qualified person/s means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and/or can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Principle	Rehabilitation objective No.	Rehabilitation objectives	Completion criteria and performance indicators ¹
Principle 3: Impacts on the environment are minimised as far as is reasonably practicable.	12	Priority weeds and pest species controlled in accordance with legislative requirements.	— Weed and pest species are managed under a weed and pest control program, developed in accordance with <i>Biodiversity Act 2015</i> and relevant guidelines. — Documented evidence (e.g. work sheets, progress reports, etc.) of weed control activities specifically targeting priority species. — Weed control activities mapped and spatial extent monitored on site (pre and post treatment). — The final covered landform is not a haven for vertebrate pest species.
Principle 6: Transition from operations to the future land use	13	Determine future land use for the ERAD.	— An options analysis has been undertaken to assess viable future land uses. — The preferred future land use has been selected.
	14	Vegetation has established on the final covered landform that is compatible with the future land use (land use to be determined).	— Surfaces seeded with target vegetation (species and seeding rates to be determined). — Surfaces achieve target vegetative groundcover (target groundcover to be determined).
Principle 7: Efficient use of required resources.	15	Only wastes approved under EPL 1429 to be used for the final landform construction and cover system.	— Documented evidence (e.g. records, design/as built drawings) of waste types received at the site for use in final landform and cover system construction in line with the requirements of the POEO Act.

5 Implementation measures

Implementation measures have been developed to support the achievement of the completion criteria and performance indicators identified in Section 4. The implementation measures also consider requirements of relevant legislation and guidelines identified in Table 1.2. The implementation measures are presented in Table 5.1. The rehabilitation objectives and the associated implementation measures have been reordered to reflect a logical sequence and hence the corresponding rehabilitation objective numbering is not in sequential order.

Table 5.1 Measures for the implementation of the ERAD rehabilitation objectives

Rehabilitation objective No.	Rehabilitation objectives	Implementation Measure ¹	Timing
13	Determine future land use for the ERAD.	Undertake an options assessment on the future land use options that align with the closure vision for the ERAD and greater Eraring site for ongoing industrial use, including energy related infrastructure.	Within 12 months of the approval of this RMP.
		The future land use will be selected following the options assessment.	Minimum 12 months prior to cessation of Eraring operations.
1	Removal of all connected services (power, water, communications) and all ERAD infrastructure (e.g., roads, tracks, pumps, ash pipelines, concrete structures etc) that are not required for the future land use (excludes third party services).	All services and infrastructure will be identified as either required or not required.	Following final ash deposition.
		All services and infrastructure identified as not required are disconnected, decommissioned, demolished, and removed. Disconnection, decommissioning, demolition, and removal will be undertaken by appropriately qualified persons ² in accordance with any relevant Australian standards, guidelines and/or codes of practice.	Disconnection, decommissioning, demolition, and removal to occur following final ash deposition.

¹ Implementation measures also consider requirements of relevant legislation and guidelines identified in Table 1.2.

² Unless otherwise specified in relevant legislation, an appropriately qualified person/s means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and/or can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Rehabilitation objective No.	Rehabilitation objectives	Implementation Measure ¹	Timing
		The areas where services and infrastructure have been removed will be (where necessary) reshaped to blend into the final landform, compacted areas ripped, topsoiled, and seeded with target vegetation species at specified seed rates.	Reshaping, ripping, topsoiling, and seeding following removal of services and infrastructure.
2	Apply fire management regimes appropriate to the future land use and in accordance with the <i>Rural Fires Act 1997</i> .	Fire management activities will be commensurate with the future land use, the vegetation species selected, and the groundcover considerations.	Throughout the rehabilitation process.
4	The Declared Dam consequence category of the ERAD following rehabilitation achieves the lowest practicable level.	Further consultation with Dams Safety NSW will be carried out in relation to the implementation measures relating to the Declared Dam consequence category.	Throughout the rehabilitation process. Ongoing assessments conducted following the final covered landform construction.
7	Determine target vegetation for the final covered landform that is compatible with the future land use.	Target vegetation (species and seed rates) identified, and groundcover achievement will be determined based on the future land use determination.	Following the determination of the future land use.
15	Only wastes approved under EPL 1429 to be used for the final landform and cover system construction.	The final landform and cover system designs will incorporate material characteristics to identify suitable materials for use. Where approved, waste materials can be utilised for the final landform and/or cover system, these will be identified, and sources determined as well as feasibility of volumes available. Further consultation with NSW EPA will be conducted.	During the design and construction phase of the ERAD final landform and cover system.
5	Final landform (prior to cover system installation) constructed in accordance with final landform design.	Conceptual landform designs will be developed. A preferred conceptual landform design/s will then be selected to progress for further investigation.	Minimum 12 months prior to cessation of Eraring operations. Minimum 12 months prior to cessation of Eraring operations.

Rehabilitation objective No.	Rehabilitation objectives	Implementation Measure ¹	Timing
		An appropriately qualified person/s ² will design the final landform (prior to cover system installation) based on the preferred concept.	Minimum 12 months prior to cessation of Eraring operations.
		An appropriately qualified person/s ² will provide certification for the constructed final landform (prior to cover system installation) based on the design.	Following construction of final landform prior to installation of cover system.
8	Dust emissions from the ERAD are minimised.	The progressive cover system installation will follow on from the cover system design and consider the ash deposition strategy for the final landform. Interim measures (such as temporary cover or installation of sprays) may be implemented to manage dust emissions where required.	Following the completion of the cover system design and as areas become available for rehabilitation.
9	Cover system constructed in accordance with final cover system design (design to be determined)	Material requirements, characterisation, availability, and balance will be investigated for determining the cover system design.	Following completion of the design of the final landform and during the design of the cover system.
		An appropriately qualified person/s ² will design the cover system for the final landform.	Following completion of the design of the final (uncovered) landform.
		Install the final cover system in accordance with the design.	Following the design of the cover system.
		An appropriately qualified person/s ² will provide certification for the installed final cover system.	Following the completion of the installation of the cover system.
6	Final covered landform accounts for settlement and/or natural material loss via erosion.	Settlement of ash during and following cessation of deposition and materials used for the cover system can	During the design phase for the final landform and cover system.

