Warragamba Dam EIS consistency review

NPWS comments

1. Critical issues - summary

NPWS has identified critical areas that are not adequately addressed in the EIS, as required by the SEARs. These are focused on impacts to lands reserved under the *National Parks and Wildlife Act 1974* (NPW Act), and measures to avoid, minimise and offset or compensate such impacts, in the following areas:

- Direct v indirect impacts
- Impacts to protected area values and offsets
- General offsets
- World Heritage
- Post-fire assessment.

These require further detailed consideration in the EIS prior to public exhibition.

A summary of each of these areas follows, followed by more detailed comments.

Direct v indirect impacts

The EIS implies that the inundation of national park and World Heritage lands are an "indirect" impact of the proposal, as they occur as part of the "operational" phase of the project rather than during the construction phase. This is not a valid description. It is clear that additional inundation will arise as a direct consequence of the project. NPWS understands that the characterisation of impacts as indirect would particularly affect the consideration of mitigation or offset requirements for biodiversity impacts and is also concerned it may influence the consideration of other impacts. That is, resulting in reduced emphasis on the need to address and offset all residual impacts, not just those identified as direct impacts.

Recommendation

Relevant sections of the EIS should be reframed to clearly consider inundation as a direct impact on values.

The EIS should also clarify that all residual impacts – whether direct or indirect – will require comprehensive mitigation and offset arrangements.

Impacts to protected area values and offsets

The EIS needs to specifically recognise that there are direct impacts to the value of the land as part of the protected area system and to identify how these will be offset. This requirement is additional to any biodiversity offsets or preparation of the Environmental Management Plan (EMP) for National Parks, both of which are existing separate obligations that do not specifically address the consequences of the project to land that has been reserved for permanent conservation protection. Refer to **6. SEARS requirement – Socio-economic, Land Use and Policy** below for further discussion.

Recommendation

The EIS needs to:

1. Recognise that land within the protected area system has value in its own right (i.e. because it was purposely set aside for permanent conservation protection)
2. Assess impacts to the protected area values of that land
3. Acknowledge that specific offsets will be required to address unavoidable impacts to those values, and
4. Commit to delivering an offset strategy that will address those unavoidable impacts.

This must be in addition to any existing requirements related to offset the biodiversity or other specific attributes of the land. This is recognised in other major project planning approvals – such as for Snowy Hydro 2.0.

Relevant SEARs

- 2(1)(l)
- 3(2)
- 13(1)(a)
- 14(6), specifically 14(6)(b).

Offsets in general

The EIS also needs to recognise that where impacts are occurring to specific environmental values within the national park estate, such as biodiversity or Aboriginal cultural heritage, then the priority should be to offset such impacts by actions within the national parks estate. Again, Snowy Hydro 2.0 provides a relevant precedent with respect to biodiversity offsets. Refer to **2. SEARS requirement – Offsets** below for further discussion.

Recommendation

Where specific impacts to environmental values are identified within the national park estate, the EIS needs to:

1. Commit to delivering required offset actions within the national park estate in the first instance (i.e. not off-park).

Relevant SEARs

- 2(1)(l)
- 6
- Attachment A.

World Heritage

Detailed comments on World Heritage matters are provided in section 5 of this paper below.

Key points are that the EIS does not:

- consider the impacts of the project on all the elements of Outstanding Universal Value (OUV) for the property as a whole
- specifically address impacts on the attributes of the values

- properly address the “integrity” component of the World Heritage Area, including with respect to Aboriginal cultural heritage
- adequately address offsets for World Heritage values, including the specific need to demonstrate “at a minimum, how the proposed offset will improve the integrity and resilience of the heritage values of the impacted heritage place or property.”

Also in relation to offsets, the EIS does not demonstrate how it complies with the Environmental Offsets Policy October 2012 under the EPBC Act to offset all World Heritage values.

Recommendation

The EIS should address the full scope of potential impacts to World Heritage values, and offset requirements to achieve improvements to those values, as outlined in the SEARs. Section 5 of this paper provides additional detail.

Relevant SEARs

- 10(1)
- 10(6)
- Attachment A

Post-fire assessment

The EIS recognises the unprecedented nature of the 2019-20 bushfires which occurred after completion of the biodiversity field surveys. The EIS also acknowledges the disproportionate impact of the fires to both threatened and non-threatened species, and refers to DPIE assessment guidance issued in March 2020. The EIS concludes that no further assessment is required, but provides no specific assessment against the March 2020 guidelines to demonstrate how this conclusion was reached.

Recommendation

The EIS should include clear and detailed information to identify how the March 2020 guidelines have been considered, in order to support any decision to do no further assessment despite the extensive impacts arising from the 2019-20 bushfires.

2. SEARs requirements – General [2. EIS and 3. Assessment of Key Issues]

NPWS comments

In general – indirect v direct impacts

The inundation of protected areas by flood events during the operational phase (and the other associated impacts that arise from that), should explicitly be considered and characterised as a direct impact of the project in the EIS. Whilst the full scope of adverse impacts arising from inundation may be difficult to quantify ahead of events, and the occurrence is uncertain, the impacts are still clearly a direct consequence of the project irrespective of the fact they will occur post-construction.

NPWS recommends that relevant sections of the EIS are adjusted to recognise the direct physical impact that inundation will have on environmental values and land within the protected area system.

This is important because:

- the community needs to have a clear understanding of the direct impacts of the proposal on the full range of significant environmental values
- any implied characterisation of inundation impacts as “indirect” risks downplaying both the significance of the impact on values and the need to avoid impacts as a priority
- the emphasis in the biodiversity offsets sections of the EIS on prioritising offsets for “direct” impacts risks implying that a similar approach will be applied to other non-biodiversity impacts (i.e. only direct impacts warrant full offsetting).

NPWS recommends the final EIS is reviewed and relevant sections reframed to:

- clearly highlight and state the impact of inundation as a direct impact on values
- ensure that the assessment of impacts and consideration of required offsets accounts for inundation impacts to all protected area values.

Additional comments

- 2.4.4 – the Warragamba Special Area is not a conservation area declared under the NPW Act. Arrangements for joint management of special areas are set out in the NPW Act, but the declaration of the area occurs under other legislation.
- 2.4.4 – 3rd para (immediately after dot points) is confusing. It implies that no approval is needed under the NPW Act because of operation of the Water NSW Act, but then says no approval is needed because no works are planned in national parks or reserves.
- 2.4.4 – 5th para does not explain well the interaction of NPW Act and Water NSW Act. This needs to be clear and unequivocal.
- 2.4.9 – the text is confusing regarding application (or non-application) of the *Wilderness Act 1987*. It should be redrafted to be clear.

