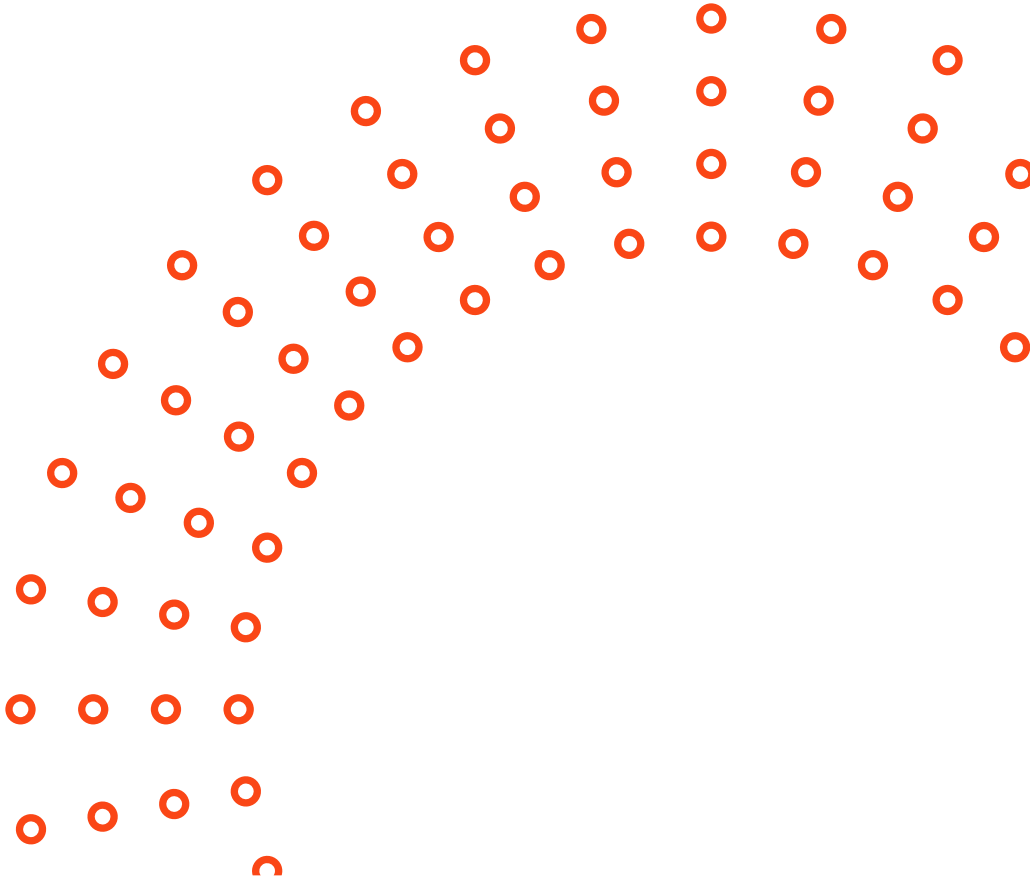
Origin Energy

Eraring Power Station – Ash Dam MOD 1

20 November 2019

Contents



Eraring Power Station Overview

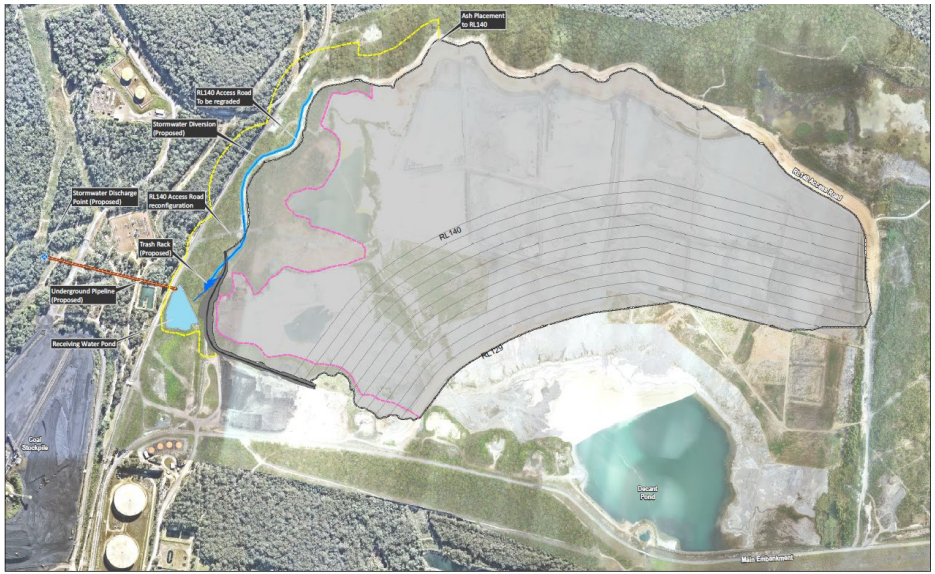
- Located on Lake Macquarie, 40km southwest of Newcastle
- Operations commenced in 1982, owned and operated by the NSW State Government
- Australia's largest power station: provides up to 25% of NSW power supply
- Consists of 4 x 720MW turbines: total generating capacity 2880MW
- Origin took ownership of Eraring in August 2013.
- Eraring Power Station is critical energy supply infrastructure for NSW and Australia