² Unless otherwise specified in relevant legislation, an appropriately qualified person/s means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and/or can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Rehabilitation objective No.	Rehabilitation objectives	Implementation Measure ¹	Timing
		impact the final landform. The settlement characteristics of the deposited ash and cover materials will be determined. The final landform design will take into consideration settlement and erosion rates for forming the final covered landform.	Survey conducted following final covered landform construction as baseline to monitor settlement. Develop an instrumentation and monitoring plan for monitoring settlement, erosion, and the phreatic surfaces.
3	Concentrations of contaminants within the final cover system are below the specific contamination level applicable to the land use scenario; or If a specified contaminant is exceeded, further appropriate investigation and evaluation is carried out to determine the risk of any contamination level exceedance.	Cover materials will be determined based on material requirements, characterisation, availability, and balance.	During the cover system design phase.
		Consultation with NSW EPA on the types of potential materials will be carried out and included in EPL 1429.	Prior to material selection.
		A material import regime will be implemented to verify materials being received if required; or, A verification sampling program of the installed final cover system is developed and implemented.	During material placement or following the cover system installation.
10	Surface water is not retained within the ERAD, is appropriately conveyed from the ERAD surface, and does not cause material harm to the receiving environment.	Following the landform and cover system designs, modelling will be undertaken to establish acceptable erosions rates based on the landform, cover materials, and climatic conditions.	During and following the landform and cover system designs.
		Drainage specifications will be included in the landform and cover system designs.	
		A surface water management strategy and monitoring program will be established and implemented. Quality criteria may be reviewed to reflect the future land use and the identified risks from the final landform design and additional studies carried out throughout the rehabilitation planning stage.	

Rehabilitation objective No.	Rehabilitation objectives	Implementation Measure ¹	Timing
		Surface water management infrastructure to be designed by an appropriately qualified person ² .	During the landform and cover system designs.
		Surface water management infrastructure to be constructed in accordance with the design.	During the landform and cover system construction.
		Surface water management infrastructure certified by an appropriately qualified person ² that is consistent with the design.	Following the landform and cover system construction.
11	Groundwater quality is consistent with modelled/predicted quality and minimises harm to the receiving environment as far as is reasonably practicable.	A groundwater management strategy and monitoring program will be established and implemented. Quality criteria may be reviewed to reflect the future land use and the identified risks from the final covered landform design and additional studies carried out throughout the rehabilitation planning stage.	During and following the landform and cover system designs.
14	Vegetation has established on the final covered landform that is compatible with the future land use (land use to be determined).	Following determination of the target vegetation species and seed rates commensurate with the future land use, seeding of the final covered landform will be carried out. Based on the future land use and the target vegetation species, the target vegetative groundcover will be determined and monitored.	Following the installation of the cover system.
12	Priority weeds and pest species are controlled in accordance with legislative requirements.	A weed and pest control program for the final covered landform that is commensurate with the future land use will be developed and implemented.	Following the installation of the cover system.

² Unless otherwise specified in relevant legislation, an appropriately qualified person/s means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and/or can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

6 Monitoring, reporting, and review

6.1 Monitoring

Success of the rehabilitation objectives, achieving the completion criteria, and meeting the performance indicators identified in Section 4 will require monitoring and/or inspection to track their progress. In addition, implementation measures may also require monitoring and inspections to be carried out to implement sampling and monitoring programs. Monitoring and inspection requirements may also be identified through the risk assessment process to determine the effectiveness of mitigation measures or controls.

The monitoring and inspections for the ERAD provided in Table 6.1 will be refined and expanded following the risk assessment being carried out and as the knowledge base expands through the completion of the further works identified in Section 7.

Monitoring and inspections may trigger additional investigations, or the initiation of rehabilitation maintenance works within the ERAD in response to observed issues or trends. A maintenance plan will be developed that will identify the triggers for when maintenance activities will need to be initiated and the actions that will be carried out.

Table 6.1 Monitoring and inspection program for the rehabilitated ERAD

Aspect	Rehabilitation objective No.	Completion criteria and performance indicators ¹	Method	Frequency
Fire monitoring	2	Fire management activities on site are undertaken (and documented) as advised by NSW RFS.	Visual assessment of condition of fire trails.	Annually during spring.
Soil monitoring	3	Concentrations of contaminants within the final cover system are below the specific contamination level applicable to the land use scenario; or, If a specified contaminant is exceeded, a site-specific assessment is undertaken to determine the risk and whether mitigation measures are required.	To be determined following the design of the final cover system, materials balance, and materials characterisation.	To be determined in the monitoring plan (as identified in Section 7).
Landform stability monitoring	5	Final constructed landform (prior to cover system installation) certified by an appropriately qualified person ² that it is consistent with the design.	Geotechnical assessment. Methods to be determined by an appropriately qualified person ² and may include existing operational monitoring instruments and others to be installed during transition to closure. Instrumentation may include items such as vibrating wire piezometers and settlement / deformation instruments.	Frequency to be determined by an appropriately qualified person ² .
Dust monitoring	8	Cover system is progressively installed as areas are available for rehabilitation. Dust controls in place and managed in accordance with dust management procedure. Trucks entering or leaving the ERAD that are carrying loads of potentially dust generating material are covered except during loading and unloading.	Visual assessment of dust generation. Review of dust management procedure for closure to ensure activities are being undertaken.	During rehabilitation activities involving earthworks.

¹ Completion criteria and performance indicators also consider requirements of relevant legislation and guidelines identified in Table 1.2.

