



Date 23 December 2019

## Eraring Ash Dam Major Project Modification Assessment 07\_0084 MOD 1

### 1. INTRODUCTION

1. On 1 October 2019, the NSW Independent Planning Commission (the **Commission**) received from the NSW Department of Planning and Environment (the **Department**) a modification request pursuant to section 75W of the Environmental Planning and Assessment Act 1979 (**EP&A Act**) from Origin Energy Eraring Pty Ltd (the **Applicant**).
2. The existing Eraring Ash Dam Project Approval (07\_0084) (the **Existing Project Approval**) was granted in 2008 and a Concept Approval (05\_0138) granted in 2006. The Applicant is seeking to modify the ash deposition strategy, extending an ash placement area, while relocating ancillary infrastructure (including stormwater management) in order to undertake ash placement (the **Modification Application**). The Modification Application would provide an estimated 5 million cubic metres of additional ash storage capacity, extending the operational life of the Eraring Ash Dam to between October 2023 and March 2026.
3. On 1 March 2018, the EPA Act was amended and the Modification Application became a transitional Part 3A project under clause 2(1) Schedule 2 of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* (**ST&OP Regulation**). The Commission is the consent authority in respect of such transitional Part 3A projects under the Minister for Planning's delegation of that function to the former Planning Assessment Commission by instrument of delegation dated 14 September 2011. The Commission is to be taken to be the same legal entity as the Planning Assessment Commission, pursuant to clause 7 of the ST&OP Regulation.
4. Under the Minister's delegation dated 14 September 2011, the Commission is the consent authority because the Applicant has declared reportable political donations.
5. The ability to modify transitional Part 3A projects under s75W has been discontinued, however as the Modification Application was made before 1 March 2018, the provisions of Schedule 2 continue to apply.
6. Professor Mary O'Kane AC, Chair of the Commission, nominated Commissioner Peter Duncan AM (Chair), Commissioner Professor Alice Clark to constitute the Commission determining the Modification Application.

#### 1.1 Site and locality

7. The Eraring Ash Dam (the **Ash Dam**) is located within the Eraring Power Station complex (the **Project Site**), on the western shore of Lake Macquarie. The Project Site is located approximately 40 kilometres southwest of Newcastle in the Lake Macquarie local government area. Figure 1 shows the location and the regional context of the Project Site.
8. The Project Site is the largest coal fired power station in Australia with an electrical

generation capacity of 2,880 megawatts, accounting for 25% of New South Wales' power requirements. Figure 2 shows the local context of the Project Site and the Applicant's landholdings.

9. The Ash Dam is a significant and critical part of the operation of the Eraring Power Station as it provides essential ash storage capacity. Ash is a by-product of electricity generation, produced by burning of coal. The Department's Assessment Report (the **Department's AR**) states "[c]urrently, approximately 29 percent of ash produced at the [Project Site] is sold and reused in other processes such as concrete manufacturing or as a gravel substitute for use in landscaping and roads. The remaining 77 percent is stored in the [Ash Dam], located to the north of the power station."

Figure 1 Site Location and Regional Context (Source: Department's AR)



10. The Project Site comprises approximately 1,200 hectares owned by the Applicant. The power station itself is located on approximately 150 hectares and the Ash Dam occupies 250 hectares. The Department's AR describes the remainder of the land as being largely undeveloped, consisting of open grassland, canals and bushland.
11. The area surrounding the Project Site has historically been used for major underground coal mining and power generation operations. Previous and existing development in the vicinity of the Project Site includes West Wallsend, Awaba, Newstan and Myuna Collieries; Mandalong Coal Mine and Vales Point and Colongra Power Stations.
12. The Department's AR describes that the "shore length of Lake Macquarie extends for approximately 174 kilometres to the south of the [Project Site] with the land

*surrounding the lake containing the residential areas of Morrissett, Dora Creek and Wangi Wangi as well as various parks and reserves. The Myuna Bay Sports and Recreation Centre (the **MBSRC**) is located approximately 450 meters to the south of the Ash Dam storage.”*

13. The MBSRC closed on 29 March 2019. The Ash Dam Stability Project is not part of the Modification Application, as described in Section 4 of this Statement of Reasons (**SoR**). On 13 December 2019, the NSW Government announced the relocation of the MBSRC.

Figure 2 General Layout of Project Site and Ash Dam (Source: Department's AR)



 Origin EPS Landholdings

**Site Overview**  
Ash Dam Augmentation Project  
Source: Origin 2018, DFSI 2018  
0 0.25 0.5 1  
Kilometres

## 1.2 Background to Development Application

### Past development consents

14. The Department's AR states "[t]he [power station] and Ash Dam were originally built and owned by the Electricity Commission of NSW in 1977. Over time, the Electricity Commission and its successor, Pacific Power were restructured, and ownership of the complex was transferred to Eraring Energy, a State-owned corporation."
15. The Department's AR further states "[t]he [Eraring] Act was enacted in 1987 to allow the Electricity Commission to transfer the power station and Ash Dam to an association of private companies to assist the Government in funding the operation of the facilities. Most of the provisions of the [Eraring] Act are now obsolete as the Commission and its successors are no longer in existence.

*However, Section 27 of the Act, which allows the site and any development on the site to be used for approved purposes, notwithstanding any other Act or instrument to the contrary, has ongoing operation."*

16. Table 1 outlines the previous approvals relating to the Project Site.

Approval Reference	Description	Date
Concept Approval (05_0138)- Coal Combustion Product Management Facility  Note – the Applicant proposes to surrender the Concept Approval.	Long term expansion of the ash dam disposal facility and changes to the ash disposal method and ancillary infrastructure, including: <ul style="list-style-type: none"> <li>• construction and operation of a 42 MW emergency turbine generator; and</li> <li>• upgrade of the ash disposal facility.</li> </ul>	2006
Project Approval (07_0084) – Capacity Upgrade and Attenuator Reservoir	Expansion of ash dam and changes to the ash disposal method and ancillary infrastructure, including: <ul style="list-style-type: none"> <li>• upgrade of turbines to 750 MW each;</li> <li>• construction and operation of a 920 ML cooling reservoir; and</li> <li>• ancillary works and activities.</li> </ul>	2008

*Table 1 Existing Project Site Development Consents*

17. The Department's AR states "[t]he Project Approval allows the ash produced during the production of electricity at the [Project Site] to be either reclaimed for beneficial reuse or deposited hydraulically via pipelines into the Ash Dam. Several reclaim and reuse operations are currently approved to operate at the site by third party contractors, including Flyash Australia and Boral. Flyash Australia manages the reuse fly ash on site which supplies fine grade fly ash and tailor-made ashes that are utilised in a variety of concrete applications. Boral reclaims bottom ash from the Ash Dam for use as an aggregate in applications such as bitumen in road construction projects. Together these and other initiatives have sustained an ash reuse rate of around 29% (477,292 tonnes) in the 2017-2018 period.

*Ash that is not reused is approved to be deposited in the Ash Dam. The existing approved ash placement strategy involves beached and cell deposition of dense phase*

*ash slurry from three dispersal pipelines (nodal points) to a reduced level (RL)<sup>1</sup> of 140m. The total existing capacity of the Ash Dam is approximately 40 million cubic metres. Due to current high deposition rates, the dam is now likely to reach its storage capacity sometime between November 2020 and January 2022.”*

18. The Modification Application is described in Section 1.3 of this SoR and the Commission’s determination is limited to the Modification Application. The previous development consents and operations of the Project Site do not form part of the scope of the assessment, except where there is a proposed modification.
19. The Commission noted in its first site inspection on 19 November 2019 (described in paragraphs 68-76) that the Project Site receives coal supply via direct transportation methods (conveyor systems), rail loop infrastructure and private haul roads.
20. Ash deposition currently occurs via a pipe network from the Power Station to the Ash Dam. The ash travelling throughout the pipe network, deposited in the Ash Dam, is made up of 70% solid material, 30% water. The Applicant’s Environmental Assessment of the Modification Application (the **Applicant’s EA**) describes this as ‘dense phase ash slurry’. The Project Site changed its operational management from a more liquefied slurry to dense phase ash slurry in 2008.

#### Dam safety status of existing dam

21. The *Dams Safety Act 1918* provides the framework for the regulation of dam safety in NSW. The Dams Safety Committee (**DSC**) was constituted under the Act to ensure that dams meet a level of safety that is acceptable to the community.
22. The Department’s AR states *“[t]he existing Ash Dam has a "High B" Consequence Category under the DSC Guidelines<sup>2</sup>. This consequence category invokes conservative dam design criteria and a high level and frequency of dam surveillance inspections, monitoring and reporting. In November 2018, as part of the continuous risk and assurance process for the existing Ash Dam, [the Applicant] engaged Stantec Inc. (Stantec) to undertake a detailed Dam Break Assessment, which considered the population at risk and severity of damage and loss in the event of a dam break. This assessment concluded that as there was an increase in the assessed population at risk, compared to previous assessments, and as such the consequence category under the DSC Guidelines should increase to "High A". The increased population at risk was primarily in relation to an increase in the level of occupancy of MBSRC, which is located approximately 450 metres from the southern edge of the Ash Dam. The "High A" consequence category attracts a higher factor of safety than the "High B" category, due to increased seismic [(earthquake)] requirements.”*
23. The Department’s AR further states *“[i]n March 2019 [the Applicant] engaged Stantec to undertake a further Geotechnical Stability Assessment – Southern Embankment to determine whether the Ash Dam still met the DSC safety requirements based on the seismic requirements for the "High A" category. This assessment concluded that the Ash Dam no longer met the required factor of safety due to the increased seismic requirements and recommended that stability works be undertaken to the southern*

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<sup>1</sup> The Applicant has used its own surveying heights to derive a reduced level (RL) for ash placement of 140m. The actual RL of ash placement, when derived via the Australian Height Datum (AHD), is RL40m.

<sup>2</sup> Australian National Committee on Large Dams (ANCOLD) (October 2012) Guidelines on the Consequence Categories for Dams.

*embankment to meet the required factor of safety. [The Applicant] has confirmed that it is currently designing these works in consultation with Stantec, and that the tender process for undertaking the stability works is underway. [The Applicant] has also confirmed that a third party reviewer (Professor David Williams from the University of Queensland) has been engaged to oversee the design and construction of the stability works.”*

24. The Department subsequently requested additional information on dam stability which was provided by the Applicant on 13 December 2019. Dam stability in relation to the Modification Application is described further in Section 4 of this SoR (the Ash Dam Stability Project).

### **1.3 Summary of Development Application**

25. The Application before the Commission for determination proposes to augment the Ash Dam using an alternative ash placement strategy and dam landform design to increase the storage capacity of the Ash Dam in the short to mid-term.
26. The Applicant’s EA states the proposal would provide *“an estimated additional 5 million cubic metres of storage capacity, extending the operational life of the [Ash Dam] to approximately 2024. A key feature of the augmented ash dam deposition strategy is that deposition is limited to the existing operational footprint of the [Ash Dam], limiting environmental impacts when compared to other mid-term alternatives.”*
27. There are four components, described in the Department’s AR which form the basis of the Modification Application before the Commission;
  - construction of the Western Emplacement Area;
  - amendment of ash dam strategy;
  - upgrade stormwater system;
  - upgrades and modification of ancillary infrastructure.
28. The Commission’s determination assessment is of the Modification Application only. Other components of the Project Site, such as the existing approved ongoing operations (including the Ash Dam Stability Project), do not form part of this assessment.

Figure 3 Design Landform - Ash Placement to RL 140 (Source: Department's AR)

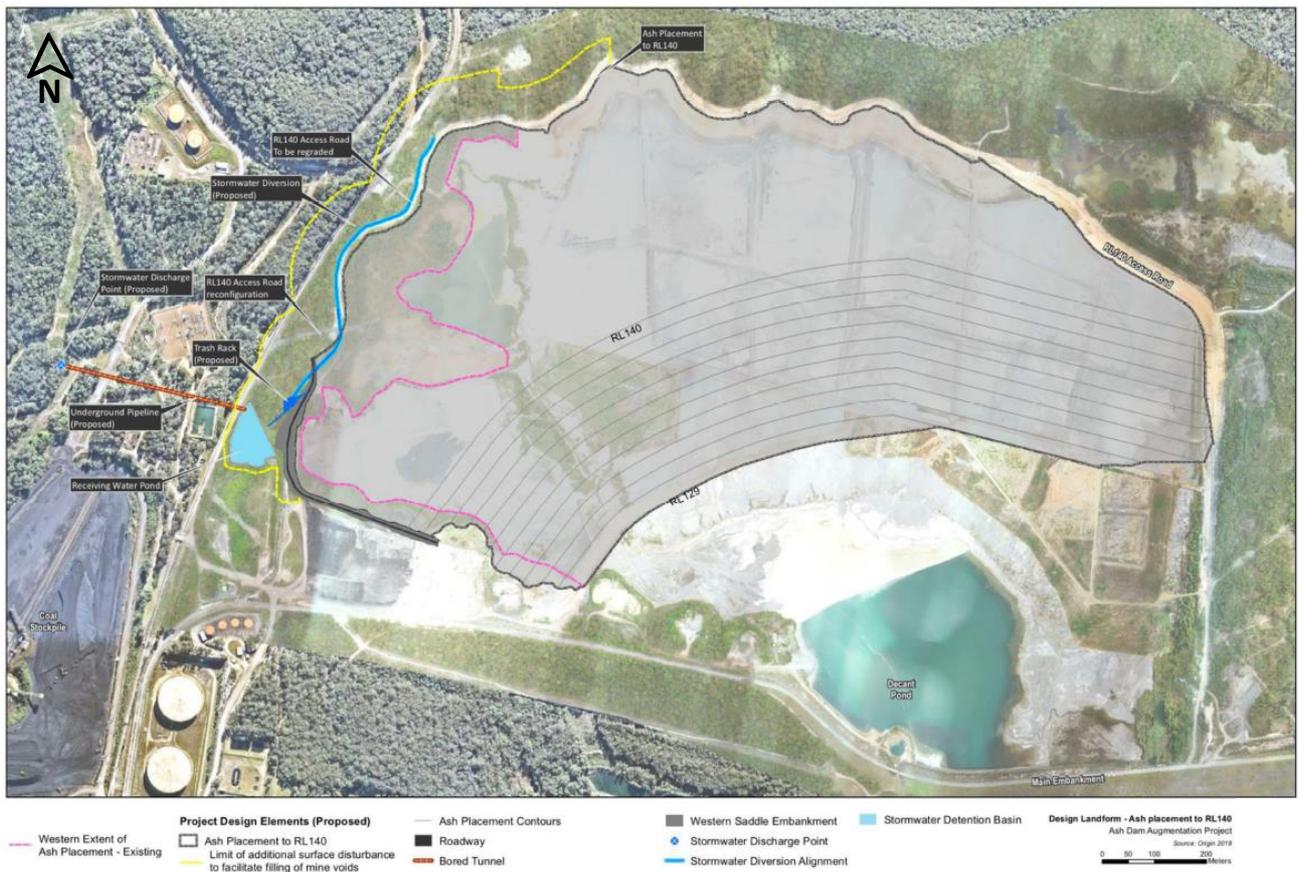
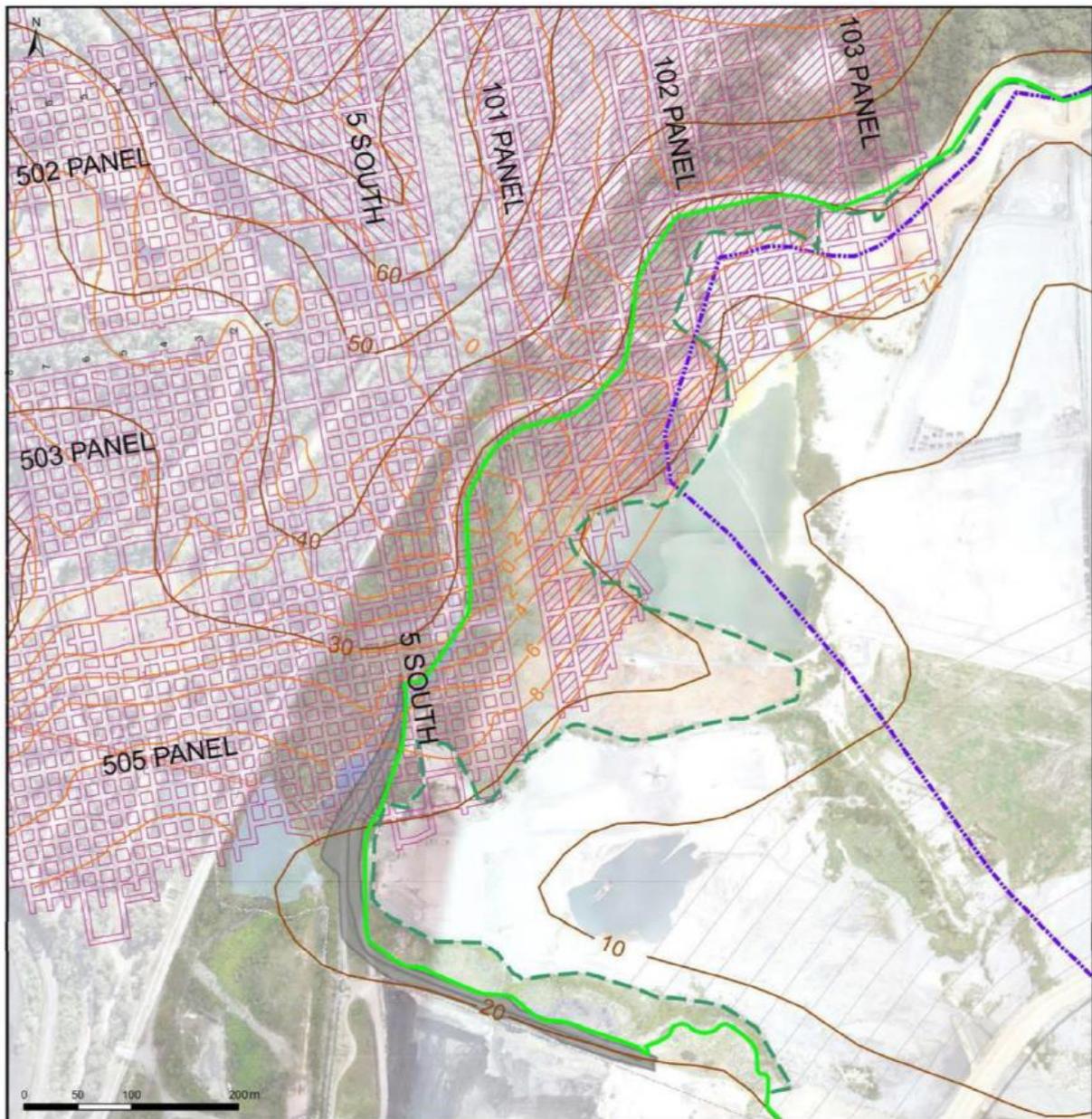


Figure 4 Location of Mine Workings below Ash Dam (Source: Department's AR)



## 1.4 Stated need for proposal/modification

29. The Applicant's EA states that the Modification Application is necessary as 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 [Power Station]. Ash Dam operations at the [Project Site] are undertaken in accordance with an Ash Dam Operations Management Strategy and a Long-Term Management Strategy (Coal Combustion Products).