3. SEARs requirement – offsets [6. Biodiversity, 13. Protected and Sensitive Lands, and 14. Socio-economic, Land Use and Property)

(Note: *Appendix M: Socio-economic, land use, and property assessment report* was also reviewed for how impacts on national park values (e.g. fire trails, roads and other assets) were addressed)

NPWS comments

Offsets to protected area impacts are not specifically addressed

The project will result in clear direct impacts to lands in the protected area estate, which are subject to the highest levels of statutory, in-perpetuity protection. Specifically, under a PMF scenario, there will be a:

- 3,055 hectare increase in inundation across all national parks and reserves, representing a 9.03% increase compared to current inundation levels (EIS Chapter 20, Table 20-14 and Table 20-18)
- 590 hectare increase (0.06%) in inundation in the World Heritage Area (EIS Chapter 20, p.20-25).

For a 1:100 year flood, there would be a 2,264 hectare increase (7.36%) across all reserves, and 415 hectare increase (0.04%) for the World Heritage Area.

The SEARs require the EIS to address:

- measures to avoid, minimise or offset impacts must be linked to the impact(s) they treat, so it is clear which measures will be applied to each impact [2(1)(l)]
- detail how any residual impacts will be managed or offset, and the approach and effectiveness of these measures [3(2)]
- impacts to protected areas [13]
- socio-economic impacts related to land reserved under the NPW Act, including expanded consideration of indirect effects of inundation [14(6)].

As currently drafted, the EIS largely focuses on biodiversity offsets that will be identified through application of the FBA, and references a future "National Park Environmental Management Plan".

However, the FBA is a process to determine biodiversity offsets. It is not an appropriate surrogate for the loss of broader national park values.

Similarly, the EMP is a requirement of the *Water NSW Act 2014* – it is an existing legislative obligation focused on managing the environmental consequences of an inundation event (weeds, erosion, etc). The EMP is an existing mitigation requirement, required by law – and is equally not a surrogate mechanism to offset impacts to national park values.

The EIS therefore does not specifically address impacts associated with the loss of protected area values (see section 6 below), nor does it commit to offsetting the residual impacts to those values. For example, the compilation of mitigation measures in Chapter 29 of the EIS only references biodiversity offsets and the EMP. There are no separate, specific actions targeted at offsetting the impact to the loss of protected area values in their own right (ie. degradation of permanently protected lands reserved under the NPW Act). This is despite the observations that:

- the consequences of upstream inundation are the potential loss of environmental qualities of regional, national and international significance (p.15-91)
- even with mitigation the risks remain high and adequate resources are needed to ensure successful implementation of mitigation measures (p.15-92)
- most of the upstream catchment contains intact native vegetation that has experienced minimal disturbance and no or low weeds, and numerous sites of high cultural significance to Aboriginal people (p.29-4).

Compensation is needed for loss of protected area values

The EIS recognises there are significant uncertainties around the full extent of inundation impacts due to the lack of scientific information (p.15-91). This supports applying prudent measures consistent with application of the precautionary principle.

In this case, if the project proceeds, there will be no available means to avoid inundation. Indeed, the EIS acknowledges that for more frequent events (such as the 1:5 year flood), the landscape will have less ability to recover to its previous condition and there is potential for changes to vegetation communities in affected areas due to the relatively higher frequency and longer period of inundation (p.20-25).

Hence offsets and compensation are the only possible options to counter the loss of protected area values.

Principles for determining compensation for loss of protected area values, including from priority infrastructure projects are outlined in the NPWS Revocations Policy (which was listed in the SEARs as a current guideline). These should be referenced with respect to determining the scope of appropriate offsets or compensation for loss of national park values. Options may include the provision of land for inclusion in the national park system, funding contributions for ecological restoration activities or threat management (e.g. pest species actions), or similar.

Snowy Hydro 2.0 demonstrates the need for compensation

The Snowy Hydro 2.0 proposal in Kosciuszko National Park provides a current example of how impacts to a national park are considered and appropriately offset (in addition to biodiversity and other offsets). An extract from the planning approval for the Snowy Hydro exploratory works is provided below. This is only one aspect of the total Snowy Hydro project approvals offset and compensation package for on-park impacts that now exceeds $97 million.

SCHEDULE 3
SPECIFIC ENVIRONMENTAL CONDITIONS

IMPACT ON KOSCIUSZKO NATIONAL PARK

Offset

1. Prior to carrying out any development under this approval, unless the Planning Secretary agrees otherwise, the Proponent must pay the NPWS $4,962,777.

   Note: The NPWS will use these funds and any interest generated by these funds to enhance the Kosciuszko National Park and offset the impacts of the development on the conservation and recreational values of the park. The NPWS will:
   - *develop a detailed program for the allocation of these funds to specific projects;*
   - *monitor, evaluate and publicly report on the spending of these funds and the effectiveness of these projects.*

NPWS recommends the final EIS provides:

- clear consideration and assessment of impacts to protected area values (ie. taking account of the permanent protected status of the land reserved under the NPW Act)
- outline clear commitments (in the form of land, financial or other contributions) to compensate or offset residual, unavoidable impacts to those protected area values, that are in addition to other specific environmental offsets.

Biodiversity offsets should be directed on-park

NPWS considers that where offsets are required for impacts to biodiversity values within the national park estate, then those offsets should be in the form of actions that benefit the national park estate as the first priority (rather than off-park). The Snowy Hydro 2.0 planning approvals operate on this same principle (see extract from the infrastructure approval below).

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Biodiversity Offset Payments

12. The Proponent must make the following payments to the NPWS to offset the residual biodiversity impacts of the Main Works:
    (a) $14.76 million prior to the commencement of construction;
    (b) $14.76 million within 1 year of the commencement of construction;
    (c) $14.76 million within 2 years of the commencement of construction; and
    (d) $14.76 million within 3 years of the commencement of construction.

