

30 January 2019

Attention: Stephen O'Donoghue

Team Leader – Resource and Energy Assessments
Department of Planning & Environment
Email: stephen.odonoghue@planning.nsw.gov.au

Dear Steve

RE: Eraring Ash Dam Modification – Request for Information

In response to your emails on 6 December 2018, please find enclosed the additional information as requested.

Request - A summary of the environmental management plans for the Ash Dam

Response

Origin maintains a range of environmental management plans for the Eraring Ash Dam (EAD) to meet the requirements of various Project Approvals and Environmental Licences and legislation. A summary of key plans relevant to the ash dam is provided below:

- Environmental Management Plan (Origin, 2018) – This document has been prepared with consideration of AS/NZS ISO 14000 series and guides the overall environmental management of Origin Eraring Power Station.
- Water Management Plan (Umwelt, 2013) – documents the range of management measures to be implemented in order to fulfil the requirements of the Eraring Power Station project approvals, Environmental Protection Licence and other relevant approvals.
- Groundwater Management Plan (AECOM, 2009) – This document was developed as part of the project approval process for the (original) upgrade of the EAD.
- Biodiversity Land Management Plan (AECOM, 2015) – provides an overarching framework outlining the management measures and principles for the protection and conservation of land and biodiversity values present at Origin EPS.
- Air Quality Management Procedures (Origin, 2018) – guides the proactive management of dust generation potential associated with the EAD and includes a framework for responding to risk scenarios through predetermined actions.
- Habitat Offset Plan (ENSR, 2008) – prepared in relation to the provision of compensatory habitat for the Coal Combustion Product Storage Facility Expansion and Attenuation Reservoir. The plan guides the sustainable management of flora and fauna within the designated offset areas.
- CCP Long Term Management Strategy (AECOM 2010) – The LTMS is typically reviewed on an annual basis to report progress towards a stipulated goal of 80% reuse or recycling of ash from the Eraring Power Station by 31 December 2021. The last review was completed in November, 2018.

Any information/statistics on the reduction in leachate/water seepage from the dam as a result of moving from a lean to a dense phase placement technique

Origin notes the following considerations in relation to the requested information:

The works in relation to historical mine workings, which Origin is carrying out at present involves two key components.

1. The geotechnical component; and
2. The hydrogeological component.

Both components are key to increase and develop our understanding of the mine void and to support the design works required to develop the Western Emplacement Area.

The transition from lean phase to dense phase CCP placement occurred in 2008 and substantially reduced the amount of process water deposited in the EAD during CCP placement activities. It is estimated that previous lean phase reduced from 70- 80% water composition to 30-40% water composition during dense phase placement.

We note that the consideration of using lean or dense phase deposition is an operational consideration and it is unclear to what extent this drives or should be considered as part of the proposed works considered under this application.

Based on preliminary investigations it is observed that the transition from lean to dense phase CCP placement may have resulted in operational improvements including the following:

- An increased beach slope profile (increasing storage and improving runoff);
- Reduced water saturation resulting in increased density of deposited CCP;
- A reduction in saturation of deposited material; and
- Potentially a reduction of leachate across free draining, active areas of the EAD post placement.

Origin has collected almost 20 years of piezometric information as part of routine EAD surveillance activities. As part of the mine void studies currently underway, Origin and Stantec have carried out a high level assessment of the historic piezometric data.

It appears there is a trend which could suggest a reduction of the seepage volumes when/once the volume of process water entering the ash dam (from lean to dense phase) was reduced. However, leachate or water seepage at the EAD main embankment is influenced by a variety of factors including:

- rainfall;
- overland stormwater inflows from surrounding catchments;
- the overall site water balance of Eraring Power Station;
- CCP placement techniques; and
- operating freeboard levels.

To be able to make conclusive statements in relation to the contribution to or effect of the lean vs the dense phase ash, Origin requires a hydrogeological model to be developed. It is anticipated that this would be completed as part of the current mine void studies underway. These further studies which may include field investigations and detailed hydrogeological modelling would enable Origin to provide more information on this issue.

Lastly, we note that the EAD operates a combination of an extensive system of relief wells and drains to intercept and direct seepage to toe drains from which it is returned to the ash dam to evaporate.

The proposed improvements to existing stormwater infrastructure beside the EAD would reduce runoff currently entering the EAD via overland flows, and therefore reduce the potential for surface water and groundwater impacts. Depending on the outcome of the mine void study, additional monitoring infrastructure may be installed along the western side supporting the proposed works.

The objective of the studies, geotechnical and hydrogeological, is to quantify and define the overall EAD related hydrogeological model, which would allow Origin to develop a detailed design which may include mitigating measures to reduce or minimise seepage.