*It is expected that there will continue to be an increasing reliance on the [Project Site] following the recent and planned closures of large generation assets in NSW (e.g. Munmorah Power Station which closed in 2012 and Liddell Power Station which is due to be closed in 2022) and in Victoria and South Australia. The continued operation of the Ash Dam is a business-critical priority for [the Applicant] and is required to ensure future power system security within the broader National Electricity Market.*

*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 10.3Mm<sup>3</sup> storage capacity (Aurecon, 2009)."*

30. The Applicant's EA further states "[t]o meet market demand and ensure system security (as a result of recent power station closures) [the Project Site] has operated at higher than planned output rates. This has resulted in an increase in ash disposal rates which has reduced the defined capacity of the [Ash Dam] within a shorter timeframe than planned. Consequently, alternative ash placement strategies are required to extend the storage capacity of the ash dam in the short to mid-term.
31. The Applicant's EA provides a capacity assessment and scenario testing of the Ash Dam, it states that "[a]n assessment of ash dam storage capacity has been undertaken and has determined that the [Ash Dam] would likely reach its capacity sometime between October 2023 and March 2026 based on alternate ash placement strategies [refer to Table 2]. It is noted that the alternate ash placement strategies would require approval and provide additional capacity compared to current ash placement activities undertaken in accordance with Project Approval 07\_0084."
32. The Applicant's ES further states "[u]ltimate 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 the [Project Site] 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 the [Project Site] and to cater for the needs of the National Electricity Market."

Scenario	Description	Ash generation (approx. tonnes p/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	106,188	40%	March 2026
4	Increased generation and decreased re-use	133,691	27%	July 2023

*Table 2 Storage Capacity Assessment (Source: Applicant's EA)*

33. The Applicant's Response to Submissions (the **Applicant's RtS**) states "[t]he [Ash Dam] provides (sic) storage capacity for [the Project Site] and so the [Ash Dam] is an essential part of [the Project Site]."

*It is expected that there would continue to be an increasing reliance on [the Project Site] following the recent and planned closures of large generation assets in NSW... To meet market demand and ensure system security (as a result of recent power station closures) [the Project Site] has operated at higher than previously planned output rates. This has resulted in an increase in (sic) disposal rates to the [Ash Dam] in recent years than previously anticipated...*

*The [Modification Application] is one of the steps that [the Applicant] is taking, in the ordinary course of the life of the [the Project Site], to ensure [the Project Site] continues to have operational flexibility to respond to market demands as the national energy generation mix changes over time, including with the increasing use of solar and other renewables."*

34. The Department's AF states that "[f]ollowing higher than planned electricity output rates at [the Project Site] to meet market demands and lower than predicted ash reuse rates, the volume of ash recently deposited at the Ash Dam has been higher than previously planned, and the dam is likely to reach its storage capacity of approximately 40 million m<sup>3</sup> sometime between November 2020 and January 2022, depending on electricity demand, deposition density and beneficial ash reuse markets.

*In order to provide essential additional ash storage capacity, [the Applicant] is proposing to amend the ash deposition strategy and extend the storage capacity of the Ash Dam by approximately 5 million m<sup>3</sup> (12.5% increase.) It is predicted that this will provide essential ash storage capacity until sometime between October 2023 and March 2026. [The Applicant] has confirmed that preparatory works for the proposed Ash Dam extension would need to commence in 2019 to ensure there is sufficient storage capacity to enable the ongoing operation of the [Project Site]."*

## 2. THE DEPARTMENT'S CONSIDERATION OF THE APPLICATION

### 2.1 Key steps in Department's consideration of the Development Application

35. The Applicant's EA for the Modification Application is dated 15 August 2018.
36. The Department upon receiving the Modification Application:
  - advertised the public exhibition of the Applicant's EA for the Modification Application in the Lake Macquarie Lakes Mail and the Newcastle Herald on 13 September 2018;
  - publicly exhibited the Applicant's EA from 13 September 2018 until 27 September 2018:
    - on its major projects website;
    - at Lake Macquarie City Council; and
    - at the Nature Conservation Council;
  - notified relevant State government authorities in writing and by phone; and
  - inspected the site on 8 October 2018 with representatives from the then Office of Environment and Heritage (**OEH**), now the Biodiversity Conservation Division within the Department, and again on 14 November 2018 with its independent geotechnical and hydrological consultant.
37. The Department's AR provides a summary of the submissions received during the public exhibition period. 32 submissions were received during the exhibition period:
  - seven of these submissions were received from government agencies;
  - seven of these submissions from special interest groups; and
  - 18 submissions from the general public.
38. Five of the special interest groups and 17 of the general public submissions objected to the proposed modification. Of the 18 submissions received from the general public, nine were form letter type submissions.
39. Of the total submissions received by the Department during the exhibition period, five submissions were from people living in the Lake Macquarie City Council Local Government Area (**LGA**), 12 submissions were made by people living within 50 km of the Project Site, and one was from a person living greater than 50 km or more from the Project Site.
40. The Department received a submission from Centennial Coal Company Limited dated 7 February 2019, the owner of the neighbouring Awaba Colliery, following the closure of the exhibition period. The submission was received after the Applicant had completed and submitted the Applicant's RtS. The submission did not object to the proposed modification but provided comment which was considered by the Department in its assessment.
41. Table 3 provides a summary of submissions received by the Department. Paragraphs 46 and 47 describe how the Applicant responded to the submissions.

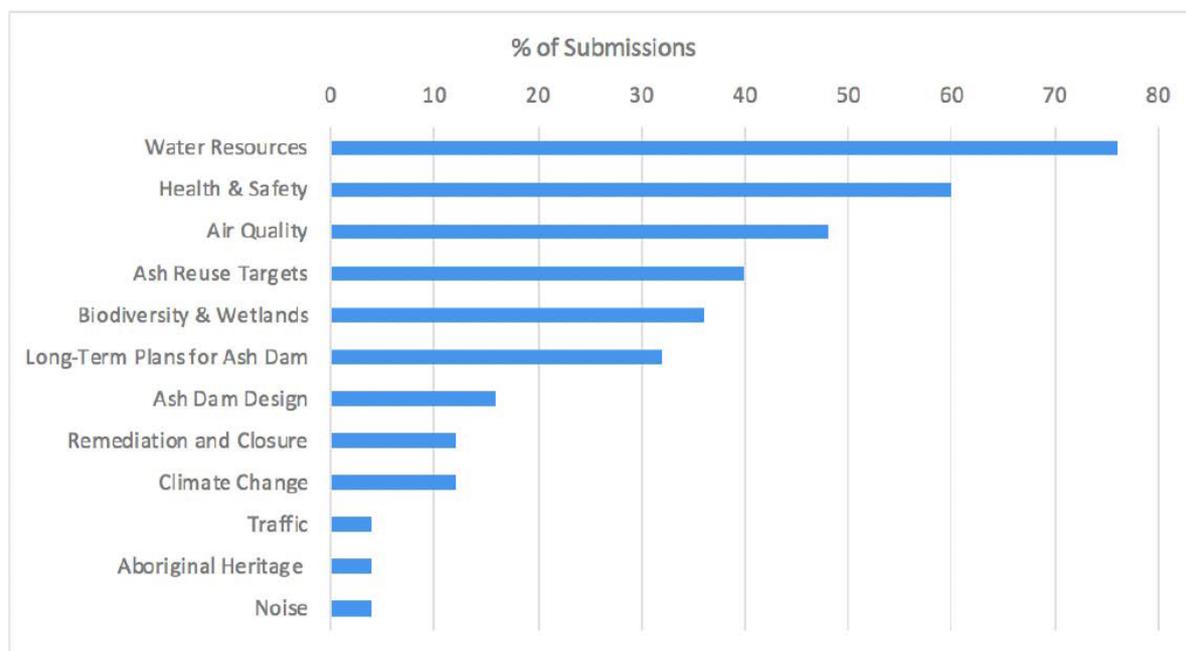
Submitters	Number	Position
<b>Agencies</b>	<b>7</b>	<b>7 comments</b>
<ul style="list-style-type: none"> <li>• Environmental Protection Authority</li> <li>• Department of Industry – Crown Lands &amp; Water Division</li> <li>• Division of Resources and Geosciences</li> <li>• Office of Environment and Heritage</li> <li>• Dams Safety Committee</li> <li>• Office of Sports</li> <li>• Lake Macquarie City Council</li> </ul>		<ul style="list-style-type: none"> <li>• Comment</li> </ul>
<b>Special Interest Groups</b>	<b>7</b>	<b>5 objections, 2 comments</b>
<ul style="list-style-type: none"> <li>• Nature Conservation Council NSW</li> <li>• Environmental Justice Australia</li> <li>• Northern Lakes Disability Tourism Precinct</li> <li>• Hunter Community Environment Centre</li> <li>• Greenpeace Australia Pacific</li> <li>• Community Environment Network</li> <li>• Centennial Coal Company Limited</li> </ul>		<ul style="list-style-type: none"> <li>• Objection</li> <li>• Objection</li> <li>• Objection</li> <li>• Objection</li> <li>• Objection</li> <li>• Comment</li> <li>• Comment</li> </ul>
<b>Community</b>	<b>18</b>	<b>17 objections, 1 comment</b>
Approximate distance from Eraring Ash Dam:		
<ul style="list-style-type: none"> <li>• &lt;5km</li> <li>• &gt;5km &amp; &lt;50km</li> <li>• &gt;50km</li> </ul>	<p>5</p> <p>12</p> <p>1</p>	
<b>TOTAL</b>	<b>32</b>	<b>22 objections, 10 comments</b>

Table 3 - Summary of Submitters (Source: Department's AR)

42. The Department received submissions from Lake Macquarie Council (the **Council**) and seven NSW government agencies (listed under the names relevant prior to the March 2019 NSW State Election):
- Environmental Protection Authority (**EPA**);
  - Department of Industry – Crown Lands & Water Division (**DOI Water**);
  - Division of Resources and Geosciences (**DRG**);
  - OEH;
  - DSC;
  - Office of Sports (**OoS**).
43. The Department's AR states that "[w]hile none of the agencies objected to the proposed modification, several commented on particular aspects of the proposal and recommended changes to the existing conditions."
44. The Department's AR described that the key issues raised in community submissions and special interest group submissions related to:
- "water resources, particularly in relation to water quality impacts on Lake Macquarie and coastal wetlands;
  - health and safety of residents; and
  - air quality impacts from wind borne dust from the Ash Dam."

45. The Department's AR provides a representation of all community concerns raised in submissions. The Department's representation has been reproduced as Figure 5.

Figure 5 Key issues raised in community and special interest group submissions objecting to the modification (Source: Department's AR)



46. On 3 December 2018 the Department received the Applicant's Response to Submissions Report (RtS), responding to the submissions summarised in Table 3.
47. The Applicant's RtS was forwarded to agencies by the Department via e-mail on 7 December 2018.
48. OEH provided a supplementary response on 21 February 2019, responding to the Applicant's RtS. OEH's recommendations are summarised in Table 4.

Theme	OEH Recommendations (21 February 2019)
Biodiversity	OEH is satisfied with the [Applicant's RtS] and has no further concerns in relation to biodiversity.
Aboriginal Cultural Heritage	OEH recommends that an Aboriginal cultural heritage assessment be undertaken in consultation with relevant Aboriginal parties to determine if there are any Aboriginal cultural heritage items or cultural values present within the modification footprint.
Flooding and Flood Risk	All details for the hydrological and hydraulic calculations need to be submitted, including, but not limited to, assumptions made, and methodology used, to achieve water mitigation measures such as receiving pond storage, outlet structures and scour protection works.

Table 4 OEH's recommendations responding to the Applicant's RtS

49. Following consultation between the Applicant and the Department additional information was provided as follows (the **Applicant's Additional Information**):
- 16 January 2019 - the Applicant responded to the Department's independent technical review described in paragraph 50;
  - 30 January 2019 - the Applicant responded to the Department's e-mail requests providing information on:
    - environmental management plans for the Ash Dam;
    - leachate/water seepage from the Ash Dam as a result of moving from a lean to a dense phase ash placement technique (reducing water composition from 70-80% to 30-40%);
    - water monitoring related to the wetland system;
    - air quality monitoring network details;
    - details of previous rehabilitation and/or revegetation capping;
    - clarification of Ash Dam storage capacity;
    - electronic design files;
    - clarification on Awaba mine barrier.
  - 11 February 2019 – the Applicant responded to Centennial Coal's submission as the submission was lodged after the Applicant provided the Applicant's RtS. The Applicant's correspondence responds to the following key issues:
    - potential extension of the existing Awaba Workings and Mine Subsidence;
    - proposed grouting of mine voids;
    - coal sterilisation and biodiversity offsets.
  - 5 August 2019 – the Applicant responded to the Department's request for information on the impact of the stability works for the Ash Dam and the relationship between the existing stability works and the Modification Application. The Applicant's response specifically addressed:
    - the reasons for the requirement to undertake the proposed Ash Dam Stability Project;
    - whether the Modification Application has a material impact on the Ash Dam Stability Project; and
    - whether the Modification Application would increase the impact of an Ash Dam wall break.
50. The Department engaged independent expert WSP to undertake an independent Geotechnical and Hydrogeological Review Eraring Ash Dam Expansion (**WSP's Review**). WSP's Review was finalised on 21 December 2018.
51. On 1 October 2019 the Department's AR was referred to the Commission. The Department's referral letter dated 1 October 2019 states *"[the Commission] is the approval authority for the Modification Application under delegation, as [the Applicant] has made a political donations disclosure... Based on its assessment, the Department considers that the modification request is approvable, subject to the recommended revisions to the project approval conditions"*.
52. The Commission's site inspections are described in Section 3.3 and 3.4 of this SoR.
53. The Commission's public meeting statement and community feedback received during the Commission's comment period is described in Section 3.6 of this SoR.

## 2.2 The Department's assessment report

54. The Department's AR, dated September 2019, addresses the Applicant's Modification Application, includes an assessment of the Applicant's Additional Information, independent experts recommendations and government agencies comments, along with recommended draft conditions for modified consent.
55. The Department consulted with the government agencies listed in paragraph 42.
56. The Department's undertook a public exhibition process as described in paragraph 36. Key issues raised in the exhibition process are described in paragraph 44 and Figure 5.
57. The Department's AR states "*[t]he Department has assessed the merits of the [Modification Application] in accordance with the relevant objects and requirements of the EP&A Act. In assessing the proposal's merits, the Department has considered the:*
  - *modification application and accompanying EA;*
  - *current conditions of the Project and Concept Approvals;*
  - *community and agency submissions;*
  - *response to submissions and additional information provided by [the Applicant]; and*
  - *relevant environmental planning instruments, policies and guidelines.*

*In addition, the Department has considered the independent expert advice from its geotechnical and hydrological consultants, WSP Australia Pty Ltd ...*

*The Department considers the key issues associated with the proposed modification are groundwater, surface water, subsidence and biodiversity impacts."*

58. The Department's AR summarises that the Modification Application "*would allow additional benefits of the project to be realised. In this regard, the project would provide essential additional ash storage capacity for the continued operation of the Eraring Power Station, thereby ensuring future power system security within the broader National Electricity Market. The ash placement strategy would secure the operation for the coming years and facilitate the development of a strategy to enable operations to continue until the presently anticipated Eraring Power Station closure, due in 2032.*

*Other key benefits of the project include improvements to existing stormwater infrastructure associated with the Ash Dam, which would reduce runoff currently entering the dam via overland flows, and therefore reduce the potential for surface water and groundwater impacts."*

59. The Department's AR concludes "*[t]he Department has assessed the modification application in accordance with the relevant provisions of the EP&A Act, including the principles of ecologically sustainable development.*

*The proposed modification would provide essential additional ash storage capacity for the [Project Site], therefore ensuring future power system security within the broader National Electricity Market. The proposal would also result in improvements to the existing stormwater system in the vicinity of the dam.*

*The Department considers its revised recommended conditions of approval provide a comprehensive, strict and precautionary approach to ensuring the Ash Dam operations*

*would continue to comply with performance measures and standards, and that the predicted residual impacts would be effectively avoided, minimised, mitigated and/or compensated.*

*Based on its assessment, the Department of Planning, Industry and Environment considers that the proposed modification is in the public interest and is approvable, subject to the stringent conditions.”*

60. Sections 5 and 6 of this SoR sets out the Commission’s detailed consideration and assessment of the matters pertaining to the Modification Application, and Section 7 sets out the Commission’s assessment of the Modification Application as a whole.