This is a fundamental principle and should be made clear in the EIS. NPWS considers there is sufficient flexibility in the SEARs and the NSW Biodiversity Offsets Policy to support delivering this outcome. Point 2(1)(l) in the SEARs is particularly relevant:

> measures to avoid, minimise or offset impacts must be linked to the impact(s) they treat, so it is clear which measures will be applied to each impact.

NPWS also provides the following specific comments on the proposed offset strategy (Appendix F6):

- as noted in above and in section 6 below, the EIS assumes (incorrectly) that general biodiversity offsets are a surrogate for impacts to the protected area estate
- 6.1.1 – the option of using land already owned by WaterNSW for a biodiversity stewardship agreement is not appropriate unless it would involve ecological condition improvements, as it is inconsistent with Principle 12 of the Biodiversity Offsets Policy – ie. offsets must be supplementary
- 6.1.3-4 and 7.1.3 – supplementary measures, including any monetary compensation, should follow the same key principle of ensuring compensation for national park impacts is directed to actions that benefit the national park. In that context, supplementary measures in 7.2.7 should also include the following within the national parks estate:
    - land rehabilitation and restoration
    - land management programs to improve ecological condition and integrity across the special area, including pest management programs
    - research that contributes to improved land management

- addressing potential inundation impacts on built/park assets.

Heritage offsets

These are discussed in section 5 of this document.

4. SEARs requirement – 13. Protected and Sensitive Lands

Key Issue and Desired Performance Outcome	Requirement (specific assessment requirements in addition to the general requirement above)
13. Protected and Sensitive Lands The project is designed, constructed and operated to avoid or minimise impacts on protected and sensitive lands	1. The Proponent must assess the impacts of the project on the water catchment and processes (and the impact of processes on the project) including, but not limited to: (a) protected areas (including land and water) managed by OEH and/or DPI Fisheries under the *National Parks and Wildlife Act 1974* and the *Marine Estate Management Act 2014*; (b) Key Fish Habitat as mapped and defined in accordance with the *Fisheries Management Act 1994* (FM Act); (c) waterfront land as defined in the *Water Management Act 2000;* (d) land or waters identified as Critical Habitat under the TSC Act, FM Act or EPBC Act; and (e) biobank sites, private conservation lands and other lands identified as offsets. 2. Maps should be included that clearly indicate the proposed high water mark line and current high water mark line, as well as protected area boundaries.

NPWS comments

The values of the national parks land as part of the protected area estate, and impacts to these, are not specifically or adequately addressed in the EIS. These values exist in their own right, in addition to any specific biodiversity, heritage or other environmental attributes that the land may possess.

Refer to sections 3 and 6 of this paper for further discussion and recommendations on how the EIS should address this issue.

NPWS also provided spatial data of national park assets, e.g. fire trails and roads, to WaterNSW, however there is no evidence in the EIS or in its Appendices that those assets have been mapped or addressed in impact assessment and mitigation.

Some specific comments follow:

- 20.2.3, first para, second sentence – it is not accurate to say the conservation areas "may be impacted by changes in temporary inundation". On best available information (as provided in the EIS), those areas will be impacted during flood events from 1:5 years up to the PMF
- 20.5.4.3 – this is a generalised statement about potential impacts to park management operations within the national parks estate. It does not appear that there is any specific analysis or information in the EIS regarding the impacts of inundation to park management activities, fire and management trails, etc. This needs to be addressed in further detail, noting that NPWS previously provided WaterNSW with relevant GIS data files to assist in this process.

- 29-11 – this appears to be the first recognition of impacts to fire trails and river crossing from inundation. As noted above. there is no specific information in the EIS about potential impacts to park management assets.

5. SEARs requirement –10. Heritage

NPWS comments - general

The SEARs, including Attachment A, outline extensive requirements related to the assessment of heritage impacts. That includes specific requirements to provide information on the proposed offset strategy, which:

> must demonstrate, at a minimum, how the proposed offset will improve the integrity and resilience of the heritage values of the impacted heritage place or property. [Attachment A, point 19(i)].

General comments

The overall summary of World Heritage impacts states:

> While the Project would impact on the GBMWHA, these would not be significant and would not result in the loss or degradation of the Outstanding Universal Values of the GBMWHA.
>
> In a PMF event only 0.14 percent of the GBMWHA would be affected by the Project. The remaining 99.86 percent would not be affected by the Project.

This assertion appears to be based on the percentage of landscape impacted rather than impact on the actual World Heritage values or number of attributes. This is not an appropriate means to access impacts to World Heritage values; it is simplistic and does not reflect the SEARs' requirements.

The EIS also states in support of this assertion that mitigation and offset measures have been developed (see comments on offsets section below).

> Comprehensive mitigation, monitoring and offsetting measures have been identified which would ensure that any impacts on the GBMWHA are minimised, detected and rehabilitated.

EIS does not consider impacts on all elements of property's Outstanding Universal Value

The EIS considers whether the project satisfies a number of World Heritage requirements, management policies, principles and management documents. It also considers compliance with the management objectives of the Strategic Plan for the Greater Blue Mountains World Heritage Area. This is a reasonable approach.

However, what the EIS fails to do is consider the impacts of the project on all the elements of Outstanding Universal Value (OUV) for the property as a whole.

In addition, the EIS does not clearly distinguish between the meaning of Outstanding Universal Value and the meaning and purpose of the criteria for inscription of a property on the World Heritage List.

EIS needs to make it clear that the list of species provided are the attributes of world heritage values

The EIS considers the impact on the World Heritage values under criterion ix and x of the World Heritage Operational Guidelines, but it is not clear where it specifically addresses the impacts on the attributes of the values i.e. listing specific World Heritage attributes and then setting out the impacts. It addresses impacts under the broader umbrella of biodiversity and threatened species, rather than World Heritage attributes.

It may be useful to more clearly address impacts on the biodiversity and threatened species values of the World Heritage property, rather than impacts on those values (more generally) only being addressed in the relevant chapters of the EIS.

EIS does not properly address integrity component of World Heritage Area

An understanding of the cultural context of the GBMA is fundamental to the protection of its integrity, an essential component of the UNESCO Statement of Outstanding Universal Value (OUV). Aboriginal people from six language groups, through ongoing practices that reflect both traditional and contemporary presence, continue to have a custodial relationship with the area. Occupation sites and rock art provide physical evidence of the longevity of the strong Aboriginal cultural connections with the land. The conservation of these associations, together with the elements of the property's natural beauty, contributes to its integrity.