Whether the recommendations made in the *Water Balance Modelling of Contaminated Water System* (AECOM, 2015), in relation to improvements to the containment of the contaminated water storages, have been implemented

The AECOM 2015 water balance (including revisions) informed a number of upgrades to key stormwater storages at EPS. Key findings of the water balance include:

In the proposed upgrade, significant improvements in the containment performance of the contaminated water system are predicted, as summarised below:

- *For the Boomerang Pond, the probability of overflow occurring in any given year reduced from 75% (25%ile year) to 55% (45%ile year). Additionally, the volume of water for a 99%ile wet year or lower probability of being released reduced significantly from 190.5 ML/year to 133.6 ML/year (no catchment changes) to 112.9 ML/year.*
- *For the 1 ML Pond, the probability of overflow reduced from essentially 100% (every year) to 0% (only in an emergency contamination scenario) as a result of the proposed upgrades. Additionally, the volume of water with a 1% (99%ile wet year) or lower probability of being released reduced significantly from 91 ML/year to 0 ML/year. Analysis assumed that the proposed pollution sensors and electronically operated valve would be triggered in the event of a contaminant.*

To reduce the likelihood of the Coal Handling Plant Settling Basins overflowing their effective capacities have been increased by sizing and raising the height of discharge weirs to provide additional storage volume. Improved access has been provided to facilitate the periodic removal of accumulated deposits and coal fines from both basins.

The Coal Handling Plant Settling Basin A (sausage pond) capacity has been increased from approximately 11.5ML to 18.7ML and Coal Handling Plant Settling Basin B (Boomerang Pond) from approximately 36ML to 57.9ML. To reduce the risk of contaminants discharging to wetlands from the EPS stormwater system the capacity of the 1 ML Pond has also been increased; its normal flow diverted to the cooling water outfall canal and on detection of contaminants, detained in the basin.

A description of any ecological and/or water monitoring in the wetland system(s)

Real time monitoring for pollutants is undertaken approximately 200m upstream of the existing offsite discharge point which comprises a settling pond to the south of the main switchyard. Coastal wetlands (as mapped in accordance with the State Environmental Planning Policy (Coastal Management) 2018) are identified approximately 400m from this point, or 200m west of Origin EPS landholdings. As wetlands within this area occur beyond Origin EPS landholdings, no monitoring is undertaken.

Whether the EPA has reviewed and approved the *Ash Dam Management Strategy* (Origin, 2017)

The Ash Dam Management Strategy is an internal strategy document prepared to assist Origin in coordinating the effective operation and maintenance of the EAD. The document has not been reviewed by the EPA and does not currently require approval by a regulatory body.

Details of the current air quality monitoring network, including number, type and location of particulate and meteorological monitors based on EPL requirements and others used for proactive management of emissions from the dam.

Air quality monitoring is undertaken in accordance with EPL 1429 and data on licensed discharge points is made publicly available via a monthly summary report¹. This includes data from a series of dust deposition gauges. Monitoring on EPL 1429 also includes two ambient monitoring stations located at Dora Creek and Marks Point. These monitoring points are shown in Figure 1.

Additional air quality monitoring measures associated with the EAD include:

- Surface condition monitoring to confirm crusting process and identify areas potentially requiring treatment.

¹ <https://www.originenergy.com.au/about/who-we-are/what-we-do/generation.html>

- Airborne Total Suspended Particulate (TSP) and Particulate Matter (PM10 and PM2.5) monitors stationed around the EAD. Real time monitors provide alarms via SMS when dusting is detected to enable an immediate response.
- Proactive weather monitoring providing real time data on rainfall, wind direction and speed, humidity and temperature for the site. Where inclement weather conditions are predicted or observed mitigation measures would be implemented in accordance with an established Trigger Action Response Plan.

Additional Documentation Request

Additional documentation is attached including:

- Copy of the *DRAFT Clean Water Design, Stormwater Drainage Design Report* (Aurecon, 2018); - this document is in draft and as such the information provided is preliminary and subject to further detailed investigation and design.
- Copy of *Water Management Plan* (Umwelt, 2013).
- Copy of the *Groundwater Management Plan* required under existing condition 3.2.
- Copy of the *Biodiversity and Land Management Plan* (AECOM 2017).

Area of the Ash Dam which has already been rehabilitated and revegetated and the nature of revegetation

Rehabilitation of the EAD occurs on a progressive basis and is subject to operational requirements. Approximately 60 hectares of land is currently undergoing progressive rehabilitation and is located to the east of the active emplacement area. In addition to these areas an area of approximately 20 hectares (ha) within the EAD has been temporarily capped since 2016 to reduce the potential generation of windblown dust. Areas temporarily capped or in the process of progressive rehabilitation may be disturbed depending on operational requirements.