² Unless otherwise specified in relevant legislation, an appropriately qualified person/s means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and/or can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Aspect	Rehabilitation objective No.	Completion criteria and performance indicators ¹	Method	Frequency
Vegetation monitoring	14	Surfaces seeded with target vegetation (species and seed rates to be determined). Surface achieve target vegetative groundcover (target groundcover to be determined).	Visual assessment and other monitoring (e.g. transect based) for species composition and groundcover.	Year 1, 2, and 5 during spring months post-completion of rehabilitation works.
Erosion and sediment monitoring	10	No unacceptable active areas of rill, gully, or tunnel erosion (acceptable erosion rates to be determined).	Visual assessment and other monitoring (e.g. transect, aerial imagery assessments) of: — Erosion extents. — Width and depth of rill and gully erosion (if identified). — Condition of banks, berms or bunds. — Sediment deposition. — Status of erosion (active or passive).	Year 1, 2, and 5 during spring months following completion of rehabilitation works.
	10	Drainage follows appropriate drainage paths.	Visual assessment of drainage and water ponding.	Annually and following rainfall events exceeding the nominated design criterion. Criterion to be identified in the monitoring plan (as identified in Section 7).
	10	Settlement and/or material loss is within predicted limits (to be determined) and will not compromise final landform drainage via differential settlement.	Monitoring requirements to be determined once the magnitude of the final settlement of the ash following deposition ceasing is understood.	Frequency to be determined once the magnitude of the final settlement of the ash following deposition is understood.

Aspect	Rehabilitation objective No.	Completion criteria and performance indicators ¹	Method	Frequency
Surface water monitoring	10	Surface water quality discharged from the rehabilitated landform meets specifications when measured at the licensed discharge points in accordance with EPL 1429.	Site sampling and laboratory analysis as per requirements identified in EPL 1429.	During releases of stormwater run-off from the ERAD in accordance with EPL 1429. Monitoring may cease following the demonstration that concentrations in stormwater run-off being released are not causing environmental harm.
Groundwater monitoring	11	Infiltration through the rehabilitated landform meets groundwater quality specifications in EPL 1429.	Site sampling and laboratory analysis as per requirements identified in EPL 1429.	To be determined in the monitoring plan (as identified in Section 7) – reduction in frequency may be considered when groundwater results stabilise or if determined by an appropriately qualified person ² that concentrations in groundwater are not likely to result in environmental harm.
Weed and pest monitoring	12	Weed and pest species are managed in accordance with a weed and pest control program. The final landform is not a haven for vertebrate pest species.	Visual assessment of weed and pest species present. Monitoring (e.g. transect based) for species composition (as per vegetation monitoring).	Annually during spring.

² Unless otherwise specified in relevant legislation, an appropriately qualified person/s means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and/or can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

A trigger action response plan (TARP) is presented in Table 6.2 that includes triggers and associated actions and responses if monitoring indicates a trigger is exceeded. The TARP will be expanded and further refined as the detailed designs are produced, risk assessment completed, and the further works are progressed.

Table 6.2 Trigger action response plan for the rehabilitation of the ERAD

Aspect	Trigger / Response	Condition		
		Green	Amber	Red
Landform stability	Trigger	Geotechnical inspection / monitoring parameters within tolerable ranges (to be determined by an appropriately qualified person ¹).	Geotechnical inspection / monitoring parameters approaching the bounds of tolerable ranges (to be determined by an appropriately qualified person ¹).	Geotechnical inspection / monitoring parameters outside of tolerable ranges (to be determined by an appropriately qualified person ¹).
	Response	No response required – continue monitoring as per plan.	Initiate assessment by appropriately qualified person ¹ . Undertake corrective actions as advised by the appropriately qualified person ¹ .	Undertake corrective actions as advised by the appropriately qualified person ¹ .
Erosion/ settlement	Trigger	Erosion inspection / monitoring parameters within tolerable ranges. To be determined by an appropriately qualified person ¹ .	Minor: — Settlement, rilling and/or erosion identified. — Visible ponding of water on the surface of rehabilitated areas — Bypassing on drainage. — Lack of vegetative cover.	Excessive: — Settlement, rilling and/or erosion identified. — Visible ponding of water on the surface of rehabilitated areas. — Bypassing on drainage. — Lack of vegetative cover.
	Response	No response required – continue monitoring as per plan.	— Undertake remedial earthworks and stabilisation activities as required and continue to monitor as per plan.	— Undertake remedial earthworks and stabilisation activities as required. — Monitoring (via instrumentation as appropriate) and review of water management and control structures.

¹ Unless otherwise specified in relevant legislation, an appropriately qualified person/s means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and/or can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Aspect	Trigger / Response	Condition		
		Green	Amber	Red
Cover system performance	Trigger	Cover system inspection parameters are within tolerable ranges. To be determined by an appropriately qualified person ¹ .	— Visible signs of minor compromised capping performance (e.g. minor cracking or subsidence, erosion, water ponding). — Minor areas with lack of vegetative growth	— Visible signs of major compromised capping performance (e.g. excessive cracking or subsidence, erosion, water ponding). — Large areas with lack of vegetative growth. — Concentrations of a specified contaminant in the cover material is exceeded.
	Response	No response required – continue monitoring as per plan.	— Undertake remedial earthworks as required and/or other corrective actions. — Continue monitoring as per plan.	— Undertake remedial earthworks as required and/or other corrective actions as advised by the appropriately qualified person¹. — Site specific assessment to determine risk and mitigation measure required.
Final site drainage	Trigger	Water drains from the rehabilitated area via drainage system.	Minor areas of drainage system being bypassed without impact on landform or cover system integrity.	— Rehabilitated area drainage system is being bypassed that could impact on landform or cover system integrity. — Visible ponding of water on the surface of rehabilitated areas.
	Response	No response required – continue monitoring as per plan.	Undertake remedial earthworks as required and continue monitoring as per plan.	— Review of water management and control structures. — Undertake remedial earthworks as required.
Groundwater quality	Trigger	Results from groundwater monitoring meet groundwater quality specifications in EPL 1429.	Results from groundwater monitoring trending towards the groundwater quality specifications in EPL 1429.	Results from groundwater monitoring exceed the groundwater quality specifications in EPL 1429.