The EIS appears to assume that integrity is a 'value' in its consideration, rather than a pillar of OUV. As a result, the EIS considers the impacts of the project on one element of Integrity – Aboriginal heritage – and does not address the impacts of the project against all aspects of Integrity or of the property's OUV.

The Outstanding Universal Values integrity statement also nominates a third value, being Aboriginal cultural heritage. The impacts of the project are assessed against these three values in Section 7.

Impacts on ACH related to Integrity of the OUV have not been clearly addressed

The impacts on Aboriginal cultural heritage (ACH) as it relates to the Integrity of the OUV has not been clearly addressed as it misunderstands integrity as a value. It does not mention the impacts on natural beauty, also included as part of integrity, although it quotes the section of the OUV which identifies it. The EIS does not appear to address all aspects of the Statement of OUV or Integrity as part of that.

The main place that natural beauty (as part of the Integrity of the OUV) seems to be assessed is in the visual impact assessment, and the EIS does examine aesthetics as one of the additional values of the property and how the Project may impact on the additional values.

The visual significance of the upstream catchment impacted by the Project including areas of the GBMWHA has been assessed in the visual impact assessment

The EIS deals with Aboriginal Heritage as part of Integrity in a way that refers to numbers of sites impacted and the 'scientific value' of the Aboriginal heritage, ranking sites into levels of scientific value (which in itself is questionable and subjective as sites could have scientific value when new techniques become available for analysis and dating) rather than addressing the broader issue of 'cultural context' as per the statement of OUV.

The EIS's statement that "A partial loss of value has been assessed as the potential impact on all Aboriginal heritage sites impacted by the Project" does not assess what that means for the integrity of the World Heritage Area and the OUV.

Mitigation measures are identified as a suite of recording and support for ACH work in the GBMA. It is not clear registered Aboriginal parties (RAPs) have had input into these mitigations and how this does, or does not, affect and impact on the Integrity of the property.

NPWS comments – offsets for World Heritage

Offsets for World Heritage values need to address both biodiversity and heritage

(Note: these comments are on the EIS's Biodiversity Offset Strategy in Appendix F6)

The Environmental Offsets Policy October 2012 (Section 2.1 p 5) under the *Environment Protection and Biodiversity Conservation Act 1999* states in relation to Heritage (emphasis added):

> The use of offsets to compensate for adverse impacts to heritage values **is appropriate in some circumstances**. In cases where offsetting of adverse impacts on heritage values is considered possible and appropriate, the principles of this policy apply with regard to determining what constitutes a suitable offset. **Offsets for impacts on heritage values should improve the integrity and resilience of the heritage values of the property involved**. This may include offsets in areas adjacent to the property. For further information, please contact the department (contact details are at section 10).

Fundamentally, the EIS has assumed that the offset strategy for EPBC is appropriate to this project because the values of the GBMA are biodiversity values. It has not taken into account the impact on Aboriginal cultural heritage as part of the OUV of the property. The EIS states in the *Policy Framework for the Offset Strategy* (Section 2.6, p.17):

> As discussed in Section 1.2.4, the values that the GBMWHA was granted World Heritage status for were related to biodiversity, and therefore offsets for impacts to GBMWHA are considered appropriate.

There is no justification provided for the assumption that "offsets for impacts to GBMWHA are considered appropriate", other than that the values were biodiversity values. The proponent may need to test this assumption with advice from the Commonwealth on how their Environmental Offset Policy can be applied in this case.

Offsets for impacts on heritage values should improve their integrity and resilience

The Offset Strategy only considers Biodiversity (section 2.2 under the SEARs that are relevant), and not items listed on World or national heritage lists. The SEARs state:

> 10. The Proponent must identify and assess any direct and/or indirect impacts (including cumulative impacts) to the heritage significance of:
>
> (d) items listed on the National and World Heritage lists.
>
> Investigations including surveys and identification of cultural heritage values should be conducted in consultation with OEH regional officers.

The SEARs (in Attachment A) also state:

> 19. Where a significant residual adverse impact to a World Heritage property and/or a National Heritage place is considered likely the EIS must provide information on the proposed offset strategy. The offset strategy must:
>
> (i) include a discussion and supporting evidence of the conservation benefit associated with the proposed offset strategy. The conservation benefit must demonstrate, at a minimum, how the
>
> (ii) proposed offset will improve the integrity and resilience of the heritage values of the impacted heritage place or property; and

> (iii) be consistent with the *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offset Policy (2012): www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy or an endorsed state policy

It is not clear if these measures have been addressed – this may be because the Offset Strategy document doesn't provide a clear way forward for offsets as the acquisition of land is not certain. It does not, however, identify or state that any land that is acquired as an offset, needs to improve the integrity and resilience of the heritage values and to do this will likely need to be contiguous land with the same or higher OUV than the impacted land.

The Strategy does state that values need to be like-for-like but does not articulate how this will be done, or how it would improve the integrity or and resilience of the World Heritage values of the GBMA. The Strategy states at 6.1.3:

> Given the difficulty in sourcing biodiversity credits for all Plant Community Types and species credit species impacted by the project, the use of supplementary measures will be sought for this project.

Other general comments regarding offsets for World Heritage values

- There is no clear offset strategy provided for World Heritage values in this EIS Offset Strategy - it appears all will be determined through a future Offset Program.
- There is no obvious discussion and supporting evidence of the conservation benefit associate with the proposed offset strategy or how the proposed offset will improve the integrity and resilience of the world heritage values of the place. There is no discussion about how offsets would impact (positively or negatively) on the OUV of the property as a whole.
- The Strategy also states at 7.2.6 that it would "In the instance where biodiversity credits could not be sourced from BSA sites on WaterNSW/private land, or on the credit market, WaterNSW would deposit the balance of credits into the Biodiversity Conservation Fund to meet their offset obligations". This approach does not demonstrate how it would improve the integrity or and resilience of the World Heritage values of the GBMA.