### **3. THE COMMISSION’S MEETINGS AND SITE INSPECTION**

61. As part of its determination, the Commission met with various persons and organisations as set out below. All meeting transcripts notes and correspondence have been made available on the Commission’s website.

#### **3.1 Meeting with the Department**

62. On 12 November 2019, the Department met with the Commission.
63. The transcript of the meeting was made available on the Commission’s website on 22 November 2019.

#### **3.2 Meeting with the Applicant**

64. On 19 November 2019, the Commission met with the Applicant and received a presentation. The transcript of the meeting was made available on the Commission’s website on 22 November 2019.
65. The Applicant’s presentation from the meeting was made available on the Commission’s website on 2 December 2019.
66. The Applicant took a question on notice and committed to providing a copy of the long-term ash management strategy (the **Applicant’s LTAMS 2019**). The Applicant responded to the Commission on 4 December 2019 (the **Applicant’s Response to QoN**). The Applicant’s response was made available on the Commission’s website on 10 December 2019.
67. On 10 December 2019, the Commission made a statement providing a public comment period on the Applicant’s LTAMS 2019 and the Applicant’s Response to QoN. The public comment period closed on 17 December 2019. No public comments were received on the Applicant’s LTAMS 2019 or the Applicant’s Response to QoN.

#### **3.3 The first site inspection on 19 November 2019**

68. On 1 November 2019 the Commission sent letters of invitation to the following stakeholders to attend and observe the first site inspection, scheduled to occur on 12 November 2019:
- NSW Office of Sport;
  - Centennial Coal;

- Hunter Community Environment Centre.
- Community Environment Network.

69. On 4 November 2019 (once contact details could be established) the Commission sent a letter of invitation to the Community Environment Network to attend and observe the first site inspection, scheduled to occur on 12 November 2019.
70. The letters of invitation described in paragraphs 68 and 69 state that *“[there is the] opportunity to make [a] written submission via the Commission’s website until 5:00 PM AEDT Tuesday, 19 November 2019. The Commission will not be holding a public meeting for this project.”*
71. The letters of invitation described in paragraphs 68 and 69 were made available on the Commission’s website on 4 November 2019.
72. The Commission’s first site inspection, described in paragraphs 68-76 was originally scheduled to occur on 12 November but was deferred to 19 November 2019 due to catastrophic fire and weather conditions throughout NSW, including within the Lake Macquarie LGA.
73. The Commission extended the submission period described in paragraph 70 when the Commission released its statement on 12 November 2019 that states *“[t]he Commission has decided not to hold a public meeting in relation to this matter; however, interested individuals and groups can still have their say.*

*The Commission will accept written comments in relation to this matter up until 5pm AEDT on Wednesday 27 November 2019. Written comments provided to the Panel will be carefully considered as part of its decision-making process.”*

74. Representatives from the following stakeholder groups attended the first site inspection:
- NSW Office of Sport;
  - Centennial Coal;
  - Hunter Community Environment Centre;
  - Community Environment Network.
75. The Applicant provided and referred to copies of maps contained within the Applicant’s EA during the first site inspection. The first site inspection included three stops; the water storage dam area, road RL140 at the edge of the proposed modification ash dam area; and the proposed clean surface water discharge area.
76. A summary of the first site inspection including questions asked by the Commission and answers given by the Applicant were made available on the Commission’s website on 6 December 2019.

### **3.4 The second site inspection on 5 December 2019**

77. After the closure of the public comment period described in paragraph 73 the Commission requested a second site inspection to sight areas of the existing Project Site, outside of the Modification Application, nearby the Ash Dam, as a result of community concerns expressed in public comments.
78. The second site inspection was undertaken on 5 December 2019 by the Commission

and the Applicant. The areas sighted during the second inspection were:

- the existing southern embankment and dam wall buttress area;
- existing air quality monitoring locations; and
- existing decant pond.

79. A summary of the second site inspection including questions asked by the Commission and answers given by the Applicant were made available on the Commission's website on 10 December 2019.
80. The Applicant took a question on notice at the second site inspection and provided a response on 13 December 2019 (the **Applicant's Update on the Ash Dam Stability Project**).
81. The Applicant's Update on the Ash Dam Stability Project was published on the Commission's website on 16 December 2019 and provides an update on the Ash Dam Stability Project.

### 3.5 Meeting with Lake Macquarie Council

82. On 19 November 2019 the Commission held a teleconference with Lake Macquarie Council (the **Council**) officers and discussed the following:
  - biodiversity values;
  - air quality analysis and availability of modelling information;
  - EPA's assessment of the Applicant's air quality information;
  - community feedback received by council:
    - i. reuse strategies to achieve 80% reuse target;
    - ii. ground water quality (presence of heavy metals);
    - iii. safety of existing ash dam and the closure of the MBSRC;
    - iv. future utilisation of resource under the Ash Dam and stability.
83. The transcript of the meeting was made available on the Commission's website on 22 November 2019

### 3.6 Public meeting

84. The Modification Application was exhibited on the Department's website from 13 September 2018 until 27 September 2018 as described in paragraph 36. During that period 22 objections were received as described in paragraphs 37-45 and Figure 5.
85. There is no statutory requirement for the Commission to hold a public meeting. In accordance with the public meeting guidelines, the Commission decided to not hold a public meeting given the Modification Application received less than 25 objections (and no government agencies objected). The Commission issued a statement explaining that no public meeting would be held. The statement also extended the period for written comments until 5pm on Wednesday 27 November 2019 and confirmed that *"[w]ritten comments provided to the Panel will be carefully considered as part of its decision-making process."*
86. An opportunity to observe the Commission's first site inspection was extended to four stakeholder groups as described in Section 3.3 and a further public comment period was provided for the public to comment on the Applicant's LTAMS 2019 as described in paragraph 67.

#### Submissions received by the Commission during the comment period

87. The Commission received 127 public comments during the Commission's public comment period, which closed on 27 November 2019. The 127 comments included resubmitted comments made by members of the public, comments made by both individuals and community groups, and a late comment received after the comment period closed.
88. Of the 127 comments received; 115 raised an objection to the existing Project Site operation or the Modification Application, three were in support of the Modification Application and nine were comments made about the Modification Application.
89. In summary, the key issues included:
- air quality and management activities;
  - beneficial reuse of ash rather than creation of long term storage areas;
  - pollution of Lake Macquarie (heavy metals) and contamination;
  - health concerns related to air quality and recreational activities e.g. fishing;
  - surface water and groundwater interaction including dam lining;
  - groundwater monitoring;
  - biodiversity values;
  - rehabilitation and liability;
  - future accessibility to resources (including coal and land);
  - desire for the Commission to hold a public meeting to increase information sharing;
  - poor performance of the Applicant in managing existing ash dam (e.g. air quality, structural features, and water);
  - past surface water discharges from the Project Site (and the relationship to Crooked Creek);
  - the closure of the MBSRC;
  - stability and public safety related to existing dam structures on the Project Site.
90. Certain public comments, described in paragraph 89, raised concerns about the following:
- poor performance of the Applicant in managing existing ash dam (e.g. structural features);
  - the closure of the MBSRC;
  - stability and public safety related to existing dam structures on the Project Site.

It is beyond the remit of the Commission in making its determination for this Modification Application to consider these concerns. Paragraphs 96 – 99 describe why these concerns are beyond the remit of the Commission's determination for this Modification Application.

#### **4. ADDITIONAL INFORMATION**

##### Independent Review

91. The Department engaged independent expert WSP to undertake an independent Geotechnical and Hydrogeological Review as described in paragraph 48.
92. WSP's Review specifically provided:
- *"Advice on the measures proposed by [the Applicant] to address the geotechnical and hydrogeological risks;*
  - *Recommendations for any additional mitigation measures, including*

*monitoring or requirements for the detailed design stage to inform the [Department's] assessment."*

93. WSP's Review concluded that expanding the Ash Dam over abandoned mine workings *"is feasible if appropriate subsidence mitigation and groundwater controls are implemented."* The findings and recommendations of WSP's Review are described in Section 5.6.

Stability of existing structure outside of the Modification Application

94. On 29 March 2019, the MBSRC was closed to mitigate the potential risk arising from potential failure of the Project Site's Ash Dam Southern Embankment in the event of major seismic activity.
95. While the Southern Embankment of the Ash Dam is not part of the Modification Application, the interaction between the Modification Application and the Southern Embankment was queried by the Department during their assessment as follows:
- *"The reasons for the requirement to undertake the proposed stability works to the [Ash Dam];*
  - *Whether [the Modification Application] has a material impact on the [Ash Dam] wall stability; and*
  - *Whether [the Modification Application] would increase the impact of an [Ash Dam] wall break."*
96. On 5 August 2019, the Applicant provided the following reasons for the required Ash Dam Stability Project *"the requirement to undertake stability works resulted from an increase in the [Eraring Ash Dams] consequence category under the (sic) DSC Guidelines, not as a result of a change in the [Project Site] or [Ash Dam] operations.*

*As part of [the Applicant's] continuous risk and assurance processes, [the Applicant] engaged its [Engineer of Record] to undertake a detailed assessment of the impact of a dam break. The dam break assessment concluded that as there was an increase in the assessed population at risk (PAR), compared with previous assessments, and as such the [Ash Dam's] consequence category under the DSC Guidelines should be increased.*

*[The Applicant] subsequently engaged its [Engineer of Record] to undertake a stability assessment to determine whether the [Ash Dam] still met the DSC safety requirements based on the criteria of the increased consequence category. The assessment concluded that the [Ash Dam] no longer met the required factor of safety due to the increased seismic requirements associated with the increase in dam consequence category. As a result, the [Engineer of Record] recommended that stability works be undertaken to meet the required factor of safety under the DSC Guidelines – [the Applicant] is currently developing these works."*

97. The Applicant provided further confirmation in the same correspondence from the Applicant's Engineer of Record – Stantec which states *"[b]ased on our detailed knowledge of the project, it is Stantec's view that the scope of work proposed for the [Modification Application] does not have any bearing on the assessment of stability or likelihood of failure of the Southern Embankment."*
98. Lastly, the Applicant's letter dated 5 August 2019 states *"Stantec have undertaken additional dam break modelling of the worst-case dam break scenario to assess the impact of additional ash storage associated with [the Modification Application]. The*

worst-case scenario is a ‘sunny day liquefaction breach’ as identified in the initial March 2019 modelling which assesses a November 2018 base case.

The analysis indicates a slightly increased inundation footprint on Wangi Rd and the MBSRC resulting in a ~4% increase in the assessed Population at Risk (PAR) from 286 for the November 2018 base case to 297 for the re-assessed case including [the Modification Application]. This is manageable in the overall context of the [Ash Dam] and [Modification Application] given:

- The [Engineer of Record] has concluded that in operational terms and under normal circumstances, the [Ash Dam’s] southern embankment is assessed as being likely to perform satisfactorily and in accordance with its designed functionality;
- There is no change to the consequence category of the dam as a result of the [Modification Application];
- The PAR (by definition) does not take into account emergency procedures which when in place, would likely lead to a reduction in the impact on MBRC inhabitants when compared with the assessed PAR impact; and
- Stability works are in progress for the southern embankment foundations that will reduce the risk of a dam break from an earthquake event such that the OBE and MDE criteria for a ‘High A’ dam are achieved.”

99. The Department’s AR states “[i]n terms of the safety of residents and structural integrity of the Ash Dam, it is confirmed that the modification would have no impact on the existing stability of the Ash Dam. The design of the western saddle embankment would be undertaken in consultation with the Dams Safety Committee and in accordance with relevant guidelines and requirements of the Dams Safety Act 1918. Ongoing use and operation of the entire Ash Dam, including dam surveillance and reporting, would continue to implement best practice measures to ensure the safety of the community.”

## 5. THE COMMISSION’S CONSIDERATION

### 5.1 Material considered by the Commission

100. In this determination, the Commission has carefully considered the following material (the **Material**):
- Applicant’s EA (including all accompanying specialists’ reports) dated 15 August 2018;
  - all public submissions made to the Department in respect to the public exhibition period from 13 September 2018 until 27 September 2018, (including the late submission from Centennial Coal);
  - Applicant’s RtS (including all accompanying specialists’ reports) dated 3 December 2018;
  - WSP’s Review dated 21 December 2018;
  - Applicant’s Additional Information (including all accompanying specialists’ reports) dated as follows:
    - 16 January 2019 – the Applicant’s response to WSP’s Review;
    - 30 January 2019 – environmental management plans for the Ash Dam;
    - 11 February 2019 – the Applicant’s response to Centennial Coal’s submission;
    - 5 August 2019 – the Applicant’s response to the Department’s request for information on the relationship between the existing stability works and the Modification Application;

- Department's AR (including attachments) dated September 2019;
- all material and information provided to the Commission at the site inspections on 19 November 2019 and 4 December 2019, including verbal presentations and associated document aids - being maps from the Applicant's EA and RtS;
- presentation from the Applicant on 19 November 2019;
- the Applicant's Response to QoN and Applicant's LTAMS 2019 dated 4 December 2019;
- Applicant's Response to the Commission's request for information following the second site inspection dated 13 December 2019;
- information provided during the Commission's separate meetings with the Department, the Applicant and Council as described in Sections 3.1, 3.2 and 3.5 respectively;
- all Government agency correspondence, advice, submissions and response to submissions made to the Department made available on the Department's website;
- all correspondence with the Applicant during the determination period, made available on the Commission's website;
- all public written submissions made to the Department during the public exhibition period;
- all public written comments made to the Commission during the public comment period which closed on 27 November 2019.

## 5.2 Relevant Considerations

101. The Commission notes that the following legislation applies to the existing activities on the Project Site, although this legislation was not part of the Commission's assessment and determination of the Modification Application:
- Dams Safety Act 2015
  - Protection of the Environment Operations Act 1997
  - Coal Mine Subsidence Compensation Act 2017
  - Eraring Power Station Act 1981
102. In determining this Modification Application, the Commission has taken into consideration the following:
- The relevant provisions of all:
    - environmental planning instruments (**EPIs**) outlined in Section 5.3.
  - matters for consideration specified by the EP&A Act including s75W;
  - submissions made in accordance with the EP&A Act and Regulations;
  - the public interest.
103. In determining this Modification Application, the Commission has also considered:
- the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999* (**EPBC Act**);
  - the *Commonwealth Environment Protection and Biodiversity Conservation Regulations 2000*
  - the *NSW Biodiversity Conservation Act 2016* (**BC Act**);
  - the *NSW National Parks and Wildlife Act 1974* (**NPW Act**);
  - the *Biodiversity Assessment Method Order 2017*;
  - the *NSW Biodiversity Offsets Policy for Major Projects 2014*;
  - the *Principles for the Use of Biodiversity Offsets in NSW 2013*;
  - the *Community Consultative Committee Guidelines for State Significant Projects January 2019* (the **CCC Guidelines**).

104. The Department's AR states that *"the Modification Application can be characterised under s75W as a modification to the current project approval as:*
- *there would be a limited increase (between 4-7% increase) to the physical extent of the approved ash dam footprint;*
  - *the proposal would require clearing of a relatively minor area (8.95 ha) of native vegetation;*
  - *the proposal would result in an improved stormwater diversion and storage system;*
  - *following a relatively short construction period (3 months), there would be limited environmental impacts beyond those which have already been assessed and approved;*
  - *there is no proposed change to the existing use of the premises, the coal chemical composition or existing practice of depositing ash as a dense phase slurry; and*
  - *the final ash dam design would maintain broadly similar landform characteristics to the original approved design.*

*Consequently, the Department considers the proposal to be within the scope of Section 75W of the EP&A Act."* This is considered further in Section 5.7 of this SoR.

105. The Department's AR further states *"[t]he Department has assessed the proposed modification against the objects of the EP&A Act (see section 1.3 of the Act). Table 2 [within the Department's AR] summarises how the objects of most relevance to the decision on whether or not to approve the proposed modification have been considered."*
106. The Department's AR included an assessment of the Modification Application against the relevant provisions of the following EPIs:
- *State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP);*
  - *State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP 44);*
  - *State Environmental Planning Policy 55 – Remediation of Land (SEPP 55);*
  - *Lake Macquarie Local Environmental Plan 2014 (Council's LEP).*

### 5.3 Relevant Environmental Planning Instruments'

107. The Commission considered the following relevant EPIs:
- Coastal Management SEPP;
  - SEPP 44;
  - SEPP 55;
  - Council's LEP.
108. The Department's AR states *"[t]he Department considered the assessment of these EPIs by [the Applicant] in the [Applicant's EA] and assessed the proposed [M]odification [Application] against relevant provisions of these instruments. Based on this assessment, the Department considers that the proposed modification can be carried out in a manner that is consistent with the aims, objectives and provisions of these instruments"*.