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Aspect	Trigger / Response	Condition		
		Green	Amber	Red
	Response	No response required – continue monitoring as per plan.	— Review of groundwater quality data. — Visual inspection of covered landform.	— Review of groundwater quality data. — Assessment of cover system by an appropriately qualified person¹. — Undertake remedial works as required and/or other corrective actions as advised by the appropriately qualified person¹.
Surface water quality	Trigger	Surface water quality discharged from the rehabilitated landform well within specifications when measured at the licensed discharge points in accordance with EPL 1429.	Surface water quality monitoring results from the rehabilitated landform trending towards specifications when measured at the licensed discharge points in accordance with EPL 1429.	Surface water quality monitoring results from the rehabilitated landform do not meet specifications when measured at the licensed discharge points in accordance with EPL 1429.
	Response	No response required – continue monitoring as per plan.	— Review of water management and control structures. — Review any upstream monitoring data for similar trends.	— Review of water management and control structures. — Assessment of cover system by an appropriately qualified person¹. — Undertake remedial earthworks as required and/or other corrective actions as advised by the appropriately qualified person¹. — Assess potential impacts on receiving environment.
Pest species	Trigger	Pest and/or weed species do not impact rehabilitation vegetation criteria.	Pest and/or weed species identified in rehabilitated areas.	Pest and/or weed species impacting on rehabilitation vegetation criteria.

¹ Unless otherwise specified in relevant legislation, an appropriately qualified person/s means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and/or can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Aspect	Trigger / Response	Condition		
		Green	Amber	Red
	Response	No response required – continue monitoring as per plan.	Undertake appropriate pest and/or weed control measures.	— Review pest and weed management plan for effectiveness. — Undertake appropriate pest and/or weed control measures. — Implement any identified improvements to pest and weed management.
Dust	Trigger	No dust complaints, no excessive generation of dust.	— Dust complaint received. — Timing of surface disturbance works aligns with dry conditions.	— Multiple dust complaints received. — Visible dust generation excessive and likely to result in off-site impacts.
	Response	No response required – continue monitoring as per plan.	— Review dust control management measures. — Implement additional dust controls as required.	— Review dust control management measures for closure. — Suspend activities that are contributing to excessive dust and implement additional dust controls.

6.2 Reporting

From the approval date of the RMP, annual reporting to the DPE on progress against the completion criteria and performance indicators for meeting the rehabilitation objectives will be undertaken. The report will also include a summary of the effectiveness of the implementation measures and progress of the further works, studies and research undertaken as identified in Section 7.

6.3 Review, auditing, and implementation

6.3.1 *Review*

From the approval date of the RMP, this RMP will be reviewed every two years as a minimum. Any changes or updates to the RMP through the rehabilitation planning process or through the progression of the forward work plan may require the RMP to be updated more regularly. These out of routine reviews and updates of the RMP may be identified through reporting discussed in Section 6.2 and in consultation with the DPE. All updates to the RMP will be submitted to DPE (in consultation with the LMCC) for approval in accordance with Condition 4.9 of the Project Approval.

6.3.2 *Auditing*

From the approval date of the RMP, an independent audit will be undertaken annually by a third party on the progress against the forward work plan, achievement of the performance indicators and completion criteria. This RMP may be updated following the outcomes of these audits. Finding from the annual independent audit will be included with the annual report to DPE as discussed in Section 6.2.

6.3.3 *Implementation*

Origin will ensure appropriate resources and budget are available to allow successful implementation of this RMP.

7 Further works

Table 7.1 below provides a description of the further studies, work, research, and consultation plans that will be developed and undertaken to expand the ERAD existing knowledge base, reduce uncertainty and improve rehabilitation outcomes. The further works will refine the objectives, completion criteria, performance indicators, monitoring program and associated timings for the ERAD.

The completion of the identified further works will be reported via the annual report to DPE and inform updates to the RMP.

Table 7.1 Further works program for the rehabilitation of the ERAD

Further works aspect	Description	Indicative Timing
Rehabilitation risk assessment	Undertake a specific rehabilitation risk assessment to identify and quantify potential risks, as well as determine appropriate preventative or mitigatory controls.	Within 6 months following RMP approval and reviewed annually.
Stakeholder and community consultation plan	Develop an ERAD stakeholder engagement plan to identify key stakeholders, define consultation objectives, content and frequency.	Within 6 months following RMP approval.
Infrastructure	Develop a decommissioning strategy for remaining services and infrastructure that are not aligned with final land use.	12 months prior to EPS closure.
Future land use assessment	Undertake an options assessment on the future land use options that align with the closure vision for the greater Eraring site for ongoing industrial use, including energy related infrastructure.	Within 12 months following RMP approval and reviewed annually.
Final landform design	Develop a Life of Facility plan for the ERAD that addresses the deposition strategy to support the transition to the final landform.	Within 12 months of EPS closure.
	Understand the magnitude of final settlement of the ash following cessation of ash deposition.	Within 12 months of EPS closure.
	Develop a final landform design (prior to cover system installation) that supports the future land use and aligns with the ERAD closure vision.	Within 12 months of EPS closure.
Cover system design	Development of a cover system design for the final landform to ascertain the most suitable cover system that considers climate, material characteristics and availability, and potential environmental risks.	Within 12 months of EPS closure.
Revegetation	Determine target vegetation species and groundcover targets for the final covered landform that are compatible with the future land use and do not impact the surrounding vegetation.	Within 12 months of EPS closure.