6. SEARS requirement - 14. Socio-economic, Land Use and Policy

Key Issue and Desired Performance Outcome	Requirement (specific assessment requirements in addition to the general requirement above)
14. Socio-economic, Land Use and Property The project minimises adverse social and economic impacts and capitalises on opportunities potentially available to affected communities. The project minimises impacts to property and business and achieves appropriate integration with adjoining land uses, including maintenance of appropriate access to properties and community facilities, and minimisation of displacement of existing land use activities, dwellings and infrastructure.	6. Where land is reserved or acquired under the *National Parks and Wildlife Act 1974* (NPW Act), the EIS must detail: (a) effects of accurately predicted intermittent inundation regime, and predictions of habitat, biodiversity and cultural heritage loss or change within the OEH estate; (b) expanded consideration of indirect effects of inundation, especially in the context of land reserved under the NPW Act; (c) consider impacts of the project on visual amenity and visitor experience in land reserved under the NPW Act; (d) identification of any proposed infrastructure (including roads) proposed within the OEH estate. Additional access and recreational opportunities that may be provided by proposed roads must be considered and discussed with NPWS; (e) predictions of the time and degree of disruption to recreational and management access during construction and the mitigation measures that will be undertaken. Changes to management and visitor access and infrastructure should be identified including walking track easements and access to heritage; (f) consideration of alternative options to avoid reserved lands and justification; (g) if on-park impacts are considered unavoidable and revocation/de-listing is required, consideration of the issues identified in Revocation, Recategorisation and Road Adjustment Policy (OEH, 2012) is required, along with justification.

NPWS comments

EIS needs to address specific impacts of inundation on land reserved under the NPW Act

The EIS does not provide an "*expanded consideration of indirect effects of inundation, especially in the context of land reserved under the NPW Act*".

As noted in sections 3 and 4 of this document, the EIS fails to consider the impacts to protected area values in their own right. Instead, it assumes that the individual values of that land (e.g. biodiversity, Aboriginal heritage) comprise the sum total of values.

- It does not specifically address or consider the impacts associated with the likely long-term loss of values and degradation of national park estate that will result from repeated inundation over time.
- That is, impacts to land that was purposely set aside for permanent, in-perpetuity protection as part of the protected area estate in recognition of its outstanding conservation values and as part of the long-term objective of building a comprehensive,

adequate and representative (CAR) reserve system consistent with NSW Government objectives and to support delivery of Australia's international obligations under the Biodiversity Convention.

- As currently drafted, the EIS focuses on other component values of the land, such as specific biodiversity and heritage attributes. However, it is not merely the sum of these attributes that comprise the total value of the land reserved under the NPW Act.
- The role of the land as part of the protected area system therefore has value in its own right – in addition to any of the specific physical characteristics.
- This is what Point 6(b) in Section 14 of the SEARs is referencing – and which the EIS has not specifically addressed.
- The EIS needs to specifically provide an "expanded consideration" of impacts to land within the protected area system. Consistent with the SEARs it must also specifically outline measures to avoid, minimise and offset impacts to protected areas. The issue of offsets for impacts to land reserved under the NPW Act is also discussed in section 3 of this document above.

7. SEARS requirement - 8. Biodiversity

NPWS comments

NPWS understand the Greater Sydney Planning team will coordinate specific detailed review of the SEARs related to biodiversity impacts. The following comments are focused on ensuring accuracy and adequacy of the EIS as it relates to protected areas.

- **8.3.11.3** – the EIS notes the March 2020 DPIE guidelines for assessment of bushfire affected areas. Despite observing that threatened and non-threatened species have been "disproportionately impacted" by the 2019/20 bushfires, the EIS concludes that no further assessment is required (p.8-46). NPWS recommends that the rationale for this conclusion is detailed in full to enable consideration of the application of the relevant guidelines to the project.
- **8.7.2 - Minimise impact**s – the EIS simply lists suggested headings that may be included in the future EMP- rehabilitation & restoration, sediment and erosion control, weed and pest animals management, and monitoring, resourcing, reporting and auditing. While the specific detail of the EMP can be determined at a later stage, the EIS as a minimum should provide further elaboration of the likely content of the EMP, potential priorities, and commitments related to implementation.
- **8.8.4 - Impact Assessment - Table 8-31 –** potential error. The details provided in *Extent/Scale* - for threatened fauna are identical to those provided for threatened flora. This same information is then repeated in section 8.8.8.
- **8.8.5 - Tolerance to water-logging.-** it may be a clearer representation of potential impacts to state that only 4 species (out of how many?) may be able to tolerate inundation that is greater than 4 days.
- **8.14 -Adaptive Management of biodiversity impacts –** the ongoing governance and implementation arrangements for the adaptive management strategy and should be outlined. There needs to be clarity for the community and affected public land managers regarding how this will occur, who will be responsible for delivery of any adaptive management actions (if triggered), and what monitoring and audit oversight will apply.
- **8.15 - Environmental Management measures -** *Table 8-50 - Mitigation measures and responsibility* – further consideration is required of the proposed mitigation measures and appropriate responsibilities for implementation. A number of the proposed actions involve physical on-ground interventions and will require discussion with NPWS to determine
- **8.16 - Risk Assessment –** it is arguable that the Residual risk (Table 8-52) is incorrectly assessed (from Extreme to upper end of medium). Given the statement that mitigation measures will only "marginally reduce the consequence", it is clear that rehabilitation, replanting and pest control will not restore ecosystem function post-inundation. On that basis, the Residual risk should continue to be rated as extreme or the upper scale of high, not medium as suggested in the text (p.8-145).

9 June 2020

TfNSW Reference: SYD17/00705/02
DPI&E Reference: SSI 8441

Dominic Crinion
Department of Planning, Industry and Environment
GPO Box 39
SYDNEY NSW 2001

Dear Mr Crinion

WARRAGAMBA DAM RAISING - CONSISTENCY REVIEW FOR DRAFT EIS - CREST ROAD, WARRAGAMBA

Reference is made to the Department of Planning, Industry and Environment's referral dated 7 May 2020 with regard to the abovementioned final draft Environmental Impact Statement, which was referred to Transport for NSW (TfNSW) in accordance with the *State Environmental Planning Policy (Infrastructure) 2007*. This letter is offered as a collective response from agencies of the TfNSW cluster.

TfNSW has reviewed the documentation provided for the abovementioned development and notes that the proposal seeks development advice for for the proposal to raise Warragamba Dam for the purpose of downstream flood mitigation.

As you are aware TfNSW has been working with Infrastructure NSW to develop the regional model for flood evacuation in the Hawkesbury Nepean Floodplain. The proposed Warragamba Dam Wall Raising is part of this work.