109. The Commission has reviewed the EPIs listed above in paragraphs 103 and 106, and those identified in the Applicant's EA, the Applicant's RtS, the Applicant's Additional Information and the Department's AR. The Commission is satisfied with the Department's assessment of the relevant EPIs for the reasons described in paragraph 108. The Department's AR provides consideration of the relevant EPIs, and considers whether the Modification Application is consistent with the aims and objectives of the relevant EPIs with particular focus on the Coastal SEPP.

#### Coastal Management SEPP

110. The Department's AR states *"the SEPP states that development consent must not be granted for development on land within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on:*

- (a) The integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment; and*  
*(b) Coastal environmental values and natural coastal processes."*

111. The Department's AR states *"[t]he Department accepts that the additional flows into the wetland system would be small and infrequent, and that the quality of the water would be similar to the existing surface water runoff. As discussed further in Section 6.4 [of the Department's AR], the Department considers that the diverted flows would be unlikely to cause loss of biodiversity diversity or ecological function in the aquatic ecosystems.*

*To ensure this is the case, the Department has recommended performance measures requiring negligible environmental consequences to wetlands and aquatic ecosystems as a result of the modification. In addition, the recommended Mine Void Remediation Plan requires investigations to better conceptualise the groundwater dependent and wetland systems in the vicinity of the dam expansion zone, changes in the quantity and quality of flows through these systems and a comprehensive monitoring program to assess conditions during baseline, construction and operation.*

112. The Commission acknowledges and agrees that the assessment of relevant EPIs contained in the Department's AR identified where recommended draft conditions of consent have been proposed by the Department to minimise, mitigate and/or manage potential impacts of the Modification Application to achieve acceptable environmental and amenity outcomes as required by those EPIs.
113. The Commission generally agrees with the Department's assessment and recommendations for the reasons described in paragraphs 108 and 112. In some cases, the Commission finds that additional or adjusted conditions are warranted in order to minimise, mitigate and/or manage potential impacts of the Modification Application to achieve acceptable environmental and amenity outcomes as required by those EPIs and the principles of ESD (described in paragraphs 272-275). These additional or adjusted conditions are explained further in Section 5.6 of this SoR.

#### **5.4 Permissibility under relevant Local Environment Plans**

114. The Applicant's EA states *"[the Project Site] is located within the SP2 – Infrastructure zone under LEP 2014. The objectives of the zone are to:*
- To provide for infrastructure and related uses.*

- To prevent development that is not compatible with or that may detract from the provision of infrastructure.
- To provide land required for the development or expansion of major health, education and community facilities.

*The [Modification Application] is considered to be consistent with the objectives LEP for the SP2 – Infrastructure zone.”*

115. The Department’s AR states “[t]he Department considered the assessment of these EPIs [including Council’s LEP] by [the Applicant] in the [Applicant’s EA] and assessed the proposed [M]odification [Application] against relevant provisions of these instruments. Based on this assessment, the Department considers that the proposed [M]odification [Application] can be carried out in a manner that is consistent with the aims, objectives and provisions of these instruments”.
116. The Commission agrees with the Department’s analysis and finds that the Modification Application is consistent with the objectives of the SP2-Infrastructure zone under Council’s LEP because the Modification Application is for a 4-7% increase in the existing dam footprint, would provide a landform similar to the existing, approved landform and would provide stormwater improvements to the existing stormwater system. The modification of the Ash Dam is a use that continues to be directly related to the existing infrastructure use of the land.

## **5.5 Associated modification and consents**

117. The Commission notes that operation of the Project Site is currently approved as described in paragraph 15 and Table 1. Additional information in Section 4 of this SoR describes the Ash Dam Stability Project which were the subject of some public comments received by the Commission and summarised in paragraphs 87-90.
118. The Commission notes the Applicant’s request to surrender existing Concept Approval (05\_0138).
119. The Department’s AR states “[t]he Department has completed a comprehensive review of the existing Concept Approval ... The Department agrees that most of the conditions are now redundant , particularly in relation to limits of approval, staging and scoping of works and the specific requirements for a project application. However, several conditions remain relevant and are not reflected in the existing Project Approval. These include conditions in relation to compliance monitoring and tracking, community information, consultation and involvement. The Department has recommended that the contemporary version of these conditions be included in the modified Project Approval.

*The key condition that remains relevant to the existing and proposed modified operations of the Ash Dam is Condition 3, which requires the development of a Long-Term Ash Management Strategy.”*

120. The Commission is satisfied with the Department’s analysis and reasons given in paragraph 118, and agrees that the recommended conditions of consent should require the Applicant to retain responsibility for all previously approved impacts which are not yet complete. The Commission has reviewed the Department’s assessment and finds that the Department’s recommended conditions include contemporary versions of the Concept Approval as described in paragraph 119.

## 5.6 Likely impacts of the development on both natural and built environments

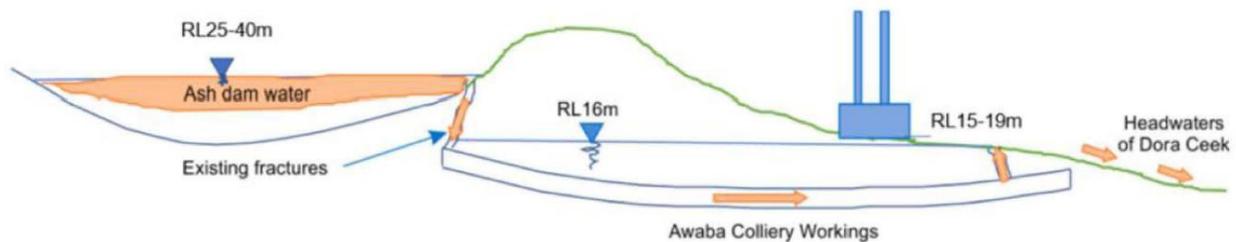
### 5.6.1 Groundwater

#### *Applicant's Consideration*

121. The Applicant undertook an assessment of the potential groundwater impacts associated with the Modification Application as part of the Applicant's EA. The Applicant's EA states "*[d]ata from groundwater bores on or near the EPS site indicate that the depth to groundwater ranges from approximately 21 to 16 m below ground level (HLA, 2006). It is expected that in general terms groundwater migrates from north of the ash dam, down gradient, towards Myuna Bay. Historical groundwater monitoring results obtained on site indicate that there are a number of trace metals in groundwater beneath the Ash Dam which have, on occasion, been recorded in concentrations in excess of the ANZECC 2000 criteria. It is unclear whether the concentrations can be attributed to background or naturally elevated conditions (HLA, 2007).*"
  
122. The Applicant's EA further states "*[p]otential impacts to groundwater quality associated with the utilisation of the Ash Dam are primarily related to the seepage and migration of potentially contaminated groundwater. The seepage and migration of potentially contaminated groundwater has the potential to impact local groundwater quality, as well as the water quality of receiving waters of Lake Macquarie, such as Myuna Bay...*  
  
*The [Modification] Project is not expected to significantly impact the groundwater quality beneath or downgradient of the Ash Dam. The cementitious nature of the dense phase placement [dense phase being 70% ash solids and 30% water] is considered likely to reduce the potential for groundwater seepage when compared to previous lean phase placement methods (i.e. using slurry containing a higher proportion of water) (HLA, 2007). In the event that seepage which has the potential to migrate off-site is identified, [the Applicant] would conduct further monitoring to determine the requirement for mitigating actions.*"
  
123. During the first site inspection (described in Section 3.3) questions were posed about options for dam lining. The Applicant reiterated that since the operational change from lean phase ash placement technique to a dense phase ash placement the cementitious nature of the material has further reduced the potential for groundwater seepage when compared to previous lean phase.
  
124. On 30 January 2019 the Applicant provided Figure 6 as part of the Applicant's Additional Information illustrating the existing clean and dirty process water.



Figure 7 Potential water flow path from Modification Application Ash Dam to nearby tributaries via Awaba workings



127. The Mine Subsidence Impact Assessment recommends that mine void filling technologies are implemented to control water connectivity and in doing will control subsidence risk *“the extent of void filling to control the water connectivity risk is expected to be larger than the extent of void filling for subsidence control, so the subsidence risk is controlled by default if the water connectivity risks are managed.”*
128. The Modification Application proposed the filling of inactive mine workings. The Applicant’s EA states *“[a] range of remedial approaches would be employed to effectively mitigate subsidence hazards identified for the site and include the following techniques:*
- *Filling of mine voids with stabilised fill material;*
  - *Excavating and collapsing of shallow mine workings; and/or*
  - *Installing an impervious barrier using clays or suitable stabilised fill materials.*

*The preferred strategy may employ all or a combination of the above techniques. The effectiveness of these remedial actions would be confirmed prior to ash placement above RL130 within the emplacement area.”*

129. The Applicant’s EA characterises the type of material needed for the mine void remediation *“[m]echanically stable fill material would be used to fill voids and fractures that exist within the overburden strata. Boreholes would be drilled from the surface to mine voids below to enable deposition of a cement stabilised fly ash fill material. The cement ratio required to stabilise the fill would be confirmed based on detailed design and site parameters but is expected to be in the range of 2 to 4% cement content for fly ash fill. The fill material would be designed to be viscous enough to displace in situ water present within the voids being filled and to avoid dilution of the grout material. Grout material would be processed on site through operation of a temporary batching plant mixing reclaimed ash material from the [Ash Dam] with cement and stabilising product. The temporary batching plant would be located within existing operational areas of the [Ash Dam].”*
130. The Applicant’s EA states that in order *“[t]o achieve effective treatment an estimated 100-130 boreholes would be drilled from the surface to depths ranging from 15 to 40m. Boreholes would be spaced according to the Awaba mine plan and located in areas of overlap with the Eraring Ash Dam and key project elements to achieve effective treatment of subsidence risks. Additional boreholes would be drilled from the existing RL140m access road, the conveyor access road and rail access road as required to minimise the potential for direct water connectivity between the Eraring Ash Dam and*

mine workings. The volume of mine voids to be filled is estimated to be approximately 200,000m<sup>3</sup>

*Where appropriate and safe to do so excavations may be undertaken to collapse shallow workings and improve stability. Materials would be stockpiled temporarily before being replaced or reused in construction activities to achieve design levels.”*

131. The mine void rehabilitation works would require clearing of vegetation to a limit of 100m from the edge of the proposed Ash Dam, illustrated in Figure 3 and described in Section 5.6.6 of this SoR.

#### *Department’s Consideration and Department’s Independent Review*

132. The Department’s AR states *“AECOM notes that the current groundwater seepage from the Ash Dam has been reduced due to the dense phase ash placement technique, which was introduced in 2008 and uses significantly less water to form the ash slurry when compared to the previous lean phase method (ie. 70% ash and 30% water compared to 30% ash and 70% water). [The Applicant] contends that the minimal water content and the cementitious nature of the dense slurry provides a low permeability layer across the surface of the Ash Dam which restricts the migration of leachate, compared to the previous lean phase deposition.”*
133. The Department’s AR states *“[the Applicant] committed to preparing a Mine Void Remediation Plan prior to mine void remediation activities commencing. It is proposed that the plan would identify the proposed void treatment methods, excavations, a material placement strategy and design criteria, as well as environmental safeguards to minimise risks to the environment. It is proposed that preparation of the Mine Void Remediation Plan would be prepared in consultation with Subsidence Advisory NSW (SA NSW) and Centennial (the owner of Awaba Colliery) and would be informed by:*
- geotechnical mine void investigations, including drilling and geotechnical core logging and/or borehole camera inspection;*
  - geotechnical and hydrologic models to assist in identifying potential groundwater flow paths, discharge locations, and water quality parameters;*
  - an assessment of potential hydraulic connectivity to determine the potential impact of subsidence and resulting hydraulic connectivity for preferred design scenarios;*
  - hydraulic conductivity of the fill material, the height to which the voids are filled, and the expected effectiveness of the filling strategy used;*
  - construction quality control measures to be implemented describing monitoring and verification of works and quality control of filling materials;*
  - design drawings, specifications and performance measures; and*
  - long-term performance monitoring requirements.*

*In addition, [the Applicant] committed to preparing a Mine Void Remediation Verification Report to determine the effectiveness of the applied rehabilitation action works. It is proposed that the verification report would be informed by and contain:*

- a summary of geotechnical and/ or groundwater investigations undertaken to verify performance measures identified in the Mine Void Remediation Plan are met; and*
- if necessary, any further monitoring or geotechnical work required to manage residual risk associated with subsidence and surface water connectivity risks prior to ash deposition above RL 130 within the western emplacement area.*

134. The Department's AR describes that submissions received during the exhibition period suggested a dam liner should be installed to act as a barrier. Similar comments were received by the Commission as described in paragraph 89.
135. The Department's AR states *"[t]he Department accepts that installing a liner under the existing Ash Dam is not feasible and notes that the existing dense phase ash placement method is likely to have formed a low permeability layer across the surface of the Ash Dam which restricts migration of leachate... installing an impervious barrier over the proposed ash extension area using clays or suitable stabilised fill materials may form part of the preferred mine void remediation strategy, subject to final detailed design and preparation of the Mine Void Remediation Plan."*
136. The Department engaged geotechnical and hydrological experts to provide independent advice on the proposed sealing techniques for the underground mine voids, and recommendations for mitigation and management of the process as described in Section 4.
137. WSP's Review concluded that expanding the Ash Dam over abandoned mine workings *"is feasible if appropriate subsidence mitigation and groundwater controls are implemented."*
138. The WSP Review further commented on each void remediation mitigation option:
- *"Grouting of the workings – stabilisation of the mine workings beneath the site by grouting is considered feasible as it provides support and has been previously used for this purpose.*
  - *Collapsing the workings – this approach is not considered an effective method to mitigate potential subsidence impacts ...*
  - *Grout barrier – this approach is proposed as an option to mitigate the flow of water from the site into the workings. Its position with respect to the dam is not known, but the grouting would need to protect the dam. This approach will need further assessment to protect the dam from subsidence impacts such as the extent of grouting to support the dam, including angle of draw impacts and abutment loading/pillar run. Pressure grouting of the overburden above mine level is expected to be needed for groundwater control.*
  - *Over-excavation – this approach is expected to be difficult due to the flooded condition of the mine workings.*
139. The Department's AR states that *"grouting or filling of the mine workings and pressure grouting overburden fractures with cement fly ash is considered the most feasible remedial method, and that this is commonly done in the Newcastle Region and other mined areas in Australia. WSP note that further consideration of the lateral extent of filling is needed, as the scientific bases for the distance of 'up to 100m' proposed [in the Mine Subsidence Impact Assessment] is not provided.*

*WSP does not consider the other remedial techniques proposed by [the Applicant] to be effective methods to mitigate potential hydrogeological risks, particularly excavation and collapsing of mine workings. This technique would create a zone of broken rock pieces which would be difficult to fill, may become flooded and the collapsing could cause vibration which may impact the existing Ash Dam...*

*The Department considers that the filling method has been used extensively in the past and is a feasible remedial technique to control potential connectivity between the Ash Dam and the mine workings."*

140. The Department's AR further states "*[WSP's Review] identified that the [Applicant's] EA contains limited groundwater information and recommended that a qualified and experienced hydrogeologist be engaged to:*
- *better conceptualise the groundwater system, particularly in the vicinity of the proposed mine filling zone, including recharge and discharge processes and locations, artesian versus non-artesian conditions, groundwater levels and local flow paths, groundwater quality (including in the mine voids) and hydraulic properties;*
  - *assess and refine the potential risks to groundwater, including the potential change to the groundwater quality due to mixing/interaction/leaching of the cement stabilised fly ash with groundwater, increasing groundwater levels and outflow from the presence of fill material, the release of potentially contaminated groundwater from the mine workings, changes in the quantity and quality of flows to the wetland systems; and*
  - *work closely with [the Applicant] and its engineering consultant to inform and refine the detailed design, including the mine fill/barrier design and program, leaching potential of cement stabilised fly ash, rate of introduction of the fill and consideration of flowability of the fill....*
141. The Department's AR describes how WSP's Review groundwater monitoring recommendations were considered "*WSP recommended that a more comprehensive ground water monitoring program, beyond that specified in the EPL, should be implemented to monitor the potential for changes in groundwater levels, flow and quality as a result of the modification. WSP recommended that this program be implemented to assess groundwater conditions during construction and operational regimes.*
- In line with WSP's advice, the Department has recommended a comprehensive ground water monitoring regime be implemented prior to the commencement of construction and during operations."*
142. The Department's AR concludes "*the Department is satisfied that the hydrogeological risks associated with the [M]odification [Application] can be effectively controlled using filling techniques, and that the development of a Mine Void Remediation Plan by an experienced and qualified hydrogeologist will ensure the existing groundwater conditions are understood and the most effective filling technique is implemented. A comprehensive ground water monitoring program would ensure any groundwater impacts associated with the modification are identified and further remedial activities implemented, if necessary."*
143. The Department's AR confirms that "*DoI Water (now the Water Division within the Department) recommended that the Surface Water and Groundwater Monitoring and Management Plan for the project be revised in consultation with DPIE Water. The Department has recommended a condition required the management plans to be updated accordingly."*

#### *Public Comments*

144. Public comments received by the Commission objecting to the Modification Application outlined the following key issues:
- surface water and groundwater interaction including dam lining; and
  - groundwater monitoring.