Investigation of a number of options are being undertaken to identify a long-term CCP disposal solution to enable operations until the presently anticipated EPS closure date of 2032. These may require disturbance of previously rehabilitated areas. It is anticipated that a detailed rehabilitation plan would be developed closer to closure once a final landform for the EAD has been developed.

Clarification of remaining EAD storage capacity

The Ash Dam provides finite ash storage capacity and the efficient and effective utilisation of this critical asset is vital to the continued operation of Eraring Power Station (EPS). Ash Dam operations at EPS are undertaken in accordance with an Ash Dam Operations Management Strategy and a Long Term Management Strategy (Coal Combustion Products).

Project Approval 07_0084 (dated 29 April 2008) details an ash placement strategy consisting of beached deposition of dense phase ash slurry from three dispersal pipelines (nodal points) to a relative height of 140m. The design relied on beaching of fly ash towards the main embankment at a grade of 2.5%. It was estimated that the design would provide an additional 10.3Mm³ storage capacity (Aurecon, 2009).

The continued operation of the Ash Dam is a business-critical priority for Origin and supports the continued reliable and secure operation of the broader National Electricity Market. It is expected that there will continue to be an increasing reliance on EPS following the recent and planned closures of large baseload generation assets in NSW Victoria and South Australia.

These closures are summarised below:

Power station	State	Capacity (MW)	Closure date
Munmorah	NSW	1,400	2012
Northern	SA	520	2016
Hazelwood	VIC	1,600	2017
Liddell	NSW	1,680	2022
TOTAL MW		5,200	

To meet market demand and ensure system security as a result of recent power station closures EPS has operated at higher than planned output rates. We would expect these higher levels of operation to be more pronounced over the coming summer period (2018/2019), as was the case for summer 2017/2018 as compared to 2016/2017 when Origin EPS recorded a 23% increase in generation output.

Increased operation has resulted in an increase in ash disposal rates which has reduced the defined capacity of the Eraring ash dam within a shorter timeframe than planned. Consequently alternative ash placement strategies are required to provide operational flexibility and extend the storage capacity of the ash dam in the short to mid-term.

An assessment of ash dam storage capacity has been undertaken and has determined that the Eraring Ash Dam would likely reach its capacity sometime between October 2023 and March 2026 based on alternate ash placement strategies (see Table 1). It is noted that the alternate ash placement strategies in table 1 are the subject of this modification application, therefore require approval to provide additional capacity compared to current ash placement activities undertaken in accordance with Project Approval 07_0084.

Table 1 Storage Capacity Assessment – Proposed Modification Scenarios

Scenario	Description	Ash generations (approximate tonnes per month)	Potential Ash Reuse (%)	Storage life
1	Base case	106,118	37%	November 2025
2	Increased generation	133,691	30%	October 2023
3	Increased re-use	106,118	40%	March 2026
4	Increased generation and decreased re-use	133,691	27%	July 2023

The preferred option (i.e. the Project) would retain operational flexibility whilst providing an estimated additional 5 Mm3 of storage capacity, extending the operational life of the Eraring Ash Dam to approximately 2025. Preparatory works for the Project would need to commence as soon as possible to ensure continued operations of the ash dam until November 2025 as identified in the Base Case above.

Ultimate ash dam capacity is influenced by a number of factors including electricity generation requirements, deposition density and rates of ash reuse which are subject to market conditions. Reaching ash dam capacity would require that electricity generation operations cease at EPS due to the inability to deposit ash without significant risks to safety and the environment. Therefore, it is essential that the currently anticipated storage life of the ash dam be increased in order to ensure the continued operation of EPS and to cater for the needs of the National Electricity Market.

Site boundary

Additional spatial data relevant to the application is provided including:

- The approximate proposed extent of additional ash placement associated with the modification.
- The approximate western extent of ash placement (existing).
- The approximate limit of additional surface disturbance required to facilitate filling of mine voids.
- The existing extent of Origin EPS landholdings.

What is meaning of Awaba mine barrier as labelled?

The Awaba mine barrier was identified in the original 2007 Environmental Assessment. The 2018 SCT assessment includes a review of the 2007 EA (refer Section 4 of the SCT report), including reference to a substantial barrier pillar.

Can we have depth of cover values, as they are missing from the contours

Contours are identified on the provided plan titled 'Eraring Energy – Flyash emplacement Proposal' dated 4th August 2007 (Centennial Newstan Pty Ltd, 2007) and autocad file.

Yours Sincerely

Lauren Barnaby
Manager Environment and Community
Energy Supply and Operations
t 07 3867 0101 m 0472 879 898
Lauren.Barnaby@originenergy.com.au