The documentation including *SMEC Traffic and Transport Assessment (TTA)* in support of the proposal has been reviewed and comments and recommendations are provided in **Attachment A– TfNSW comments.**

As access to the Dam includes local and regional roads under the care and control of Penrith City Council, it is suggested that the proponent engages with the Council on all discussions relating to the local and regional road access to ensure that Council is in support of the outcomes.

If you have any further questions, Laura van Putten, Land Use Planner at TfNSW, would be pleased to take your call on (02) 8849 2480 or please email development.sydney@rms.nsw.gov.au.

Yours sincerely

Pahee Rathan
Senior Land Use Assessment Coordinator

Attachment A – TfNSW comments

Comments

Flood Evacuation - Chapter 24: Traffic and Transport, section 24.3.2.3 Alternative routes.

1. This section addresses the crossings that are at low levels including Yarramundi Bridge, the Cattai Creek Bridge and the Sackville Ferry. It should be noted that in the recent flood event of February 2020, which was about a 1:5 year flood event, the North Richmond Bridge and Windsor Bridge, along with the Yarramundi Bridge were closed to traffic. These bridges are also low lying and affected by high frequency floods.

2. Windsor Bridge – the new Windsor Bridge was opened to traffic in May 2020.

3. Theoretical lane capacity – the report assumes a typical lane capacity of 1,750 vehicles per hour. From overseas studies, the lane capacity during an evacuation is typically much lower than the day-to-day lane capacity. From this, by applying a typical day-to-day lane capacity to an evacuation situation would be overestimating the roadway capacity.

Transport

4. In regard to the low lying bridges with extended inundation periods (as a result of the proposal) the proponent should map the road network catchment areas impacted by extended inundation, and map the alternate routes that would be available during the flooding of low lying bridges, including the labelling of bridges and their load limits.

5. The proponent should consider nearby materials recovery and reuse opportunities from nearby construction sites in Western Sydney (such as the WSA airport metro rail tunnels) if their material properties are found to be suitable for construction (to minimise long distances transportation of bulk materials).

6. Scenarios for truck routing are simplistic. For example, it is unlikely that bulk materials will originate 100% from the north. Cement and aggregates can come from the South, and fly-ash can come from the west. However, this is a construction traffic management issue which can be addressed with further refinement in later stages.

7. Mandatory truck telematics could assist the project managers and road network managers to ensure mass limits are adhered to and to reduce congestion/improve safety during peak concrete construction periods. It is suggested that this option is investigated.

8. Consideration of options that utilise rail travel for some or all of the construction materials task, particularly if materials are to be moved over long distances.

9. The cumulative impacts are to be taken into account, and should include those located outside of Wollondilly Shire (taking into account the development of the Western Parkland city and opportunities for materials reuse and supply chain efficiency).

Recommendation
The applicant shall consider including or amending the reports by addressing the above matters.

OUT20/5529

Dominic Crinnion
Team Leader, Water and Intermodal Assessments
Planning and Assessment Group
NSW Department of Planning, Industry and Environment

Dominic.Crinnion@planning.nsw.gov.au

Dear Dominic

Warragamba Dam Raising (SSI 8441) -

Draft Environmental Impact Statement (Consistency Review)

I refer to your email of 7 May 2020 to the Department of Planning, Industry and Environment (DPIE) – Water about the above matter. DPIE - Water and the NSW Natural Resources Access Regulator (NRAR) provide advice and recommendations for the Consistency Review of the Draft Environmental Impact Statement (EIS).

We have reviewed the draft EIS for consistency with the Secretary's Environmental Assessment Requirements (SEARs) issued on 13 March 2018 and identify a number of improvements that are recommended (see **Attachment A**) to the draft EIS relating to the following SEARs:

- 8. Flooding
- 15. Soils
- 20. Water – Hydrology
- 21. Water – Quality

Attachment B provides a table with more detail with respect to SEARs 8, 15 and 20, as well as comments regarding mitigation issues.

Please note that the NSW Department of Primary Industries – Fisheries is responsible for considering impacts to aquatic habitat and should be consulted in the planning and approval process to ensure that these impacts are adequately considered.

Any further referrals to DPIE - Water and NRAR regarding this matter can be sent by email to: landuse.enquiries@dpi.nsw.gov.au.

Yours sincerely

Mitchell Isaacs
Director, Office of the Deputy and Strategic Relations
Department of Planning, Industry and Environment: Water
23 June 2020

ATTACHMENT A

DPIE – Water and NRAR Recommendations for Improvement to the Draft Environmental Impact Statement for the Warragamba Dam Raising (SSI 8441)

1.0 Flooding, Soils and Hydrology (SEARs 8, 15, 20 respectively)

In general the draft EIS provides information on the project's flooding, soils and hydrology impacts. However it would be improved by better identifying impacts on flood behaviour relating to downstream erosion and scour potential. In particular, the proponent could more adequately address SEARs 15 (8) by providing advice on mitigation options for increased erosion and scour resulting from the project.

Explanation

The relevant SEARs are:

- SEARs 8(2) Assess and model the impacts on flood behaviour during construction and operation for a full range of flood events including: downstream velocity and scour potential
- SEARs 15 (6),(7),(8) Assess impacts on soil and land resources … from soil erosion and sediment transport, and how impacts will be managed in the event of a maximum flood level event.
- SEARs 20(4)(d) Assess and/or model direct or indirect increases in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses

The EIS clearly identifies erosion and scour as 'unavoidable' impacts of this development (Appendix H1, 4.2.5), but no description of the likely extent of impact (or mitigation options) is provided. The EIS does not provide adequate detail on the potential inundation extents and locations for erosion and deposition, nor the impacts of these processes. Particularly, the assessment needs to focus on inundation transitional areas and downstream sections which may be subjected to increased scour and erosion by changed flow patterns and levels.

Any modelling of inundation and erosion should support interpretation of the causes of the impacts and not just identify the symptoms (presence/absence), otherwise, effective mitigation recommendations cannot be made.

To improve how data is used to support analysis we suggest the following:

- Scale considerations - The report has undertaken coarse-scale analysis of sites and potential impacts, but lacks a framework for identifying and investigating sites in more detail. Using existing data (e.g. in River Styles database) to develop criteria for identifying reaches and locations most sensitive to adjustment and then reporting on the potential forms of adjustment (not only presence/absence) would improve the level of detail and therefore understanding of the associated impacts.
- Spatial Data Use - The method for analysing longitudinal profiles and the spatial impact of inundation could be significantly improved, by using high quality topographic data such as a Digital Elevation Model (DEM).