### *Commission's Consideration*

145. The Commission acknowledges the public's comments summarised in paragraph 144.
146. The Commission has considered WSP's Review and notes WSP's Review found that the *"grouting or filling of the mine workings and pressure grouting overburden fractures with cement fly ash is considered the most feasible remedial method, and that this is commonly done in the Newcastle Region and other mined areas in Australia"* as described in paragraph 139.
147. The Commission agrees with the WSP Review conclusion that expanding the Ash Dam over abandoned mine workings *"is feasible if appropriate subsidence mitigation and groundwater controls are implemented"* as described in paragraph 137.
148. The Commission notes the Applicant's representations (described in paragraph 122) that dense phase ash placement forms a cementitious layer that is considered likely to reduce the potential for groundwater seepage when compared to previous lean phase placement methods.
149. The Commission finds that while the groundwater seepage likelihood described in paragraphs 121 and 122 may be reduced, it is appropriate to require the assessment and refinement of the potential risks to groundwater, including the potential change to the groundwater quality due to mixing/interaction/leaching of the cement stabilised fly ash with groundwater further (described further in paragraph 139-141).
150. The Commission agrees with WSP's Review independent advice and reasoning, and finds that the Applicant is required to undertake additional groundwater studies as outlined in the Department's assessment described in paragraphs 137-141).
151. The Commission agrees with the Department's recommended conditions of consent relating to hydrogeology studies, groundwater and surface water management plans are appropriate to mitigate and manage impacts to groundwater.
152. The Commission agrees that the Department's recommended conditions of consent for a Mine Void Remediation Plan are adequate for the reasons provided by the Department as described in paragraph 142.
153. The Commission finds that it is warranted to impose an additional condition of consent to require an appropriately qualified person to be appointed to monitor construction and independently verify the entire mine void remediation works program, producing a finalisation report to be submitted to the Department. The Commission finds this is warranted to ensure supervision and reporting of the construction works occur in accordance with independent advice while responding to ground conditions during the construction phase (refer to Condition 4.6 (h) and 4.7).

### **5.6.2 Surface water**

#### *Applicant's Consideration*

154. The Applicant's EA described the current operation of Ash Dam and surface water flow paths *"[t]he Ash Dam receives flow from a range of sources including:*
  - *Incidental rainfall and adjacent contributing catchment;*
  - *Power station fly ash (solid tailings and water) via a pipe;*

- Power station bottom ash (solid tailings and water) via an open channel;
- Outflows from the transfer pond via an open channel;
- Captured seepage pumped from the Toe Drain Pond;
- Treated drainage water from designated station hard stand areas;
- Pumped outflow from the Demin Plant;
- Pumped flow from the Return Water Tank and Outfall Canal as required for maintaining water level in the Ash Dam;
- Pumped excess water from Awaba Mine.

Part of the rehabilitated surface area of the ash dam and the natural catchments towards the north are diverted into the adjacent constructed wetland, and serve to reduce clean catchment inflows into the Ash Dam.

In addition to evaporative processes, captured water is discharged by:

- Outflow via a siphon pipe controlled by a valve to the Return Water Dam;
- Overflow discharge via a spillway to the Return Water Dam;
- Seepage, some of which is collected in the Toe Drain Pond and re-circulated to the Ash Dam;
- Some minor losses due to moisture content of the ash which is harvested and transported offsite.”

155. Figure 6 illustrates the clean and dirty water process, while Figure 3 shows the location of the stormwater diversion works including the reviewing pond.

156. The Applicant’s EA states the proposed surface water improvements works “would divert stormwater flows from local catchments into an existing receiving pond located to the west of the Eraring Ash Dam which would otherwise enter the ash dam through a series of culverts beneath the RL140m access road... and would include:

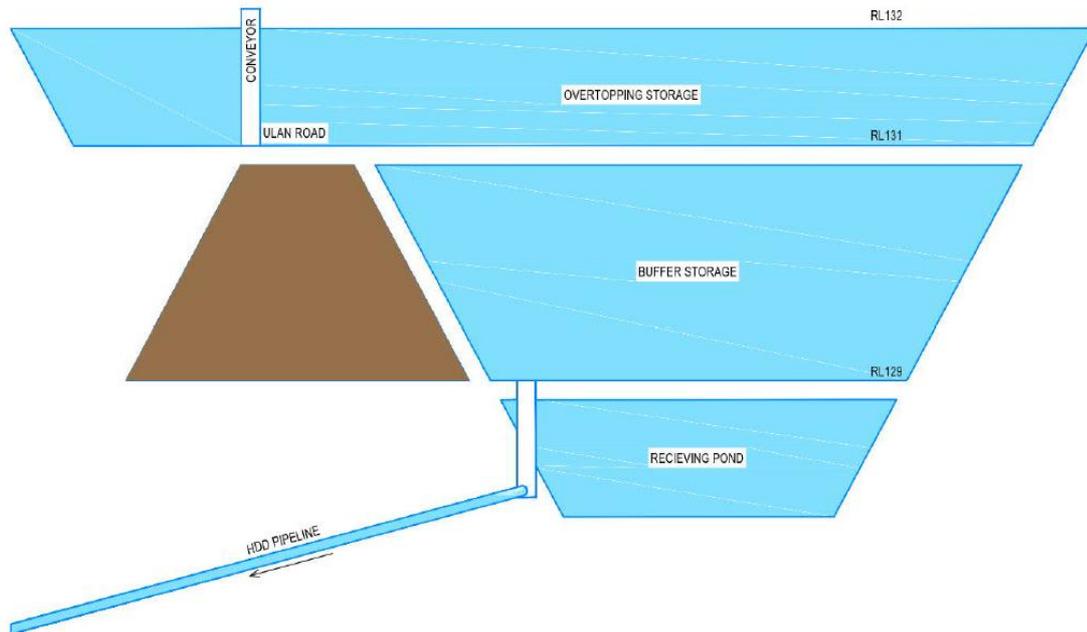
- Clearing and earthworks to the north west of the western emplacement area along a 1km alignment, to divert stormwater flows into the existing receiving pond located to the west of the Ash Dam
- A new inlet structure at the existing receiving pond
- A new HDD pipeline which would extend underground to the west from the new inlet structure, for around 360 metres, towards a new discharge point consisting of a rock lined channel.”

157. The Applicant’s EA proposes to upgrade a receiving pond (refer to Figure 8) to contain clean stormwater. The Applicant’s EA states the storage volumes of the upgraded receiving pond “will provide an estimated 10,000m<sup>3</sup> of storage volume, and additional buffer storage and overtopping storage based on the surrounding terrain.”

Storage element	Details	Estimated Capacity (m <sup>3</sup> )
Receiving Pond	Below RL 129 (estimated)	10,000
Buffer storage	Between RL 129 and RL 131	21,346
Overtopping storage	Between 131 and RL 132	17,996

Table 5 Receiving pond storage capacity (Source: Applicant’s EA)

Figure 8 Receiving Pond Conceptual Arrangement in Cross Section (Source: The Applicant's EA)



158. The Applicant's RtS states "[t]he proposed receiving pond has sufficient storage to provide detention for events up to and in excess of the 1% AEP event (the "1 in 100 year" flood) and this is typically considered an appropriate design standard for stormwater retention or detention storage.

*The Potential Maximum Flood (PMF) is the largest flood that could conceivably occur at a particular location, estimated based on Probable Maximum Precipitation (PMP), coupled with the worst flood producing catchment conditions. The EA notes that overflow storage would only be utilised in an extreme event (i.e. the PMP) which for a catchment of that size, equates to a recurrence probability exceeding well beyond 1 in 1 million years (sic) (noting that at this extent of extrapolation there is a high degree of uncertainty)"*

#### Department's Consideration

159. The Department's AR noted that the Modification Application has the potential to impact on surface waters during construction and operational phases. The Department's AR states "[t]he Department is satisfied that the potential surface water impacts during construction can be adequately managed through standard construction management measures and erosion and sediment controls. The existing Construction Environmental Management Plan (CEMP), including an Erosion and Sediment Control Plan for the site would be required to be reviewed and updated to incorporate the proposed construction work controls associated with the modification."
160. The Department's AR states "Aurecon indicates that the receiving pond has been designed to be double the existing capacity (proposed capacity of 70,000 m<sup>3</sup>) with additional buffer (21,000 m<sup>3</sup>) and overtopping storage (18,000 m<sup>3</sup>) based on the

surrounding terrain [refer to Figure 8]. Once the capacity of the receiving pond is exceeded, water would be discharged via an underground pipe to a new discharge point approximately 360 m to the west of the receiving water pond...

*The discharge point would consist of a headwall and rock lining to control localised scour and erosion. From this discharge point, water would be directed south-west through existing drainage pathways to enter existing wetlands prior to flowing into Lake Eraring and ultimately Lake Macquarie."*

161. The Department's AR affirms that "[t]he Department accepts that the designs for the stormwater containment and diversion works have been based on accepted industry best practice, and notes that the upgraded stormwater system has been designed to cater for heavy rainfall events. Aurecon's calculations demonstrate that the:
- *buffer storage would fill to 16% during a critical 1% AEP storm, and would drain to the dry weather level after 0.6 hours; and*
  - *overtopping storage would fill to 56% during a critical PMP storm duration and would drain to the dry weather level after 5.4 hours.*

*Only during a sustained extreme PMP storm event would the overtopping storage be used and would there be temporary inundation of Ulan Road (a private access road) and the coal conveyor. In its submission, OEH recommended that the receiving pond be redesigned so that it has capacity to store all appropriate floodwaters. However, the Department considers that the proposed receiving pond has sufficient capacity to provide detention for events up to and in excess of the 1% AEP event (the "1 in 100 year" flood) and that this is an appropriate design standard for clean stormwater storages. Further, the access road is not a public road and inundation would only be for a short period following a PMP storm event."*

162. The Department concluded that "overall, the Department considers that the stormwater improvements would reduce water inflows into the Ash Dam by diverting flows from local catchments which would otherwise enter the dam. This would ultimately reduce the volume of process water and leachate entering the system and the risk of water discharges to Lake Macquarie."
163. During the Department's assessment process both OEH and Council noted that the modification is within the proximity of a coastal wetland and sought further consideration of Coastal Management SEPP. The Applicant responded to these comments in the Applicant's RtS.
164. The Applicant's RtS notes that potential impacts associated with the Modification Application are primarily related to the diversion of additional stormwater into the existing wetland, prior to flowing into Lake Eraring and ultimately Lake Macquarie, during times of sustained rainfall events when the receiving pond's storage capacity may be exceeded. The Applicant's RtS states that "these impacts are unlikely to impact on the integrity or resilience of the coastal wetland environments, given:
- *the diverted surface water flows would not come into contact with ash or process water, so would be "clean" water and of comparable quality to existing surface water runoff that drains into the wetland from the surrounding environment;*
  - *the proposed increased stormwater catchment area (27 ha) is relatively small compared to the existing catchment area reporting to the wetland system (1 37 ha) as well as the existing wetland it would flow into (700 ha), so the volume of water diverted would comprise a small proportion of the receiving water*

volume;

- *the diverted flows would be limited to a maximum rate of 240m<sup>3</sup> per hour and temporary in nature (less than 40 minutes during a 1% AEP storm event and 5.4 hours during a PMP event), which is considered inconsequential in comparison to the flows reaching the wetland under existing conditions.*

165. The Department's AR notes that surface water monitoring will be required by the EPL and that *"the EPA has confirmed that the existing EPL is currently under review and that the review will include consideration of additional monitoring associated with this [Modification Application]....Key parameters of the surface water monitoring program include metals, selenium, temperature, pH, nutrients and total suspended solids."*

166. The Department's AR notes that WSP's Review recommended water monitoring including surface water monitoring. WSP's Review is described in detail in Section 5.6.1 of this SoR.

167. The Department's AR states *"[t]he Department accepts that the additional flows into the wetland system would be small and infrequent, and that the quality of the water would be similar to the existing surface water runoff.... The Department considers that the diverted flows would be unlikely to cause loss of biodiversity diversity or ecological function in the aquatic ecosystems.*

*To ensure this is the case, the Department has recommended performance measures requiring negligible environmental consequences to wetlands and aquatic ecosystems as a result of the modification. In addition, the recommended Mine Void Remediation Plan requires investigations to better conceptualise the groundwater dependent and wetland systems in the vicinity of the dam expansion zone, changes in the quantity and quality of flows through these systems and a comprehensive monitoring program to assess conditions during baseline, construction and operation."*

#### *Public Comments*

168. Public comments received by the Commission objecting to the Modification Application outlined the following key issues:

- surface water and groundwater interaction including dam lining;
- pollution of Lake Macquarie (heavy metals) and contamination;
- health concerns related to recreational activities e.g. fishing; and
- past surface water discharges from the Project Site (and the relationship to Crooked Creek);

#### *Commission's Consideration*

169. The Commission acknowledges the public's comments summarised in paragraph 168.

170. The Commission has considered the interaction between surface water and groundwater in Section 5.6.1 of this SoR.

171. The Commission notes that the EPL is under review and will include metals analysis as part of the monitoring requirements for the Modification Application as described in paragraph 165.

172. The Commission agrees with the Department's analysis described in paragraphs 159-162 and 166 that the stormwater improvements would reduce water inflows into the

Ash Dam and this would ultimately reduce the volume of process water and leachate entering the system and the risk of water discharges to Lake Macquarie.

173. The Commission notes that the past surface water discharges from the Project Site relate to the existing operational EPL. The Commission finds that consistent with paragraph 162, by reducing the volume of process water entering the system and risk of discharges, the need to undertake emergency discharge would also be reduced.
174. The Commission is of the view that the Department's assessment has adequately considered the Coastal Management SEPP in that the Department's assessment concluded that the additional flows into the wetland system would be small and infrequency, and that the water would be similar to the exiting surface water runoff thereby unlikely to cause loss of biodiversity diversity or ecological function in the aquatic ecosystems.
175. The Commission is of the view that the Department's recommended conditions of the consent are appropriate to mitigate and manage potential surface water impacts.

### 5.6.3 Geotech

#### *Applicant's Consideration*

176. The Applicant's EA states in order to obtain the additional 5 million cubic meters of ash *"a western saddle embankment is required along the perimeter of the Western Emplacement Area to enable safe placement of ash to RL 140m.*

*The concept design of the new western saddle embankment incorporates:*

- *An earth-fill embankment;*
- *Faces battered at nominal 1.5:1 upstream and 3:1 downstream subject to ground conditions and detailed design;*
- *An embankment approximately 600 m in length constructed to a maximum height of 10 m depending on topography (also acting as an access road);*
- *Incorporation into existing embankments;*
- *An access ramp extending approximately 80 m connecting the embankment to an existing access road.*

*The western saddle embankment is estimated to require approximately 32,000m<sup>3</sup> to 40,000m<sup>3</sup> of fill material with final volumes subject to detailed engineering design. Where possible, material won during excavation activities may be reused to construct the divider berms and other dam structures. Where required additional fill material including Virgin Excavated Fill Material (VENM) and clays may be imported to site.*

*The Eraring Ash Dam is identified as a prescribed dam under Schedule 1 of the Dams Safety Act 1978. Therefore, design of the western saddle embankment of the Eraring Ash Dam has been undertaken in consultation with the NSW Dam Safety Committee (DSC), relevant DSC guidelines and the requirements of the Dams Safety Act 2015.*

177. The Applicant's EA included an Mine Stability Impact Assessment which assessed two potential risks associated with the project:
  - *"Potential for subsidence in the form of either pillar collapse or roof failures leading to sinkhole formation and impacting on the ash dam and the western saddle embankment; and*

- *Mining induced fractures resulting in connectivity and the potential for surface water to flow from the ash dam into the mine workings.*

178. Potential subsidence associated with the disused Awaba workings is described in Section 5.6.1 of this SoR. The Mine Stability Impact Assessment concludes that “[b]oth subsidence and surface water connectivity hazards can be effectively controlled through the application of mine void filling technologies.”

#### *Department’s Consideration*

179. The Department’s AR noted that “[n]umerous submissions on the modification noted the risks of dam failure and raised concerns regarding the structural integrity of the Ash Dam and the proposed saddle embankment”. Similar concerns were raised in public comments received by the Commission.
180. The Department’s AR states “[t]he DSC has confirmed that the proposed Ash Dam western extension saddle embankment is assessed with Low Consequence Category. However, DSC intend to treat the embankment in conjunction with the existing Ash Dam, which currently has a "High B" Consequence Category. This consequence category invokes highly conservative dam design criteria and a high level and frequency of dam surveillance inspections, monitoring and reporting to ensure the ongoing use and operation of the dam is in accordance with best practice measures.”
181. The Department’s AR states that WSP’s Review “confirmed that stabilisation of the mine workings beneath the site by filling voids is considered feasible as it provides support and has been previously used for this purpose. Other proposed remedial methods, including collapsing the workings and/or over-excavation, are not considered to be effective to mitigate potential subsidence impacts, primarily due to the flooded nature of the workings.”
182. WSP’s Review recommended that a mine subsidence expert be retained to conduct the investigations of mine workings and subsurface conditions and to further consider subsidence impacts to the site and mitigation.
183. The Department’s AR states “[t]he Department agrees that filling considerations are a key component to ensure both structural stability and minimise flow paths from the dam. The Department has therefore recommended that a subsidence expert be retained and that a fill trial and program be included as part of the Mine Void Remediation Plan. The Department has also recommended subsidence performance measures requiring the dam expansion area, including the western saddle dam, be safe, stable and non-polluting with negligible subsidence impacts.”
184. The Department’s AR further states “Centennial indicated that it currently holds Consolidated Coal Lease 746 over the proposed Ash Dam extension area, and that potential future expansion of its underground mining operations would be within the West Borehole Seam, located approximately 200-300 m beneath the proposed extension area. Centennial raised concerns about any subsidence related interactions of future mining in this seam jeopardising the effectiveness of any remedial strategies to reduce the potential for water connectivity between the Ash Dam and the Awaba Mine workings, and potentially sterilising coal reserves in this area. Centennial requested that remedial measures and ash containment embankment walls be designed in consultation with the mine and the Subsidence Advisory NSW (SA NSW) to prevent sterilising coal reserve.