Project Context

- Australia's energy context is in a state of constant change and is challenging to all involved:
  - Recent and planned closures in NSW of large base load generation – Munmorah, Wallerawang and Liddell Power Stations, coupled with unplanned outages
  - Closure of Hazelwood (VIC) and the Northern Power Station (SA)
- Increasing demand for electricity during peak periods, leading to risk of power shortages and blackouts.
- Record levels of generation occurring at Eraring to meet demand, resulting in higher volumes of ash to be stored in the ash dam. This coupled with a revised ash deposition strategy means an increase in ash dam storage capacity is needed.
- Origin have a strategic focus on ash recycling, increasing from a historic recycling rate of around 30-40% (35% in 2018/19) towards a target of 80%. The proposed increase in dam storage is required regardless of achieving a significant increase in recycling.

Modification 1 - Project Overview

- Ash Dam is a critical part of the operation of the Eraring Power Station
- Components of the project include:
  - Construction of Western embankment to RL140m
  - Amended ash deposition strategy and landform
  - Mine Void grouting / management
  - Upgrade to Stormwater management system
  - Upgrade/ modification to ancillary infrastructure (access roads, ash deposition pipelines)
- Increase storage capacity:
  - Additional storage for 5 million cubic metres
  - Increase footprint by approx. 4%
  - Additional capacity required by 2022
  - Extend life of ash dam to late ~2026 (dependent of generation demand and market demand for recycling)



Engagement – Response to Submissions

- The EA was on exhibition from 13 September 2018 – 27 September 2018
- A total of 32 Submission received, with the following breakdown

Submitters	Number of Submissions	Position
Agencies	7	• 7 Comments
Public	18, (9 form letters)	• 17 Objections • 1 Comment
Special Interest Groups	7	• 5 Objections • 2 Comments
Total	32	• 22 Objections • 10 Comments

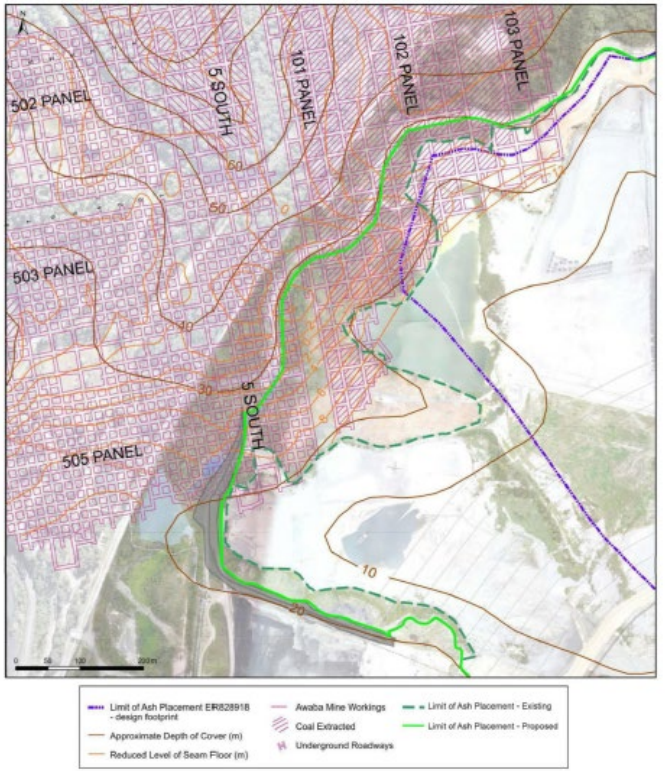
Seepage management system (existing)

CURRENT CONTEXT:

- Seepage is collected via an extensive drainage system which has been installed in the main embankment of the dam.
- Seepage from these drains flows to a seepage pond and then pumped back to the Ash Dam.
- The current seepage from the Ash Dam has been reduced due to the dense phase ash placement technique and reduction of decant pond size which was introduced in 2008.