Further works aspect	Description	Indicative Timing
Surface water drainage	Undertake an assessment of the hydrology in relation to the final covered landform design to determine the interaction of surface water run-off (levels and velocities) with the landform and appropriate drainage design for conveying run-off across the final covered landform and from the elevated areas following rehabilitation. Investigate options for drainage and diversions to minimise operational catchments and the separation of uncontaminated and contaminated run-off from the ERAD catchments.	Within 12 months of EPS closure.
Acceptable erosion rates	Undertake an erosion assessment of the final landform and cover system design to inform the acceptable erosion rates for the final landform and cover system.	Within 12 months of EPS closure.
Materials balance.	Undertake a material balance to ascertain the required quantities, current and potential availability, and location of available and potential cover material and topsoil/growth media material.	Within 12 months of EPS closure.
Materials characterisation	Undertake an assessment of material for characterisations to ascertain the suitability of available and potential materials for suitability as rehabilitaiton material and growth media material.	Within 12 months of EPS closure.
	Investigate utilising ash as a growth media and approved waste material in final land forming and cover materials to minimise the use of virgin materials. Trials may also be undertaken utilising these materials.	Within 12 months of EPS closure.
Groundwater infiltration	Assess the likely infiltration rates and quality from the rehabilitated landform and potential impacts on the receiving environment including the adjacent coastal wetland. Amend EPL 1429 in consultation with the EPA to include appropriate monitoring points and trigger limits for the RMP groundwater monitoring.	Within 12 months of EPS closure.
Stormwater run-off.	Undertake an assessment of run-off water quality against relevant regulatory and other standards and guidelines (e.g. Australian and New Zealand guidelines for fresh and marine water quality, 2019). Investigate run-off water quality monitoring limits to define release criteria and amend EPL 1429 to include new licenced discharge points (if required).	Within 12 months of EPS closure.
Weed monitoring and management plan	Development of a weed monitoring and management plan.	Within 12 months of EPS closure.
Maintenance and montoring plan	Develop a monitoring and maintenance plan for the rehabilitated landform including progressive rehabilitation areas, landform stability, drainage, and vegetation monitoring.	Within 12 months of EPS closure.
Contaminated land	Identify and quantify contaminated areas, including the location, type, and volume to assess requirements for additional management (if any).	Within 12 months of EPS closure.

Appendix A

Stakeholder consultations

As required by Condition 4.9 of Project Approval 07_0084, Origin has prepared this RMP in consultation with Lake Macquarie Council (LMCC). Table A.1 below contains a summary of the consultation completed to date and any response/actions such as updates to the RMP as a result of this consultation.

Table A.1 LMCC consultation

Date	Details	Response/Action
4 July 2023	Meeting between LMCC and Origin to provide an overview of the planning process underway for the RMP and process for Council consultation in late 2023.	n/a
17 October 2023	Email from Origin to LMCC to discuss and advise of timeline for the RMP submission to Council	n/a
17 October 2023	Email from LMCC to Origin advising timeline is achievable	n/a
10 November 2023	Email from Origin to LMCC providing the RMP for review and comments	n/a
8 December 2023	Email from Origin to LMCC following up on any comments on the RMP	n/a
11 December 2023	Phone call to LMCC and message left following up on RMP comments	n/a
11 December 2023	Email from LMCC to Origin advising there has been a pressing matter and meeting which has affected capacity to deliver a response and will aim to provide something in the coming days.	n/a
11 December 2023	Email from Origin to LMCC asking for Council to advise after meeting when comments may be provided.	n/a
12 December 2023	Email from LMCC to Origin advising aim to get comments back by end of the week.	n/a
15 December 2023	Email from LMCC to Origin providing comments on the RMP	RMP reviewed in consideration of comments from LMCC
11 January 2024	Email from Origin to LMCC providing a letter response to their comments on the RMP. Letter outlines a response to each issue raised, additional information and feedback on document revision.	See letter response to LMCC in Appendix B.

Appendix B

Letter response to LMCC on RMP comments



11 January 2024

Lake Macquarie City Council
126-138 Main Road
Speers Point, NSW, 2284

Attention: Glen Mathews (Principal Development Planner)

Dear Glen,

**PROJECT APPROVAL 07_0084 – REHABILITATION MANAGEMENT PLAN (CONDITION 4.9)
COMMENTS**

In accordance with Condition 4.9, Rehabilitation Management Plan (RMP) of Project Approval (PA) 07_0084, Origin Energy Eraring (Origin) submitted the draft RMP to Lake Macquarie City Council (LMCC) on the 10 November 2023 for consultation. Origin received comments on the draft RMP from LMCC on the 15 December 2023.

Origin has reviewed the comments raised by LMCC and would like to take the opportunity to provide LMCC with a response and additional information on the points raised. A summary of comments from LMCC and Origins response is provided in Appendix A. Comments raised from consultation with LMCC will be incorporated into the revised RMP prior to submission to the Department of Planning and Environment (DPE).

Origin would like to acknowledge that this RMP will be the first of many iterations of the document as Origin completes further studies, work, research and consultation to expand the Eraring Ash Dam (ERAD) existing knowledge base, reduce uncertainty and improve rehabilitation outcomes. This further work will refine the objectives, completion criteria, performance indicators, monitoring program and associated timings for the ERAD. Origin will continue to consult with LMCC through the development and further refinement of the RMP.

Should you require any further details regarding this response, please contact Mikayla Henderson (Principal Environment & Community Business Partner) on 0460 032 343 or Mikayla.Henderson@originenergy.com.au

Kind regards

A handwritten signature in black ink, appearing to read "Brett Murphy".

Brett Murphy
Head of Ash Strategy



A. Appendix A - Response to LMCC Comments

The following table presents Origins comments and response to comments on the RMP raised by LMCC during consultation. Comments raised from consultation with LMCC will be incorporated into the revised RMP prior to submission to the Department of Planning and Environment (DPE).

Table 1 - RMP Comments and Origin Response

Section Referenced (if applicable)	Item Raised	Origin Response
General	The RMP in its current form attempts to address on-site issues/impacts. It does not address the off-site impacts to downstream ecology, hydrology, water quality or sediment quality, directly related to the Ash Dam and how they are intended to be rehabilitated or managed.	This RMP, relates to the rehabilitation of the domains within the boundary of the ERAD identified in Figure 1.1, as required by Modification 1 of the Project Approval. All other infrastructure outside the boundary of the ERAD, unless identified within the domains depicted in Figure 4.1, will, where necessary, be decommissioned and rehabilitated as part of the Eraring Power Station (EPS) closure. The management and any works relating to downstream ecology, hydrology, water quality or sediment quality related to the closure of the Ash Dam will be further understood through the further works identified in Section 7.
General	The principles stated in the RMP generally appear sound and it is understood that a stable landform and control of pollution and contaminants will be priorities. Principles should also address ash reuse and application of a circular economy to the site.	As discussed in Section 7, Origin have committed to undertaking an options assessment on future land use that align with the closure vision for the greater Eraring site for ongoing industrial use, including energy related infrastructure. As discussed in Section 1, Origin will continue to monitor market conditions and trends for ash re-use that will inform any future direction for the rehabilitation/re-use of the