*The Department confirms that the Ash Dam, including the proposed western extension area, are located within the West Lake Mine Subsidence District. SA NSW regulates development within mine subsidence districts to protect infrastructure (typically homes and buildings) from potential subsidence damage. Under Section 22 of the Coal Mine Subsidence Compensation Act 2017, [the Applicant] is required to obtain approval from SA NSW for the extension of the Ash Dam. The Department has consulted with SA NSW in relation to the proposed modification and has sent a copy of the recommended conditions in relation to mine void remediation works. In addition, the Department has recommended that the Mine Void Remediation Plan would be prepared in consultation with SA NSW.”*

185. The Department’s AR concluded “*the Department considers that the final design, construction and operation of the proposed saddle embankment and western extension area would be done in consultation with the Department, DSC and following approval from SA NSW, therefore ensuring a high level of safety to the community and environment, and ensuring existing coal reserves beneath the extension area are not sterilised.*”

#### *Public Comments*

186. Public comments received by the Commission objecting to the Modification Application outlined the following key issues:
- future accessibility to resources (including coal and land);
  - the closure of the MBSRC;
  - stability and public safety related to existing dam structures on the Project Site.
187. Some of the public comments relate to the structural integrity of the existing Southern Embankment, being addressed by the Ash Dam Stability Project which does not form part of the Modification Application as described in Section 4 of this SoR. The western extension saddle embankment, the stability of ash placement over the Awaba working do form part of the Modification Application.

#### *Further matters raised by the Commission*

188. On 19 November 2019 the Commission attended the first site inspection and thereafter held a meeting with the Applicant. The transcript of the Applicant meeting is discussed in paragraph 64.

#### *Commission’s Consideration*

189. The Commission acknowledges the public’s comments summarised in paragraph 186.
190. The Commission has considered the interaction between groundwater and the Awaba workings in Section 5.6.1 of this SoR.
191. The Commission agrees with the Department’s assessment outlined in paragraphs 183-185 and notes that the Mine Void Remediation Plan would reduce the potential for water connectivity between the disused mine workings and Ash Dam, noting that the final Mine Void Remediation Plan will be prepared in consultation with SA NSW.
192. The Commission agrees with WSP’s Review recommendations described in paragraphs 181 and 182 and agrees that a qualified person be appointed, monitor

construction and independently verify the entire mine void remediation works program. The Commission agrees that the Department's recommended conditions of consent for a Mine Void Remediation Plan itself are adequate but also requires an additional condition for verification of construction works to reflect WSP's Review recommendations. The Commission finds that it is warranted to impose an additional condition of consent to require an appropriately qualified person to be appointed, monitor construction and independently verify the entire mine void remediation works program, producing a finalisation report to be submitted to the Department.

#### 5.6.4 Ash Reuse and Rehabilitation

##### *Applicant's Consideration*

193. Existing approvals for the Project Site require the preparation and implementation of a Long-Term Ash Management Strategy, with the goal of 80% reuse of ash by December 2021.
194. The Applicant's EA states the Project Site *has "sustained an ash reuse rate averaging approximately 40% between 2005 and 2016"*.
195. The Applicant's ash reuse rates and storage life is tabulated in Table 2, and described in paragraphs 31 and 32.
196. The Applicant's EA states *"[the Project Site] is expected to reach the end of its operational life by 2032."*
197. The Department's AR summarises *"during the 2017-2018 period, the [Project Site] produced around 1.6 million tonnes of ash. Approximately 29% of the ash produced was sold and reused in other processes. Origin currently has agreements in place with both Flyash Australia and Boral to use the ash produced at the power station in the production of cement and concrete used in the building and construction industries. The remaining 77 % of ash produced at EPS was stored in the Ash Dam.*

*Ash reuse rates over the last few years have reduced by around 77% due to an extended power station outage (scheduled to occur every ten years) and variance in coal supplied to {the Project Site} in early 2017, which saw ash produced during this time deviate from typical product specifications. Together both issues contributed to a number of customers sourcing alternative ash supplies or reverting to blast furnace slag or other recycled products in lieu of ash produced at the [Project Site]. [The Applicant] anticipated that reuse rates will return to long term trends as confidence in supply is restored."*

198. The Applicant's EA states *"[f]ollowing decommissioning of [Project Site] it is anticipated that the site will be rehabilitated to a point that will allow further uses, for example industrial and/or community uses. Origin will rehabilitate the final footprint of the CCP management facility in a manner generally consistent with the surrounding landform."*
199. The Applicant's RtS states *"on-going, progressive rehabilitation of the [Ash Dam] would be carried out in accordance with the Biodiversity and Land Management Plan (AECOM, 2017). Further, areas disturbed as a result of construction activities from the [Modification] Project which are not required for future operational use would be progressively stabilised and rehabilitated as soon as practical following disturbance (in accordance with the Biodiversity and Land Management Plan (AECOM, 2017))..."*

*Long term rehabilitation of the [Ash Dam] is dependent on further engineering design to enable operation until the anticipated [the Project Site] closure date of 2032. It is anticipated that a detailed rehabilitation plan would be developed closer to closure once a final landform for the [Ash Dam] has been developed."*

200. The Applicant's RtS further states *"it is anticipated that the site would be rehabilitated to a point that would allow further uses, for example industrial and/or community uses. [The Applicant] would rehabilitate the final footprint of the [Coal Combustion Product] management facility in a manner generally consistent with the final landform. [The Applicant] maintains allocations across its energy portfolio to provide assurance for long term rehabilitation objectives associated with its assets. A bond is not considered necessary as part of the Project [Site] as appropriate environmental safeguards are currently in place for the existing [Ash Dam] and would continue to be applied to the Project [Site] in its modified form."*

#### *Department's Consideration*

201. The Department's AR summarises the Department's consideration of rehabilitation:
- *"Concerns were raised in submissions that there is no long-term remediation/rehabilitation strategy or closure plan for the Ash Dam.*
  - *In its response, Origin confirmed that an area covering 60 ha on the eastern side of the Ash Dam has progressively been rehabilitated and revegetated with native plant species.*
  - *Origin committed to further ongoing and progressive rehabilitation of the Ash Dam in accordance with the existing Biodiversity and Land Management Plan (AECOM, 2017).*
  - *Origin noted that long term rehabilitation of the Ash Dam is dependent on further engineering design, however the company committed to preparing a detailed rehabilitation and closure plan once the final landform for the Ash Dam has been developed.*
  - *The Department accepts this approach and notes that the existing conditions of approval require the preparation of a Rehabilitation Program, which will be updated to incorporate the proposed modification area.*

#### *Public Comments*

202. Public comments received by the Commission objecting to the Modification Application outlined the following key issues:
- beneficial reuse of ash rather than creation of long term storage areas;
  - rehabilitation and liability.

#### *Further matters raised by the Commission*

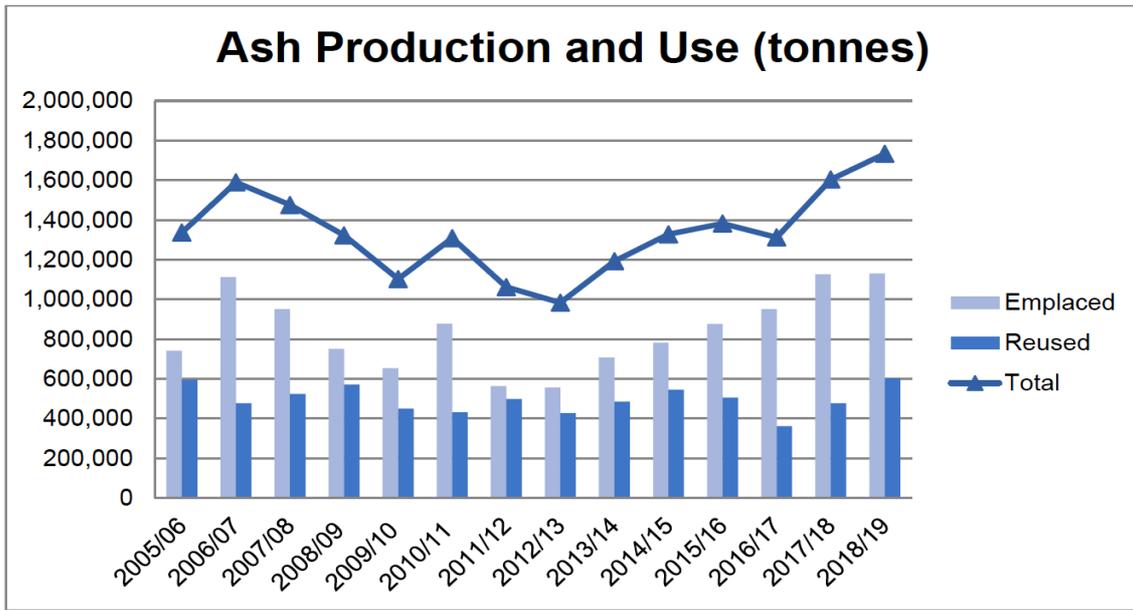
203. On 29 November 2019 the Commission met with the Applicant. During the Applicant meeting the Commission queried if the ash reuse goal of 80% was considered to be an achievable goal for the Applicant.
204. On 29 November 2019 during the Applicant meeting the Commission requested a copy of the Applicant's LTAMS 2019.

#### *Applicant's Response on Further Matters*

205. During the Applicant meeting described in paragraphs 64-67, the Applicant confirmed that an ash reuse goal of 80% was achievable by 2021. The transcript of the Applicant's meeting is described in paragraph 64.
206. On 4 December 2019 the Applicant's LTAMS 2019 was provided to the Commission by the Applicant. On 10 December 2019 the Applicant's LTAMS 2019 was placed on the Commission's website and was open for comments for seven days. No public comments were received on the Applicant's LTAMS 2019 as described in paragraph 67.
207. The Applicant's LTAMS 2019 provides a framework for the identification, investigation and development of alternatives to ash storage at the existing ash dam through possible ash use and recycling options states "*[the Applicant's] commitment to the ash recycling target can be evidenced by the following:*
- *[The Applicant] continues to monitor developments in ash management and opportunities within the building/construction and allied sectors and assist in changing the image of ash from a waste product to a commodity.*
  - *[The Applicant] has implemented and maintained monthly reporting to site and senior management with updates on progress with new opportunities identified to be incorporated into the LTAMS. [The Applicant] also reports back to the Secretary of DPIE with updated LTAMS on an annual basis.*
  - *[The Applicant] is an active member of the Ash Development Association of Australia (ADAA) in its attempts to investigate and create new markets through increasing users', stakeholders' and regulators' awareness of the benefits of effective ash utilisation.*
  - *[The Applicant] continues educating and marketing to potential customers about the new streamlined processes available for ash under the Coal Ash Exemption 2014.*
  - *[The Applicant] commits to working with regulatory authorities to streamline approval processes and avoid exposure to regulatory risk associated with the use of ash.*
  - *[The Applicant] will continue its efforts to increase the use of ash in existing markets through new agreements and those currently in place.*
  - *[The Applicant] holds regular meetings and contact with key people within relevant State and Local Government departments to facilitate access to key opportunities for ash use in government projects.*
  - *[The Applicant] will continue its efforts to progress new markets in ash reuse through the expansion of research and development opportunities, and through the implementation of proven technologies for the use of fly ash.*
  - *[The Applicant] will further develop technical data sheets and associated information for the use of ash as required."*
208. The Applicant's LTAMS 2019 states "*the 2018/19 period reported the largest quantities of ash produced in recent years driven by national energy demands. With recycling tonnages of 602,580 tonnes and a rate of approximately 35%, 2018/19 also had the highest quantity of ash recycled since 2005/06.*

*In addition to ash demand [the Applicant] puts this down to the focussed effort of the recycling business unit and senior management drive to achieve the 2021, 80% target."*

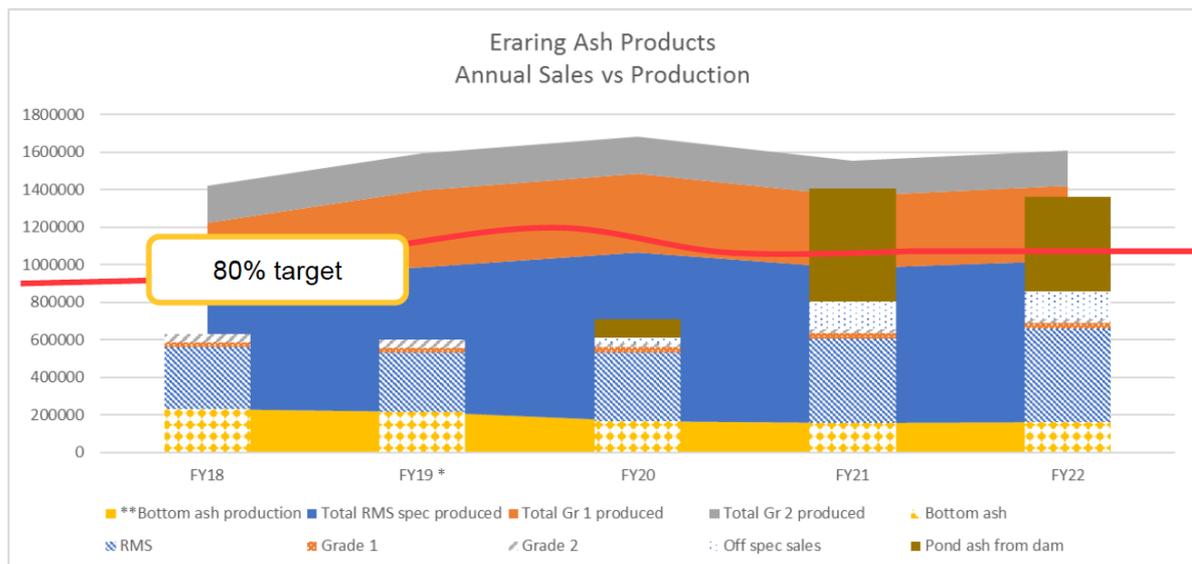
Figure 9 Ash Production and Use (tonnes) (Source: Applicant's LTAMS 2019)



209. The Applicant's LTAMS 2019 noted that approximately 90% of all ash is fly ash and 10% is bottom ash. In 2018/19 130% of bottom ash was recycled, that is all of the bottom ash generated in that year was recycled (100%) with additional bottom ash removed from the ash dam for recycling sales opportunities (30%).

210. The Applicant's LTAMS 2019 further states "[Figure 10] shows the current position where ash recycling in 2019 is approximately 602.5ktpa. In the near term (2020 – 2022) the diversified Run of Station sales and the mine rehabilitation trial project has the potential to significantly increase ash recycling up to a recycling rate from the current 35% to above 50%."

Figure 10 Ash recycling ramp rate (Source: Applicant's LTAMS 2019)



211. Innovative new products and technology opportunities under investigation by the Applicant include:
- Ultra-high-volume fly ash pavement;
  - Ash amended road base pavements and quarry products;
  - Light weight aggregate manufacturing;
  - Pre-cast building materials;
  - Mine Void Rehabilitation;
  - Mine Rehabilitation;
  - Geopolymers.
212. The Applicant's LTAMS 2019 makes a concluding statement about progressive rehabilitation completed to date *"[the Applicant] has undertaken temporary capping in the south west and south east sections of the dam and is planning to temporarily cap eastern areas of the dam which have recently been reopened once placement in the area is complete. [The Applicant] will continue to review opportunities for temporary capping in line with current strategies for ash placement and recycling. [The Applicant] may also re-open previously capped areas of the ash dam to recover impounded ash for recycling purposes."*

#### *Commission's Consideration*

213. The Commission acknowledges the public's comments summarised in paragraph 202.
214. The Commission notes the Applicant's position that achieving an 80% reuse goal by 2021 is achievable and projected to occur as described in paragraphs 203, 208 and Figure 10.
215. The Commission encourages the Applicant to actively accelerate the development of additional recycling and reuse applications for ash.
216. The Commission finds that it is warranted to alter the LTAMS condition to strengthen the requirement to achieve the 80% ash reuse goal (refer to Condition 4A.1(a)) for reasons described in paragraph 214.
217. The Commission agrees with the Department's analysis of rehabilitation for the Modification Application and the recommended conditions. However, the Commission finds that an additional condition is warranted to ensure appropriate planning commences for the rehabilitation of the Ash Dam post 2032. The Commission finds that it is warranted to require the preparation of a rehabilitation management plan for the Ash Dam to be submitted to the Department within three years of the Modification Application determination as the Ash Dam (being part of the Project Site) is scheduled to close in 2032 and therefore should commence rehabilitation planning (refer to Condition 4.9).