2.0 Water Requirements (SEAR 20(4)(f))

While the draft EIS provides estimations of the project's water (volumetric) requirements, it would be improved to include the requirements for the associated Water Access Licence (for the additional storage within Warragamba Dam), and details on amendments to the Water Supply Works Approval for the proposed works.

3.0 Water Quality (SEAR 21)

The EIS provides information on water quality but would be improved if an estimation of the amount of organic matter and suspended material likely to be released from the flood management zone following inundation is provided. The water quality assessment (Chapter 27) states that the increase in organic matter and turbidity due to the inundation of land not previously flooded is expected to be low. However, there is no modelling or estimation of the likely changes in organic carbon or turbidity that may be expected during an inundation event that support this conclusion.

END ATTACHMENT A

ATTACHMENT B

Flooding, Soils and Hydrology (SEARs 8, 15, 20 respectively) and Mitigation Measures – Specific Recommendations and Comments

Warragamba Dam Raising (SSI 8441) - Draft Environmental Impact Statement (Consistency Review)

Table 1 : Recommendations related to Flooding, Soils and Hydrology (SEARs 8, 15, 20 respectively)

Key issue and desired performance outcome (from SEARs)	Requirement	DPIE Water comment
8. Flooding The project minimises adverse impacts on existing flooding characteristics. Construction and operation of the project avoids or minimises the risk of, and adverse impacts from, infrastructure flooding, flooding hazards, or dam failure.	1. The Proponent should quantify what flood events can be mitigated by the dam. 2. The Proponent should assess and model the impacts on flood behaviour during construction and operation for a full range of flood events up to the probable maximum flood (accounting for sea level rise and storm intensity due to climate change) including: (a) any detrimental increases in the potential flood affectation of other developments, land, properties, assets and infrastructure. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories; (b) quantify the benefits of reducing flood affectation to developments, land, properties, assets and infrastructure; (c) consistency (or inconsistency) with applicable Council floodplain risk management plans; (d) compatibility with the flood hazard of the land; (e) compatibility with the hydraulic functions of flow conveyance in flood ways and storage areas of the land; (f) downstream velocity and scour potential; (g) impacts the development may have upon existing community emergency management arrangements for flooding. These matters should be discussed with the State Emergency Services (SES) and relevant Councils; and (h) any impacts the development may have on the social and economic costs to the community as consequence of flooding. Specifically, events at a minimum should be assessed for the 1 in 5 year, 1 in 10 year, 1 in 20 year, 1 in 100 year and the probable maximum flood. Modelling should include flood characteristics such as extent, level, velocity, and rate of rise at a minimum. Discussion and an assessment of the flood management zone also needs to	• Further analysis of downstream velocity and scour potential is required. • Erosion Risk Hotspot modelling is not suited to analysis of channel processes. It identifies zones where erosion is more likely to occur, but the EIS requires analysis at finer scale, and from a process perspective, to groundtruth risk predictions, identify sites of present instability, and gain insight into the causes of such erosion. Designing release flows to minimise impacts will require a more detailed understanding of the process by which erosion could occur post-development. • In locations where erosion is occurring, channel cross-sections and calculation of appropriate metrics (unit stream-power, near-bank velocity etc) would provide a useful framework for estimating and describing the change in post-development erosion risk, and for proposing measures to mitigate any residual impacts. • Erosion and scour risk mapping should be supported by analysis of the River Styles database to identify target reaches for detailed investigation. Criteria should include stream condition, fragility and recovery potential to identify those reaches that are most vulnerable to geomorphic adjustment and then consider preventative and remedial actions that treat the causes of adjustment.

Key issue and desired performance outcome (from SEARs)	Requirement	DPIE Water comment
	be included. 3. The Proponent should model the effect of the proposed project on the flood behaviour of the broader catchment under the following scenarios: (a) Current flood behaviour for a range of design events as identified in point 2 above; (b) The 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change or modelling of the 1 in 100 year flood with the range of climate change scenarios recommended in Australian Rainfall and Runoff 2016. 4. The Proponent should identify and address any impacts the project may have upon existing emergency management arrangements for flooding. These matters are to be discussed with the SES and relevant councils downstream and upstream of the Dam. 5. The assessment should discuss emergency management, evacuation and access, and contingency measures for the construction and operational stages of the project considering the full range or flood risk including the probable maximum flood. These matters are required to be discussed with the SES and relevant councils. 6. Discussion in the assessment of the consequences of flooding on social and economic costs to the community and in the broader catchment, including up to the probable maximum flood level.	
15. Soils The environmental values of land, including soils, subsoils and landforms, are protected. Risks arising from the disturbance and excavation of land and disposal of soil are minimised, including disturbance to acid sulphate soils and site contamination.	1. The Proponent should verify the risk of acid sulphate soils (Class 1, 2, 3 or 4 on the Acid Sulphate Soil Risk Map) within, and in the area likely to be impacted by the project. 2. The Proponent should assess the impact of the project on acid sulphate soils (including impacts of acidic runoff offsite) in accordance with the current guidelines. 3. The Proponent should assess whether the land is likely to be contaminated and identify if remediation of the land is required, having regard to the ecological and human health risks posed by the contamination in the context of past, existing and future land uses. Where assessment and/or remediation is required, the Proponent should document how the assessment and/or	• Section 5.1.3 considers impact of upstream in-channel sediment deposition in terms of suspended load (rates estimated) and bedload. This section focuses particularly on potential for mobilisation of bedload (larger particles) but focuses less on potential for deposition of silts, clays and fine sands. Descriptions of upstream catchment areas and suspended load yield rates given in this report suggest that deposition of fine material is likely, and that this material would be likely to fill spaces between larger particles on the riverbed (with associated reduction of habitat availability and quality). • The significance of this increased deposition is potentially