		ERAD. Investigations into other opportunities for ash reuse and recycling are ongoing and may include post-EPS closure extraction from the ERAD.
General	Council are of the opinion insufficient information has been included to satisfy subsections e, f and g of Condition 4.9 Rehabilitation Management Plan of MP07_0084 mod 2.	Origin acknowledges that this RMP is not a final version and there will be ongoing revisions to the document as a result of further works. Section 7 of the RMP provides a description of the further studies, work, research, and consultation plans that will be developed and undertaken to expand the ERAD existing knowledge base, reduce uncertainty and improve rehabilitation outcomes. The further works will refine the objectives, completion criteria, performance indicators, monitoring program and associated timings for the ERAD rehabilitation works.
Table 1.2	Please ensure all relevant regulatory requirements are included, of note the Coastal Management Act 2016 is absent. As the site is located adjacent to coastal wetland there are associated legislative requirements concerning: a. the biophysical, hydrological, or ecological integrity of the adjacent coastal wetland b. the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland	Table 1.2 has been revised to ensure that the <i>Coastal Management Act 2016</i> is included.
Rehabilitation objective 1	Removal of all non-required infrastructure is supported however consideration of requirements for any future land use should be included.	As discussed in Section 7, Origin have committed to undertaking an options assessment on the future land use options that align with the closure vision for the greater Eraring site for ongoing industrial use, including energy

		related infrastructure. Additionally, rehabilitation objective 13 will involve the completion of an options analysis to assess viable future land uses and associated infrastructure requirements.
	The completion criteria and performance indicators are generally supported however direct seeding is not considered best practice. Rehabilitation of disturbed areas should be in accordance with best practice and relevant Lake Macquarie City Council (LMCC) Management Guidelines.	Origin has committed to further refinement of target vegetation species for the final landform cover which are compatible with the future land use. Rehabilitation trials, comprising predominantly grass species, within the existing ERAD footprint have utilised direct seeding and hydro mulching with high success, particularly in relation to rapid cover establishment and erosion protection. Due to the risks posed by trees falling and impacting capping layers, trees and shrubs are not currently proposed as part of the targeted species for the ash dam. As part of trials currently occurring onsite, Origin is utilising native grasses as a component of seed mixes. Therefore, direct seeding is currently proposed due to existing site success and recommendations from Origin consultants. This position will continue to be reviewed through the further development and refinement of the RMP.
	The completion criteria and performance indicators should be amended to include LMCC guidelines.	Origin has updated Table 1.2 to include LMCC guidelines. Origin will consider relevant LMCC guidelines in the planning, development, and implementation of rehabilitation of the ERAD. This will also include the further refinement of completion criteria and performance indicators as appropriate.

	The associated implementation measures in section 5 and monitoring and inspection program in Section 6 shall be updated to reflect the change listed.	Objective 1 relates to the removal of all connected services (power, water, communications) and ERAD infrastructure (e.g., roads, tracks, pumps, ash pipelines, concrete structures etc) that are not required for the future land use. As discussed in Section 7, Origin have committed to undertaking an options assessment on the future land use options that align with the closure vision for the greater Eraring site for ongoing industrial use, including energy related infrastructure. Implementation measures (Section 5) and monitoring, reporting, and review requirements (Section 6) will be updated as future land use assessments are completed and the rehabilitation strategy for the ERAD is further defined.
Rehabilitation objection 7	The completion criteria and performance indicators should be amended to include revegetation to be in accordance with best practice and LMCC guidelines to enhance and protect compensatory habitat through the establishment of a native vegetation buffer. The associated implementation measures in Section 5 and monitoring and inspection program in Section 6 shall be updated to reflect changes listed.	Origin has committed to further refinement of target vegetation species for the final cover landform which are compatible with the future land use. Rehabilitation trials within the existing ERAD footprint have utilised direct seeding and hydro mulching with high success, particularly in relation to rapid cover establishment and erosion protection. Due to the risks posed by trees falling and impacting capping layers, trees and shrubs are not currently proposed as part of the targeted species for the ash dam. As part of trials currently occurring onsite, Origin is utilising native grasses as a component of seed mixes. Therefore, direct seeding is currently proposed due to existing site success and

		recommendations from Origin consultants. This position will continue to be reviewed through the further development and refinement of the RMP. Origin has updated Table 1.2 to include LMCC guidelines. Origin will consider relevant LMCC guidelines in the planning, development, and implementation of rehabilitation of the ERAD. This will also include the further refinement of completion criteria and performance indicators as appropriate. Origin is committed to continue to protect the compensatory habitat established to the north and east of the ash dam. Currently (and likely into closure of the ERAD pending final design) there is a buffer established between the compensatory habitat and the ERAD through a maintenance corridor and stormwater drainage which diverts rainfall runoff from the north around the ERAD. However, the presence of this drainage infrastructure and maintenance corridor prevents the ability to establish a further native vegetation buffer corridor as commented by Council.
Rehabilitation objective 8	Air quality impacts go beyond visible dust emissions. The objective should be reworded to be more specific and align with best practice environmental performance. The objective should be expanded to address all relevant air quality issues (ie., PM 2.5, 10 etc), not just visible dust.	Rehabilitation objective amended to include air quality issues more generally. Origin has a Ash Dam Dust Management Plan in place for the ERAD which currently covers operations of the facility. This management plan will be further refined as the asset transitions towards closure however this plan references the network of air quality monitoring stations on the ERAD which