#### **5.6.5 Air quality**

218. The Applicant's EA states *"[t]he Project [Site] is surrounded predominantly by undeveloped bushland, which serves as a buffer zone between the [Project Site] and surrounding residential areas...."*

*The nearest residential receivers to the project area include the suburb of Eraring (approximately 1 km south), Dora Creek (approximately 4 km southwest), Wangi*

*Wangi, Arcadia Vale and Buttaba (approximately 3 km east), Awaba (approximately 3 km north), and Toronto (approximately 4.5 km northeast)...The Myuna Bay Sport and Recreation Centre is located approximately 500m to the south..."*

219. The Applicant's EA described the construction work period, "[p]otential emissions from construction works would be minor and temporary and would be managed in accordance with standard construction management measures."
220. The Applicant's EA outlines existing air quality management practices undertaken in accordance with an existing environmental protection licence. "A comprehensive air quality, surface water and groundwater monitoring program is maintained in accordance with EPL 1429 ... Continuous ambient air quality monitoring is currently undertaken at two locations, including south of the [Project Site] at Dora Creek and east of the [Project Site] in Marks Point. Continuous monitoring is undertaken for sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO, NO<sub>x</sub> and NO<sub>2</sub>) as well as various meteorological parameters. Depositional dust is also monitored at four locations in the vicinity of [Project Site]. Stack emission monitoring is conducted at discharge points on the four boiler units at [Power Station] on the Emergency Turbine Generator."
221. The Applicant's EA further states "[t]he peak dispersion impacts [of the Modification Application] were predicted to the east of the EPS site over the suburbs of Rathmines, Balmoral, Buttaba, Arcadia Vale and Wangi Wangi. However, the potential influence of the Ash Dam emissions dispersion on local receptors was well below the EPA criteria. No exceedances were found to occur at any of the residential areas as a result of the Ash Dam emissions, with a maximum criterion contribution of 27% (24 hour PM<sub>10</sub> concentration of 13.6 µg/m<sup>3</sup> compared to the EPA PM<sub>10</sub> 24 hour criterion of 50 µg/m<sup>3</sup>). A screening analysis for heavy metal impacts using ash composition and total suspended particulates (TSP) dispersion modelling predicted all heavy metals met relevant EPA assessment criteria by a large margin."
222. The Applicant's RtS confirms progressive rehabilitation has occurred on some parts of the existing Ash Dam. "[The Applicant] has commenced an extensive program of rehabilitation and revegetation of areas affected by the operations of the [Project Site]. Progressive rehabilitation of completed surfaces of the [Ash Dam] would be undertaken where possible, which would minimise the potential for generation of dust emissions."
223. The Applicant's RtS provides a summary of environment management procedures currently employed "to mitigate the potential for dust generation on the Ash Dam and are addressed within the [Project Site] environmental management procedures:
- Temporary capping and vegetation
  - Strategic placement of CCP to maintain the [Ash Dam] surface in a moist condition
  - Progressive rehabilitation of completed surfaces
  - Strategic application of crusting agents
  - Use of vegetative screens and bunds around areas of active CCP placement
  - Direct water application through sprays or water cannon
  - Temporary mobile or longer term fixed wind breaks
  - Monitoring measures including:
    - i. Surface condition monitoring to confirm crusting process and identify areas potentially requiring treatment
    - ii. Airborne Total Suspended Particulate (TSP) and Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>) monitors stationed around the [Project Site]. Real

*time monitors provide alarms via SMS when dusting is detected to enable an immediate response*

- iii. *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.”*

224. The Applicant described air quality management practices similar to those in paragraph 223 during the second site inspection.

#### *Department’s Consideration*

225. The Department’s AR states, *“EPA is satisfied that its areas of responsibility have been adequately addressed in the EA and noted that the EPL1429 which applies to the [Project Site] is currently under review.”*

226. The Department’s AR summarises *“[i]n relation to air quality, the existing emissions from the Ash Dam at local receptors are well below the Environment Protection Authority’s air emission criteria, which have been developed for the purposes of protecting human health and amenity. The proposed modification would increase the Ash Dam surface area potentially exposed during operation by between 4% and 7%, which represents approximately 70 hectares. Emissions from the minor increases in the surface area of the Ash Dam would be effectively managed using existing monitoring and controls designed to mitigate dust generation. The potential impacts to air quality are predicted to remain substantially the same during operation.”*

#### *Public Comments*

227. Public comments received by the Commission objecting to the Modification Application outlined the following key issues:

- air quality and management activities;
- health concerns related to air quality;
- desire for the Commission to hold a public meeting to increase information sharing;
- poor performance of the Applicant in managing existing ash dam (e.g. air quality, structural features, and water).

#### *Council’s Comments*

228. Council did not object to the Modification Application but sought additional clarification of the air quality assessment. On 19 November 2019 the Commission met with Council (as described in paragraph 82). During the Commission’s meeting with Council, Council advised they would defer to EPA’s assessment of the Applicant’s Additional Information for air quality. Council requested a copy of air quality monitoring information to be provided by the Applicant in due course. The dissemination and access to monitoring information is discussed in paragraph 263 and 264.

#### *Commission’s Consideration*

229. The Commission acknowledges the public’s comments summarised in paragraph 227.

230. The Commission acknowledges Council’s comments summarised in paragraph 228.

231. The Commission notes the Applicant's air quality management procedures described in paragraph 223.
232. The Commission notes that during the second site inspection on 5 December 2019 the Commission sighted one of the air quality monitoring devices as described in paragraph 78.
233. The Commission notes that the Department and the EPA are satisfied that areas of responsibility are adequately addressed in the EA and EPL, as described in paragraph 5.
234. The Commission agrees with the Department's analysis of air quality impacts for the Modification Application as existing emissions at local receptors are well below the EPA's air emission criteria and that the Modification Application would increase the disturbed surface area by 4-7%. However, the Commission finds that an additional condition is warranted in order to minimise, mitigate and/or manage potential air quality impacts. The Commission has therefore applied Condition 4.8 for the Applicant to prepare, submit and manage the Ash Dam in accordance with an Air Quality Management Plan.

### 5.6.6 Biodiversity

235. The Modification Application seeks approval to impact approximately 8.95 ha of native vegetation. A Biodiversity Development Assessment Report was prepared in accordance with the BC Act.
236. Three ecosystem-credit species were recorded during field surveys or were considered likely to occur, including:
- Black-eyed Susan;
  - Squirrel glider;
  - Stephen's banded snake.
237. Two Plant Community Types (PCTs) were assessed as being in good condition:
- 0.95 ha of PCT-1627 Smooth-barked Apple-Turpentine - Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast; and
  - 8.0 ha of PCT-1636 Scribbly Gum - Red Bloodwood-Angophora inopina heathy woodland on lowlands of the Central Coast.
238. The Applicant's EA states "*[f]ollowing the application of avoidance and mitigation measures, assessment in accordance with the Biodiversity Assessment Method identified that the following biodiversity credits would be required to offset the impacts of the Modification Application:*
- *22 ecosystem credits for PCT1627 Smooth-barked Apple – Turpentine – Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast;*
  - *261 ecosystem credits for PCT1636 Scribbly Gum – Red Bloodwood – Angophora inopina heathy woodland on lowlands of the Central Coast*
  - *327 species credits each for Black-Eyed Susan, Squirrel Glider and Stephen's Banded Snake."*

239. The Applicant’s offset strategy is described in the Applicant’s EA as “[the offset requirements under the BC Act would be fulfilled using one or a combination of the following offset strategies:

- *In-perpetuity conservation through the establishment of a Stewardship site achieved and the retirement of credits;*
- *Securing required credits through the open credit market and/or;*
- *Payments to the Biodiversity Conservation Fund.*

*In-perpetuity conservation would form the preferred method of offsetting under the BC Act where practicable. [The Applicant] has undertaken preliminary investigations of land-based offset opportunities and identified approximately 60ha of potentially suitable land. An additional 500ha of potential offset sites have been identified within 10km of the Project [Site].”*

240. The Applicant’s RtS included an EPBC Assessment of Significance Report assessing the likelihood of occurrence and an assessment of significance for biodiversity related Matters of National Environmental Significance (MNES) listed under the EPBC Act (described further in paragraph 244).

#### *Department’s Consideration*

241. The Department’s AR states “OEH has confirmed that it is satisfied that the BDAR has appropriately been completed in accordance with the Biodiversity Assessment Method Order 2017 (BAM) of the [BC Act].”

242. The Department’s AR tabulates the disturbance footprint and credits required (refer to Table 6).

*Table 6 Summary of offset credit requirements (Source: Department’s AR)*

PCT/Species Credit	Disturbance Area	Credits Required
<b>Ecosystem Credits</b>		
PCT1627 Smooth-barked Apple-Turpentine – Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast	0.95	22
PCT1636 Scribbly Gum – Red Bloodwood – <i>Angophora inopina</i> heathy woodland on lowlands of the Central Coast	8.0	261
<b>Species Credits</b>		
Black-eyed Susan – <i>Tetratheca juncea</i>	8.95	327
Squirrel glider – <i>Petaurus norfolcensis</i>	8.95	327
Stephen’s banded snake – <i>Hoplcephalus stephensii</i>	8.95	327

243. The Department's AR confirmed "OEH has reviewed and accepted the calculations as presented in the BDAR and has indicated that it is satisfied that the above offsetting approach is consistent with the BAM."

244. The Department's AR states "[the EPBC] assessment identified 702 threatened and/or migratory entities have been recorded and/or are predicted to occur in the locality. Of these, 11 were categorised as having a medium or greater likelihood of utilising the terrestrial habitats in the modification development footprint. Assessments of the 'significance of impact' of these entities was undertaken which found that the [Modification Application]:

"... is unlikely to result in a significant impact on an important population of the migratory black-faced monarch or vulnerable grey-headed flying-fox, large-eared pied bat, *Acacia bynoeana*, *Grevillea parviflora* subsp. *parviflora*, *Rutidosis heterogama*, or *Tetradlea juncea*, and unlikely to result in a significant impact on a population of the endangered spotted-tailed quoll or critically endangered regent honeyeater, swift parrot or *Genoplesium insigne*."

Based on these findings, [the Applicant's consultant] concluded that the proposed [Modification Application] is unlikely to have a significant impact on biodiversity related MNES and, as such, a referral to the Commonwealth Environment Minister should not be required. The Department accepts this conclusion, noting that whether to refer the activity under the EPBC Act is a matter for [the Applicant] to decide."

245. The Department's AR states "[t]he land disturbance would mostly be associated with the areas required to improve the existing stormwater management system and to facilitate filling of mine voids.

The proposed modification has been designed to limit biodiversity impacts to the existing operational footprint of the Ash Dam as far as possible, and to avoid impacting areas currently reserved for habitat offsets, previously revegetated areas and an existing wetland. [The Applicant] has also committed to implement additional mitigation measures to minimise indirect impacts on biodiversity, including demarcation of approved clearance boundaries, pre-clearance surveys, weed management, pest animal control and bushfire management."

246. The Department's AR concludes "OEH and the Department agree that potential biodiversity impacts associated with the proposed modification have been appropriately avoided and minimised, and that residual impacts are not considered significant, as:

- the area of net clearance (8.95ha) is relatively minor and necessary for the establishment of an improved storm water system and dam stabilisation works;
- the disturbance areas would be progressively rehabilitated; and
- [the Applicant's] Biodiversity Offset Strategy would compensate any residual impacts [described in paragraph 238]."

#### Public Comments

247. Public comments received by the Commission objecting to the Modification Application outlined the following key issues:

- biodiversity values (including corridor connections).

### *Council's Comments*

248. Council did not object to the Modification Application but raised concerns that the native vegetation clearing proposed as part of the Modification Application may reduce and fragment a mapped Native Vegetation Corridor. Council suggested that compensatory revegetation and rehabilitation works be undertaken on the Project Site.
249. On 19 November 2019 the Commission met with Council (as described in paragraph 82 and 83). During the meeting Council requested confirmation that the proposed clearing is not an existing offset for the Project Site. Council suggested that if the proposed clearing was existing biodiversity area, additional, further offsetting should be considered.

### *Commission's Consideration*

250. The Commission acknowledges the public's comments summarised in paragraph 247.
251. The Commission acknowledges Council's comments summarised in paragraph 248 and 249.
252. The Commission agrees with the Department's assessment of EPBC MNES as described in paragraph 244 that the Applicant's EPBC biodiversity assessment concluded that the Modification Application is unlikely to have a significant impact on biodiversity related MNES and, as such, a referral to the Commonwealth Environment Minister should not be required.
253. The Commission notes that during the site inspection on 19 November 2019 the Applicant confirmed that the proposed clearing did not include areas previously used for offsetting.
254. The Commission notes that the Department and OEH are satisfied with the Biodiversity assessment and the offset strategy as described in paragraph 246.
255. The Commission agrees with the Department's analysis of biodiversity impacts for the Modification Application and the recommended conditions as biodiversity impacts of the Modification Application have been appropriately avoided and minimised, and residual impacts are not considered significant.

### **5.6.7 Cultural Heritage**

#### *Applicant's Consideration*

256. The Applicant's EA describes that an Aboriginal heritage due diligence visual inspection was undertaken on 2018 for the Modification Application.
257. In response to questions raised by OEH, the Applicant's RtS commits to "the following additional indigenous engagement strategy:
- *Prior to construction, consultation by written correspondence would be undertaken with the following previously identified Aboriginal Parties:*
    - i. *Koompahtoo LALC;*
    - ii. *Wonnarua Nation Aboriginal Corporation (WNAC);*
    - iii. *Yarrowalk Enterprises Pty Limited (Yarrowalk) (now Tocumwall);*

- iv. *Awabakal Descendants Traditional Owners Aboriginal Corporation (ADTOAC);*
- v. *Awabakal Traditional Owners Aboriginal Corporation (ATOAC);*
- vi. *Guringai Tribal Link Aboriginal Corporation (GTLAC).*
- *Prior to construction, an updated Native Title Search for the Project area would be undertaken and if a relevant registered Native Title Party and/or Applicant is identified, consultation by written correspondence would be undertaken.*
- *Prior to construction, a one day site visit would be held with any of the previously identified Aboriginal Parties (and any additional parties..., to document and confirm the existing disturbed landscape and provide the opportunity to identify extant Indigenous or non-Indigenous sites or areas of archaeological sensitivity.*
- *Prior to construction, [the Applicant] would prepare an update of the previously completed Heritage Assessment report with supplementary findings from the site inspection with Aboriginal Parties. The supplementary assessment would comprise a short letter report containing the following information:*
  - i. *Updated desktop review of relevant available indigenous heritage assessment reports for the [Modification Application].*
  - ii. *Updated search of heritage registers as well as Commonwealth registers for indigenous heritage sites within the [Modification Application].*
  - iii. *A summary of the outcomes and findings of the one day site visit with those Aboriginal Parties.*
  - iv. *Management advice for any identified or potential indigenous heritage constraints.”*

#### *Department’s Consideration*

258. The Department’s AR notes that OEH were consulted and recommended a condition of consent for aboriginal heritage.

259. The Department’s AR summarises “[p]rior to the commencement of construction, [the Applicant] has committed to:

- *Consult in writing with the six Registered Aboriginal Parties (RAPs) informing them of the modification and inviting them to attend a one-day site visit to confirm the existing disturbed landscape and provide the opportunity to identify extant sites or areas or archaeological sensitivity; and*
- *Prepare an updated Aboriginal Heritage Management Plan documenting the outcomes and findings of the site visit and summarising any management requirements in relation to heritage items.*

*The Department considers this to be an acceptable outcome and has recommended a condition accordingly.”*

#### *Commission’s Consideration*

260. The Commission notes that the Applicant has committed to undertaking consultation with Registered Aboriginal Parties and prepare a report on the findings and management activities as described in paragraph 257.

261. The Commission agrees with the Department’s recommended conditions as Registered Aboriginal Parties need to be informed of the Modification Application, have the opportunity to undertake a site visit to provide the opportunity to identify sites or areas of archaeological sensitivity, and record the outcomes.

### 5.6.8 Other matters

262. The Department’s AR notes it has summarised a range of matters that “are considered to be minor and not determinative, and would be regulated under the existing EPL and/or conditions of approval”. An excerpt of which is included as in this SoR.