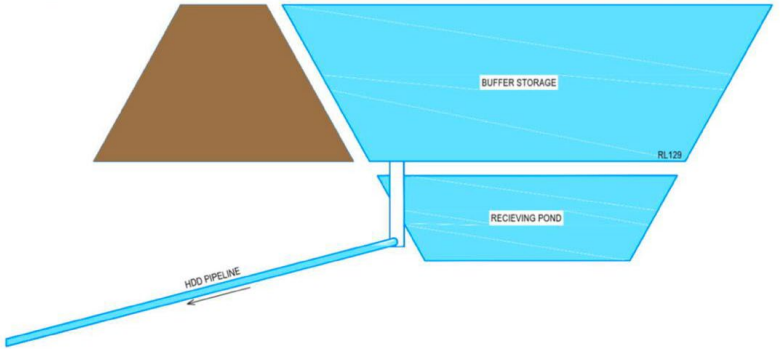
Groundwater Management

- The presence of the former underground mine workings has the potential to change the groundwater regime in the vicinity of the project.
- Groundwater impacts in the mine void area can be effectively managed by filling up the mine voids and mining induced fractures with grout.
- A Mine Void Remediation Plan (MVRP) will be prepared that considers the design of the mine void grouting and sets performance criteria for the effectiveness and management of potential groundwater impacts.
- Origin conducts groundwater monitoring in accordance with our EPA licence. To date the results of this monitoring have indicated that the risk of environmental impacts on the lake or the local community in relation to Origin's operations is low.
- DPE engaged an independent geotechnical and hydrogeological consultant (WSP).
- WSP concluded that the project is feasible if appropriate subsidence mitigation and groundwater controls are in place (such as grouting or filling of the voids).



Surface Water Management

- Origin is proposing to:
  - Construct a stormwater diversion works along the Access Road to the north west of the Ash Dam to divert local catchment flows away from the ash dam into an existing receiving pond.
  - Upgrade and reconfigure the existing receiving pond, including the inlet structure and discharge point, to accommodate design storage volumes.
  - Water would be discharged via an underground pipe to a new discharge point.



Biodiversity

- A Biodiversity Development Assessment Report (BDAR) for the project was prepared.
- The proposed modification would require clearing of approximately 8.95 ha of land, which comprises native fauna habitats and two Plant Community Types (PCTs) assessed as being in good condition.
- The land disturbance would mostly be associated with the areas required to improve the existing stormwater management system and to facilitate filling of mine voids.
- Origin's Biodiversity Offset Strategy would compensate any residual impacts.
- Origin has committed to incorporate the Project into the site based Biodiversity and Land Management Plan.

Air Quality – Dust Management

- The Project generally maintains the existing scale of operations as it would be located primarily within the existing operational footprint of the ash dam. The area of addition exposure for wind-blown dust is very small (approximately 4%) relative to the overall ash dam.
- Existing dust management measures would be extended to the project area including pro-active use of weather forecasts to guide operational activity; temporary capping; strategic placement of ash to maintain the surface in a moist condition; application of crusting agents; and direct water application through sprays or water cannon.
- The existing network of ash dam dust monitoring would be extended to the project area to provide quantification of dust impacts, including daily reports.
- Origin continues to review and adapt its dust management plan to compliment the ash deposition strategy.

Southern Embankment Stability

- The southern embankment stability assessment studies identified that for a seismic event caused by a low probability large earthquake the factor of safety recommended by the ANCOLD guidelines wasn't achieved.
- The Project does not have any bearing on the assessment of stability or likelihood of failure of the southern embankment of the ash dam. There are three reason for this:

    1) the distance between the fly ash deposition footprint and the southern embankment (575 m at its closest point);
    2) the proposed relatively flat deposition landform (1-2% slope), meaning the placed ash would be at is natural repose angle and remain stable; and
    3) continue to operate the existing leachate collection decant pond at the current operational water levels.

- Origin is progressing southern embankment stabilisation works that includes ground improvement along the foundations of the dam wall followed by construction of a buttress. Construction works are due to start in early 2020.

Ash Recycling

- Origin has existing agreements in place with various customers to supply ash for recycling purposes. In 2018-19 Origin recycled 35% of the ash generated.

- EPS has a target of 80% ash recycling by December 2021, and progress towards this target is reported to the Department of Planning Industry and Environment annually within our Long-Term Ash Management Strategy (LTAMS).

- The 2019 update of the LTAMS includes a framework for accelerating the ash recycling rate towards the target with a range of opportunities being investigated with existing and new customers.

- Market conditions and regulatory constraints remain a challenge to achieving high levels of ash recycling.

- Despite the expected acceleration in ash recycling over the next few years, the Augmentation Project is needed as in any situation at least an additional 5Mm^3 of ash dam capacity will be required into the future.

Rehabilitation

- Full ash placement in the ash dam will not be completed until towards the end of the life of EPS.
- This is because a substantial ash storage area would still be required whilst EPS is operational.
- Where necessary and feasible, Origin temporarily caps and revegetates areas of the ash dam where ash placement is not currently occurring but may again occur in the longer-term future in order to manage environmental issues such as dust generation.
- It is therefore likely that much of the final rehabilitation works will commence during the last 12 months of EPS's operational life.
- Alternatively recycling activities may continue at the ash dam into the future.
- The evolution of the ash dam including rehabilitation and ash recycling is updated annually in our Long Term Ash Management Strategy (LTAMS) and reported to the Department of Planning, Industry and Environment.