	The completion criteria and performance indicators should be amended to be specific and measurable and include reference to the network of air quality monitoring stations in and around the Eraring site. The associated implementation measures in section 5 and monitoring and inspection program in Section 6 shall be updated to reflect the increased specificity provided.	are utilised in managing particulate emissions from the ERAD. This plan additionally captures the specificity suggested by LMCC including alarming and limits. Origin currently does not have any approval limits placed on emissions from this asset however manages dust emissions from the ERAD in accordance with the relevant conditions in Environment Protection Licence (EPL) 1429 and PA 07_0084. As rehabilitation planning, associated approvals and plans for the ERAD are updated, Section 5 and 6 will be updated to reflect increased specificity to the rehabilitation activities and completion criteria and performance indicators.
Rehabilitation objective 10	The objective is not specific and does not align best practice environmental performance. The objective should include reference to the state significant coastal wetland adjacent to the Ash Dam and the associated legislative requirements. Objective 10 should be reworded to be less minimalistic and better align with Origin Energy's objectives regarding best practice environmental performance and reference the state significant wetland that is directly downstream of the Ash Dam. The completion criteria and performance indicators should be amended to be specific and measurable and include reference to the network of water quality monitoring stations in and around the Eraring site.	Origin acknowledges that this RMP is not a final version and there will be ongoing revisions to the document as a result of further works. Section 7 of the RMP provides a description of the further studies, work, research, and consultation plans that will be developed and undertaken to expand the ERAD existing knowledge base, reduce uncertainty and improve rehabilitation outcomes. The further works will refine the objectives, completion criteria, performance indicators, monitoring program and associated timings for the ERAD. This further work will include refinement to rehabilitation objective 10 and associated completion criteria, performance indicators and monitoring.

	Surface water quality/quantity should be identified and compared to how to the relevant water quality objectives for the site and downstream receiving waters.	Water quality monitoring continues in accordance with EPL 1429 and EPS Water Management Plan. The RMP has been updated to reflect this.
	The associated implementation measures in section 5 and monitoring and inspection program in Section 6 shall be updated to reflect the increased specificity provided and included references to the various stages of rehabilitation works.	Completion criteria and performance indicators against rehabilitation objective 10 have been updated to include the suggested reference to the adjacent coastal wetland.
Rehabilitation objective 11	The objective is not specific and does not align practice environmental performance. There is no indication of what the modelled/predicted quality of groundwater is, or the impact of this on receiving waters. The objective should include reference to the state significant coastal wetland adjacent to the Ash Dam and the associated legislative requirements. Objective 11 should be reworded to be less minimalistic and better align with Origin Energy's stated objectives regarding best practice environmental performance and reference the state significant wetland that is directly downstream of the ERAD site. The completion criteria and performance indicators should be amended to be specific and measurable and include reference to the network of groundwater quality monitoring stations in and around the Eraring site. The modelled/predicted quality of	Origin acknowledges that this RMP is not a final version and there will be ongoing revisions to the document as a result of further works. Section 7 of the RMP provides a description of the further studies, work, research, and consultation plans that will be developed and undertaken to expand the ERAD existing knowledge base, reduce uncertainty and improve rehabilitation outcomes. The further works will refine the objectives, completion criteria, performance indicators, monitoring program and associated timings for the ERAD. Specifically, Table 7.1 includes a groundwater infiltration study to assess the likely infiltration rates and quality from the rehabilitated landform and consideration of impacts of the receiving environment, including the adjacent coastal wetland.

	groundwater should be identified and compared to how to the relevant water quality objectives for the site and downstream receiving waters.	Objective 11 has been reworded to include reference to minimising harm to the receiving environment as far as reasonably practicable.
	The associated implementation measures in section 5 and monitoring and inspection program in Section 6 shall be updated to reflect the increased specificity provided and included references to the various stages of rehabilitation works.	Completion criteria and performance indicators against rehabilitation objective 11 have been updated to include the suggested reference to the adjacent coastal wetland.
Rehabilitation objective 14	The rehabilitation objectives should be updated to include establishment of self-sustaining ecosystem commensurate with the surrounding Plant Community types as well as the establishment of a vegetation buffer to areas of compensatory habitat.	Origin has committed to further refinement of target vegetation species for the final cover landform which are compatible with the future land use, which will also consider opportunities for ash reuse and recycling and ongoing post-EPS closure extraction from the ERAD. Rehabilitation trials within the existing ERAD footprint have utilised direct seeding and hydro mulching with high success, particularly in relation to rapid cover establishment and erosion protection. Due to the risks posed by trees falling and impacting capping layers, trees and shrubs are not currently proposed as part of the targeted species for the ash dam. As part of trials currently occurring onsite, Origin is utilising native grasses as a component of seed mixes commensurate with the surrounding Plant Community types as well as pasture species to facilitate appropriate stabilisation and cover. Due to the species mix, previous onsite success and recommendations from Origin consultants, direct seeding is currently proposed. This position will continue to be
	The completion criteria and performance indicators should be amended to specify plating of local provenance tube stock should at densities in accordance with LMCC Guidelines. Direct seeding is not considered best practice and should be removed.	
	The associated implementation measures in section 5 and monitoring and inspection program in Section 6 shall be updated to reflect the change listed.	

		reviewed through the further development and refinement of the RMP and the determined final land use.
General	In addition to the above specifics Council raise particular concern with: 1. The area to be restored/rehabilitated shares a boundary with the compensatory habitat areas that were established as conditions in relation to the expansion of the Ash Dam 2. Disturbance associated with the Ash Dam is so close to these compensatory habitat areas and 3. The Rehabilitation Management Plan does not specify them as no go areas or areas that require special consideration or protection. The Rehabilitation Plan should aim to improve the ecological integrity of the compensatory habitat areas and other areas of native vegetation adjacent to the dam. This can be done by establishing a native vegetation buffer to them. If there is any disturbance to compensatory habitat areas, there should be an additional offset package negotiated and delivered that involves high quality and mature native vegetation.	As above, Origin is committed to protecting the compensatory habitat areas and other areas of native vegetation adjacent to the ERAD. Currently (and likely into closure of the ERAD pending design) there is a buffer established between the compensatory habitat and the ERAD through a maintenance corridor and stormwater drainage which diverts rainfall runoff from the north around the ERAD. However, the presence of this drainage infrastructure and maintenance corridor prevents the ability to establish a further native vegetation buffer corridor as commented by Council. Origin additionally has specific management plans for the protection and management of the compensatory habitat areas and biodiversity more generally at EPS. Any additional disturbance required by the closure of the ERAD will be completed in accordance with relevant approvals and legislation.
General	The completion criteria and performance indicators are very general. It is recommended that further consultation occur with Council once these become more specific.	Origin acknowledges that this RMP is not a final version and there will be ongoing revisions to the document as a result of further works. Section 7 of the RMP provides a description of the further studies, work, research, and consultation plans

		that will be developed and undertaken to expand the ERAD existing knowledge base, reduce uncertainty and improve rehabilitation outcomes. The further works will refine the objectives, completion criteria, performance indicators, monitoring program and associated timings for the ERAD.
General	In addition, outside of the RMP it is important to continue to consult with Council on acceptable future land uses as this may have implications for the infrastructure that is to be removed and the final landform.	Origin commits to continuing consultation with Council on the RMP as it develops through ongoing revisions underpinned by the results of further works identified in Section 7.