Issue	The Department’s Finding (Source: The Department’s AR)
Historic Heritage	<ul style="list-style-type: none"> <li>• <i>The EPS, including the Ash Dam, is listed as a heritage item under the Lake Macquarie Local Environmental Plan (LEP) 2014. The objective of the LEP is to conserve the heritage significance of listed heritage items.</i></li> <li>• <i>AECOM considers that the heritage significance of the [Project Site] is primarily related to electricity generation infrastructure and technology associated with the power station building.</i></li> <li>• <i>The modification would primarily be located within the existing operational footprint of the Ash Dam and would not impact key electricity generation infrastructure at the [Project Site]. AECOM therefore considers that impact to the heritage item would be negligible.</i></li> <li>• <i>The Department accepts this conclusion.</i></li> </ul>
Noise	<ul style="list-style-type: none"> <li>• <i>Noise impacts associated with the proposed modification would primarily be associated with the operation of vehicles and plant involved in the construction of the western emplacement area. These works would be located on the north and western boundaries of the Ash Dam, away from the nearest sensitive receivers.</i></li> <li>• <i>The existing noise environment between the proposed construction works and the sensitive receivers is dominated by road traffic noise from Wangi Road.</i></li> <li>• <i>Construction noise impacts would be limited to daytime hours already specified in the Project Approval (Condition 2.3), for a period of approximately 3 months.</i></li> <li>• <i>The Department considers that construction noise levels associated with the modification would be minimal and adequately managed through implementation of the Construction Noise Management Plan, which would be updated to incorporate the proposed modification.</i></li> <li>• <i>Operational noise levels associated with the Ash Dam would remain similar to those already approved.</i></li> </ul>
Construction Traffic	<ul style="list-style-type: none"> <li>• <i>The modification would require the transport of fill material (40,000m<sup>3</sup>) and cement (8,000m<sup>3</sup>) to the site, which would require up to 600 truck movements over a construction period of approximately 3 months. This would equate to an additional 50 truck movements per week, or 70 truck movements per day on the existing road network.</i></li> <li>• <i>A small number of additional light vehicle movements would also be required for construction workers.</i></li> <li>• <i>Several submissions raised concerns about potential traffic impacts of the modification, and the OoS requested to be consulted if any changes in access arrangements to the MBSRC (located along Wangi Road) are proposed.</i></li> <li>• <i>[The Applicant] has confirmed that the modification would not impact existing access arrangements to the [Project Site] site or internal access to the Ash Dam, and that all additional light and heavy vehicle parking would be accommodated within the EPS site.</i></li> </ul>

	<ul style="list-style-type: none"> <li>• Heavy vehicles would be required to travel to the site via Construction Road, Rocky Point Road, Wangi Road, Macquarie Street, Dora Street and then Mandalong Road to the Pacific Highway (M1).</li> <li>• Additional heavy vehicle movements as a result of the modification would represent a less than 5% increase on the existing overall vehicle movements at the Dora Street/ Short Street and Rocky Point Road/ Construction Road intersections during the morning and evening peak periods.</li> <li>• Council did not raise any concerns in relation to the traffic increases associated with the proposed modification.</li> <li>• The Department considers that the predicted increases in heavy vehicle movements during the short construction period would not significantly impact the capacity of the existing traffic network, and that construction traffic can be appropriately managed under the Traffic Management Plan (TMP), which would be updated to incorporate the proposed modification.</li> </ul>
Climate change	<ul style="list-style-type: none"> <li>• As the proposed modification is linked with the operation of a power station, the impacts of climate change due to greenhouse gas emissions was an issue raised in several community and special interest group submissions.</li> <li>• The proposed Ash Dam modification would not involve any increase in the production of electricity at the [Project Site], or the generation of additional greenhouse gas emissions beyond those already approved.</li> <li>• The Department considers that the concerns over climate change impacts largely by association with the [Project Site] are incidental and not directly relevant to the assessment of the proposed [Modification Application].</li> </ul>

*Table 7 Other minor not determinative issues (Source: an excerpt of Table 5 of the Department's AR)*

### *Commission's Consideration*

263. The Commission notes the Department's analysis and agrees with the findings listed in for the reasons outlined by the Department in Table 7. However, the Commission also finds that it is warranted to include an additional condition of consent requiring an ongoing Community Consultative Committee to allow for the dissemination of information and greater transparency of environmental management activities and information.
264. The Commission finds that a number of public comments received by the Commission were seeking access to monitoring information, and a greater understanding of the Modification Application in relation to the existing Project Site. The Commission requires the Applicant to structure the consultation activities in accordance with the CCC Guidelines to foster greater community understanding of the operations, ash reuse strategies, environmental management activities and reporting (refer to Condition 1.5).

## **5.7 The public interest**

### *Applicant's consideration*

265. The Applicant's EA concludes "[t]he project would extend the storage life of the Eraring Ash Dam in a manner that:
- Maintains operational flexibility in terms of future ash deposition strategies and engineering design;

- Supports the continued operation of EPS to 2032 and deposition of ash towards a final landform that is both safe and stable in the long term;
- Is technically feasible;
- Remains consistent with Dams Safety Committee of NSW (DSC) guidance and Australian National Committee on Large Dams (ANCOLD) guidelines;
- Minimises potential impacts to the environment.

*The potential environmental impacts of the project have been assessed and it is considered that whilst the project may have some residual impacts, the mitigation measures identified would effectively ensure that the environmental consequences associated with the proposed modifications are minimised and likely to remain substantially the same as those currently approved.*

*Offset requirements under the BC Act would be fulfilled in accordance with a Biodiversity Offset Strategy which would ensure that the unavoidable loss of biodiversity values as a result of the Project is appropriately compensated. In-perpetuity conservation would form the preferred method of offsetting under the BC Act where practicable with a number of potential offset opportunities identified in the vicinity of the Project area both within and outside of [the Applicant's] existing landholdings.*

*Subsidence hazards would be effectively controlled through remedial action with works verified to determine their effectiveness.*

*The benefits of the [Modification Application] would outweigh its potential impacts with the implementation of the proposed management and mitigation measures as identified in this EA. It is therefore considered that it is appropriate and in the public interest to approve the Project.*

#### *Department's consideration*

266. The Department's AR includes a tabulated consideration of the Modification Application against the objects of the EP&A Act. Table 8 has been reproduced from the Department's AR.

Objects of the EP&A Act (section 1.3)	The Department's Consideration
(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources;	<p>The modification meets this object because it would provide essential ash storage capacity necessary to allow continued operation of the [Project Site] and ensure future power system security within the national electricity market.</p> <p>Continued operation of the [Project Site] would also contribute to the security and continued employment of around 400 power station workers, as well as provide employment for additional workers and contractors during construction operations. The modification will be designed to ensure that the existing coal reserves below the dam western extension area and within potential biodiversity offset areas are managed in consultation with both the DRG and SA NSW.</p>
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment;	<p>The modification is generally consistent with ESD principles as it is unlikely to have significant environmental impacts, as it would:</p> <ul style="list-style-type: none"> <li>• provide essential ash storage capacity with a minimal increase in the Ash Dam footprint (4%) and minimal incremental environmental impacts to water resources, biodiversity and heritage;</li> <li>• require the retirement of ecosystem credits (283) and species credits (987) in accordance with the BC Act, that would offset the clearing of 8.95 ha of native vegetation;</li> <li>• not trigger a referral for assessment under the EPBC Act;</li> <li>• generate no additional greenhouse gas emissions beyond those already approved; and</li> <li>• have no impact on Aboriginal cultural heritage or historic heritage.</li> </ul>
(c) to promote the orderly and economic use and development of land;	<p>The modification would result in a minimal increase the physical extent of the approved Ash Dam footprint (4-7%) over currently undeveloped grassland and disturbed bushland. The extended Ash Dam would facilitate use of undeveloped land to ensure security of electrical supply to the State.</p>
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats;	<p>The modification meets this objective as it does not involve material changes to environmental matters as:</p> <ul style="list-style-type: none"> <li>• remedial measures would be implemented to mitigate subsidence and associated hydrogeological risks;</li> <li>• stormwater improvements would reduce the volume of process water and leachate and the risk of water discharges to Lake Macquarie;</li> <li>• there would be negligible environmental consequences to wetlands and aquatic ecosystems; and</li> <li>• residual impacts to biodiversity would be limited to a net increase in clearing of 8.95 ha of native vegetation, which would be appropriately offset in accordance the BC Act.</li> </ul>

(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage);	The modification would not directly impact Aboriginal cultural heritage or historic heritage.
(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State;	The Department has assessed the modification in consultation with Council and other relevant NSW government authorities and given consideration to the issues raised by these agencies in its assessment.
(j) to provide increased opportunity for community participation in environmental planning and assessment.	The Department publicly exhibited the modification and considered all submissions in its assessment.

*Table 8 Consideration of the Modification Application against relevant objects of the EP&A Act (Source: Department's AR)*

267. The Department's AR concludes *"[the Department has assessed the [Modification Application] in accordance with the relevant provisions of the EP&A Act, including the principles of ecologically sustainable development*

*The proposed [Modification Application] would provide essential additional ash storage capacity for the [Project Site], therefore ensuring future power system security within the broader National Electricity Market. The proposal would also result in improvements to the existing stormwater system in the vicinity of the dam. The Department considers its revised recommended conditions of approval provide a comprehensive, strict and precautionary approach to ensuring the Ash Dam operations would continue to comply with performance measures and standards, and that the predicted residual impacts would be effectively avoided, minimised, mitigated and/or compensated.*

*Based on its assessment, the Department of Planning, Industry and Environment considers that the proposed modification is in the public interest and is approvable, subject to the stringent conditions."*

#### *Public Comments*

268. The Commission received public comments until 27 November 2019 asserting that the Modification Application is not in the public interest for the reasons put forward in Section 3.6 of this SoR.

#### *Commission's Consideration*

269. The Commission has had regard to the Material before it and has considered the issues raised in public comments to the Commission. The Commission has considered the issues raised by the public and whether the Application is in the public interest in its findings contained throughout Sections 5.6.1 to 5.6.8 of this SoR.

The Objects of the EP&A Act (in section 1.3), applicable to the Modification Application are:

*"(a) to promote the social and economic welfare of the community and a better*

- environment by the proper management, development and conservation of the State's natural and other resources;*
- (b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment;*
  - (c) to promote the orderly and economic use and development of land;*
  - (e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats;*
  - (f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),*
  - (i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,*
  - (j) to provide increased opportunity for community participation in environmental planning and assessment.*

270. The Commission generally agrees with the Department's assessment that the Application has considered sections 1.3(a), (b), (c), (e), (f), (i) and (j) of the EP&A Act.

271. The Commission finds that section (j) of the EP&A Act has been satisfied by the following:

- the Application was exhibited from 13 September 2018 until 27 September 2018 with submissions received by the Department;
- the Department commissioned the independent WSP Review of certain aspects of the Modification Application;
- the Commission received public comments on the Modification Application until 27 November 2019, with 127 comments received by the Commission.

*The principles of Ecologically Sustainable Development*

272. The Commission notes that section 6(2) of the *Protection of the Environment Administration Act 1991* states that ESD requires the effective integration of social, economic and environmental considerations in its decision-making, and that ESD can be achieved through the implementation of:

- the precautionary principle;
- intergenerational equity;
- conservation of biological diversity and ecological integrity; and
- improved valuation, pricing and incentive mechanisms.

273. The Commission agrees that the conservation of biological diversity has been addressed by avoiding and minimising biological impacts and through the biodiversity offset package (described in section 5.6.6).

*Intergenerational equity*

274. The Commission finds that the intergenerational equity has been utilised throughout the application with appropriate mitigation and management measure set out in the Applicant's EA and subsequent documentation. The Commission notes that the Department's AR includes recommended draft conditions of consent. The Commission agrees with the Department's conclusions as described in paragraph 267. The Commission has imposed additional measures in relation to rehabilitation management (paragraph 217), air quality (paragraph 234), mine void remediation independent verification (paragraph 192), ash reuse goal (paragraph 216) and community consultative committee (paragraphs 263-264) to address impacts of the Modification Application. The Commission finds that the intergenerational equity has

been addressed through maximising efficiency of extending the existing ash dam, utilising ash in remediation of mine voids to repair subsidence, and stormwater improvements as described in Sections 1.3 and 1.4 of this SoR

275. In summary the Commission finds that the Modification Application is consistent with ESD, because the Modification Application, if approved, would achieve an appropriate balance between relevant environmental, economic and social considerations.

## **6. HOW THE COMMISSION TOOK COMMUNITY VIEWS INTO ACCOUNT IN MAKING DECISION**

276. The views of the community were expressed through public submissions and comments received (as part of the exhibition process, during the public comment period as part of the Commission determination process as discussed in paragraphs 37-44, and 87-89.

277. The Commission received 127 public comments as part of the Commission's determination process (including duplicate comments):

- 115 objecting to the Project Site or the Modification Application;
- three supporting the Modification Application;
- nine commenting on the Modification Application.

278. The key issues raised in the written comments are described in paragraph 89.

279. As described in paragraph 276-279, the Commission carefully considered all the views of the public as part of making its decision and in its consideration of whether the Modification Application is in the public interest. The way in which these concerns were taken into account by the Commission is set out under each issues section (Section 5 of this report).

## **7. CONCLUSION: THE COMMISSION'S FINDINGS AND DETERMINATION**

280. The Commission has carefully considered the Material before it.

281. The Commission finds that consent for the Modification Application can be provided for the reasons set out in this SoR, and in summary because:

- the Modification Application supports the ongoing operation of the Earing Power Station which accounts for 25% of New South Wales' power requirements as described in paragraph 8;
- the Modification Application is seeking to modify the ash deposition strategy, extending an ash placement area, while relocating ancillary infrastructure (including stormwater management) in order to undertake ash placement as described in paragraphs 25-28;
- the Modification Application would provide an estimated 5 million cubic metres of additional ash storage capacity, extending the operational life of the Earing Ash Dam to between October 2023 and March 2026 as described in paragraph 31, and Table 2;
- mine subsidence as a result of the Awaba Colliery workings and potential connectivity with groundwater has been examined. Mine void filling technologies have been proposed and independently reviewed to minimise impacts to groundwater as discussed in paragraphs 146-148. Conditions of consent require additional groundwater monitoring, mine void remediation planning and mine void rehabilitation supervision throughout the construction

process as discussed in paragraphs 149- 152. The conditions of consent are to ensure impacts are appropriately managed and mitigated. The Commission has found it is warranted to require an additional condition to require an appropriately qualified person to be appointed to monitor construction and independently verify the entire mine void remediation works program, producing a finalisation report to be submitted to the Department as discussed in paragraph 153. (refer to Conditions 4.6 (h) and 4.7) ;

- surface water impacts have been appropriately assessed and surface water improvements proposed in the Modification Application. Surface water improvements will reduce the amount of clean surface water entering the ash dam and therefore reduce the need for emergency discharges. The 'clean' surface water system is being improved to withhold a 1 in 100 year event. The conditions of consent are to ensure impacts are appropriately managed and mitigated as discussed in paragraphs 169-174;
- geotechnical investigations have indicated that filling voids is considered feasible to mitigate groundwater seepage and abate subsidence in the area impacted by the Modification Application as described in paragraphs 180-183 and 189-190. Conditions of consent requiring a mine void remediation plan with independent verification of works have been included to ensure impacts are appropriately managed and mitigated as discussed in paragraph 192;
- ash reuse and rehabilitation has increased recently as described in paragraph 208 and Figures 9 and 10. In 2018/19 130% of bottom ash was recycled (that is all of the bottom ash generated in that year was recycled with additional bottom ash removed from the ash dam for recycling sales opportunities). The Applicant expects to achieve the goal of 80% reuse by 2021 as described in paragraphs 205 and 207. The Applicant is developing new products and technology opportunities. The Commission has found that an adjusted condition of consent is warranted to strengthen the requirement to achieve the 80% reuse goal by 2021 to ensure impacts are appropriately managed and mitigated as discussed in paragraph 214-216 (refer to Condition 4A.1(a));
- a rehabilitation management plan for the Ash Dam is required to be submitted within three years to ensure rehabilitation impacts of the Ash Dam are appropriately managed leading to the closure of the Project Site. The Commission has found it is warranted to require an additional condition for completion of a rehabilitation plan within three years as described in paragraph 217 (refer to Condition 4.9);
- air quality impacts have been appropriately assessed. Existing air quality management practices are in place. The Commission has found that an additional condition of consent is warranted requiring an updated air quality management plan have been included to ensure impacts are appropriately managed and mitigated as discussed in paragraphs 230-233 (refer to Condition 4.8);
- biodiversity impacts have been appropriately assessed, offsets have been quantified and an offset strategy identified to retire the necessary biodiversity offsets for the Modification Application through land purchase or Biodiversity Offset Fund contributions as described in paragraphs 252-255;
- cultural heritage investigations have been undertaken. The Applicant has committed to undertaking further consultation with Aboriginal stakeholders and develop a Aboriginal heritage management plan as described in paragraph 257. Conditions of consent requiring the preparation of a Aboriginal heritage management plan have been included to ensure impacts are appropriately managed as described in paragraphs 258-259;
- historic heritage have been adequately assessed and appropriately managed

- for the reasons described in ;
- noise impacts have been adequately assessed and appropriately managed for the reasons described in ;
- construction traffic impacts have been adequately assessed and appropriately managed for the reasons described in ;
- climate change impacts have been adequately assessed and appropriately managed for the reasons described in ;
- a Community Consultative Committee is found to be required by the Commission. A condition of consent has been included to require regular community consultation meetings to occur, in order to facilitate information sharing and flow of environmental monitoring data to community and stakeholder groups as described in paragraphs 263 and 264. The conditions of consent require the Applicant to develop a Community Consultative Committee as per the CCC Guidelines (refer to Condition 1.5);
- the Modification Application conditions for consent provide for the Applicant to surrender their Concept Approval. The conditions of consent require the Applicant to retain responsibility for all previously approved impacts which are not yet complete, as set out in paragraphs 117-120;
- predicted impacts of the Modification Application have been appropriately assessed and minimised through the application of suitable mitigation, management measures and conditions of consent; and
- the Application is in the public interest, for the reasons listed above.

282. The Commission has determined that the Modification Application should be approved subject to conditions. These conditions are designed to:
- prevent, minimise and/or offset adverse social and environmental impacts;
  - set standards and performance measures for acceptable environmental performance;
  - require regular monitoring and reporting; and
  - provide for the ongoing environmental management of the development.

283. The reasons for this Decision are given in this Statement of Reasons for Decision dated 23 December 2019.



**Peter Duncan AM (Chair)**  
Member of the Commission



**Alice Clark**  
Member of the Commission