Appendix C

Statement of suitably qualified and experienced persons

Luke Johnston

I, Luke Johnston, hereby state that I meet the requirements of the definition of 'suitably qualified and experienced person' for the preparation of the Rehabilitation Management Plan as required by Condition 4.9 of Project Approval 07_0084.

I am a Senior Closure Planner with WSP Australia Ltd with over 20 years of experience in environmental regulation and assessment of Queensland mineral mines as well as environmental management of heavy industry and mining operations. I have developed specialist skills in reviewing regulatory changes for operational impacts; environmental risk management; environmental incident investigation; developing cost effective, practical environmental solutions and monitoring programs; risk management; and managing projects to achieve sound operational environmental outcomes.

My closure and rehabilitation experience includes development of regulatory Progressive Rehabilitation and Closure Plans (PRCP) for coal and other mineral mines in Queensland, coordinating technical studies and generating plans for closure of mine voids, and developing transition and closure plans for the rehabilitation and closure of industrial facilities and coal combustion product dams.

EDUCATION

Graduate Diploma in Science (Groundwater Hydrology), Flinders University

Bachelor of Science (Environmental Science/Aquatic Resource Management), CQUniversity

PROFESSIONAL ASSOCIATIONS

Closure Planning Practitioners Association (Australia)

PROFESSIONAL EXPERIENCE

- Leading the technical team for the delivery of the progressive rehabilitation and closure plan (PRCP) for a copper/gold mine in Queensland.
- Project managing a technical team in delivery of technical studies for void closure planning for coal mine voids in Queensland.
- Closure planning advice for final voids for a green field coal mine as part of an Environmental Impact Statement.
- Undertaking closure knowledge assessments and developing transition and closure plans for the rehabilitation and closure of a coal combustion product storage facility.
- Provided environmental advice and support for a coal fired power station in Queensland including environmental advice, management and monitoring of coal combustion product storage facilities.

- Develop PRCP including providing direction for technical studies to meet PRCP guidelines and incorporating studies into the final PRCP for a coal mine in Queensland.

RELEVANT PROFESSIONAL HISTORY

WSP Australia, Senior Closure Planner

Department of Environment and Science (Queensland Government), Principal Environmental Officer

Ecotone Environmental, Field Officer/Team Leader

Stanwell Corporation Ltd, Environmental Advisor

Signed: 

Luke Johnston

Date: 17 January 2024

Gareth Simpson

I, Gareth Simpson, hereby state that I meet the requirements of the definition of ‘suitably qualified and experienced person’ for the preparation of the Rehabilitation Management Plan as required by Condition 4.9 of Project Approval 07_0084.

I am a Principal Closure Consultant with WSP Australia Ltd with over 20 years of experience as a professional engineer engaged in mine closure/transition and rehabilitation, pollution control, and sustainability consulting and research. For over two decades, I have actively led integrated industrial, agricultural, mining, environmental, and water-related projects. Gareth has managed the study phases of various projects, e.g., opportunity, conceptual studies, pre-feasibility studies, feasibility studies and detailed designs, tender documentation, and execution/site supervision. I have also led and participated in multiple research projects, including Water Research Commission (South Africa), European Commission and Dutch government funded initiatives.

I have led various closure planning and transition projects with a specific focus on closure planning, post-mining land use (PMLU) selection, rehabilitation design, closure cost estimates, and quantitative risk assessments. I also have experience in facilitating workshops, e.g., option selection, integration, PMLU selection, and SWOT analyses.

EDUCATION

PhD (Agricultural Engineering), University of KwaZulu-Natal.

M.Eng. (Agricultural Engineering), University of Pretoria.

B.Eng. (Honours: Water Resource Engineering), University of Pretoria.

B.Sc. Eng. (Agricultural Engineering), University of KwaZulu-Natal.

PROFESSIONAL ASSOCIATIONS

Closure Planning Practitioners Association (Australia)

Project Management Institute: Project Management Professional (PMP)

PROFESSIONAL EXPERIENCE

Australia

- Closure PFS-A for the mine production area of a major bauxite mine in the Northern Territory.
- Expert review of a quarry expansion project in southeast Queensland.
- Closure business case for the International Commission of Mining and Metals (ICMM).
- Premier closure/transition concept study for a coal mine in NSW.
- Operations erosion assessments and rehabilitation mitigation designs for a gold mine in NSW.
- Closure/transition planning for the Eraring Ash Disposal Facility.

South Africa

- Pan re-establishment concept, detailed design, and execution.
- Mine closure and post-mining land use studies.
- Waste rock dump rehabilitation design and execution.
- Undertaking underground quantitative risk assessments, mitigation designs, and execution.
- Developing agreed relinquishment criteria for mine closure in South Africa.

RELEVANT PROFESSIONAL HISTORY

WSP Australia, Principal Mine Closure Consultant, Australia

Jones & Wagener, Technical Director: Environmental Engineering Division, South Africa

African EPA, Manager: Environmental Engineering Division, South Africa

UWP Engineers, Professional Engineer: Water Division, South Africa

Agricultural Research Council – Institute for Agricultural Engineers, Graduate Engineer: Irrigation and Resource Conservation, South Africa



Signed: _____

Gareth Simpson

Date: 17 January 2024