Key issue and desired performance outcome (from SEARs)	Requirement	DPIE Water comment
	remediation would be undertaken in accordance with current guidelines. 4. The Proponent should assess whether salinity is likely to be an issue and if so, determine the presence, extent and severity of soil salinity within the project area. 5. The Proponent should assess the impacts of the project on soil salinity and how it may affect groundwater resources and hydrology. 6. The Proponent should assess the impacts on soil and land resources (including erosion risk or hazard). Particular attention should be given to soil erosion and sediment transport consistent with the practices and principles in the current guidelines. 7. Attention should also be given to direct and indirect increase in erosion, siltation, impact on riparian vegetation of increased sediment loads and reduction in stability or river banks or water courses both upstream and downstream in the event of a flood. Consideration should be given to the amount of time areas are inundated and the impact of soil during and after these events. 8. Consideration should also be given to areas inundated by probable maximum flood levels and the potential for the project to impact how siltation remains deposited in these areas, as well as the potential impact on existing vegetation and changes in soil characteristics. The Proponent should detail, in the event that a probable maximum flood level event occurs, how soil and areas affected by changed hydrological regimes as a result of the project will be managed and/or remediated. 9. The Proponent should detail the capacity of the site to support the increased size of the structure.	understated in relation to assessment of habitat requirements for Macquarie Perch in particular, within the upstream Aquatic Ecology Assessment and upstream Biodiversity Assessment (Ch 11.5.1, Appendix F1). • Report highlights uncertainty in quantifying siltation on sensitive receptors and that data is not available to model rates of deposition. However, the report then makes the claim that the impact in terms of smothering vegetation would likely be 'minor'. A conclusion of 'minor' impact cannot be argued on the basis of there being no available data, and this conclusion is not supported. As per SEARs 3.2c, the report should consider worst case scenario in a comprehensive risk assessment. • The concluding statement, that the effect will be a "limited increase in the extent and lateral width of deposition in the upstream rivers" is inadequate for the purposes of risk assessment (SEARs 15.8). • The report should use higher quality topographic data to more accurately determine the spatial extent of inundation, then quantify the total area and stream length likely to be impacted by in-channel deposition of fine material. Where uncertainty exists, this calculation should assume worst case scenario (as per SEARs 3.2c) that the majority of the inundation extent will experience deposition in the waning stage of flood, as rising lake level reduces flow velocity. This potential deposition is significant because it would likely remain until the next flood, which may be some time. • Bank erosion index seems to only account for a limited range of erosive processes. For example, it does not account for slumping during exfiltration of saturated banks (e.g. Grove et al., 2013, *Earth Surface Processes and Landforms*) or the many contributing factors listed on p. 114 of the EIS. • More process-based interpretation is required to fully understand potential risk of erosive processes (also applies to SEARs 20.4a,d). Recommend finer-scale

Key issue and desired performance outcome (from SEARs)	Requirement	DPIE Water comment
		investigation of locations where erosion may commence or existing erosion problems may be exacerbated. This should be supported by analysis of the River Styles database to identify target reaches for detailed investigation. Criteria should include stream condition, fragility and recovery potential to identify those reaches that are most vulnerable to geomorphic adjustment. • Mitigation should then consider preventative and remedial actions that treat the causes of adjustment, or that increase resilience. • The proponent has partially addressed the likely impact of increased repeated inundation on riparian vegetation in FMZ, as part of the Biodiversity Review, but uncertainties regarding the extent of, and impacts to the riparian zone (Appendix F2, 1.5.4, Appendix F1, 3.2.5) may be improved with the adoption of higher resolution data as described above. Alternatively, the proponent should quantify the worst case scenario as a basis for analysis. • The risk of soil property changes due to increased and repeated inundation is acknowledged for vegetation impacts (App F1, 7.1.1.4), but increased slumping or erosion (ie reduced stability) is not considered in any detail.
20. Water - Hydrology Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised. The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems	1. The Proponent should consider potential alternatives for managing flood waters and justify the selection having regard to the relative environmental impacts. 2. The Proponent should describe (and map) the existing hydrological regime for any surface and groundwater resource (including reliance by users and for ecological purposes) likely to be impacted by the project, including stream orders, as per the FBA. Mapping should include upstream and downstream tributaries that may potentially be impacted, including: (a) the extent of regional flood up to the probable maximum flood; (b) flood planning area, the area below the flood planning level (area below the 100 year ARI plus freeboard); (c) hydraulic categorisation (floodways and flood storage areas);	• The EIS postpones consideration of floodwater management in the FMZ to a post-authorisation "detailed operational protocol" involving consultation with stakeholders. This approach is not supported. Flood and flow management present both the largest threat to downstream environments due to scour and erosion, and a significant opportunity (along with resilience-based rehabilitation) to minimise impacts through designed flow releases. These details are fundamental to assessing the impacts of the proposal and should be provided to enable full impact assessment (SEARs 2.2 & 3.1). Designed flow release details are specifically requested at SEAR 20.6.

Key issue and desired performance outcome (from SEARs)	Requirement	DPIE Water comment
including estuarine and marine water (if applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved). Sustainable use of water resources.	and (d) hazard categorisation. The extent of mapping/modelling used needs to be identified and rationalised. 3. The Proponent should prepare a detailed water balance for ground and surface water including the intake and discharge locations, where relevant, volume, frequency and duration of flooding events (1 in 5 year, 1 in 10 year, 1 in 20 year, 1 in 100 year, and probable maximum flood) and at times of non-flood. 4. The Proponent should assess (and model if appropriate) the impact of the construction and operation of the project and any ancillary facilities (both built elements and discharges) on surface and groundwater hydrology in accordance with the current guidelines, including: (a) natural processes within rivers, wetlands, estuaries, marine waters and floodplains that affect the health of the fluvial, riparian, estuarine or marine system and landscape health (such as modified discharge volumes, durations and velocities), aquatic connectivity and access to habitat for spawning and refuge; (b) impacts from any permanent and temporary interruption of groundwater flow, including the extent of drawdown, barriers to flows, implications for groundwater dependent surface flows, ecosystems and species, groundwater users and the potential for settlement; (c) changes to environmental water availability and flows, both regulated/licensed and unregulated/rules-based sources; (d) direct or indirect increases in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses; (e) minimising the effects of proposed stormwater and wastewater management during construction and operation on natural hydrological attributes (such as volumes, flow rates, management methods and re-use options) and on the conveyance capacity of existing stormwater systems where discharges are proposed through such systems; and (f) water take (direct or passive) from all surface and groundwater sources with estimates of annual volumes during construction and	• The proponent needs to better define the 'ancillary features' (SEARs 20.4a) including "Natural processes within rivers…" by ensuring that site investigations are representative of the river type and its associated river processes. • Reach delineation (e.g. in 3.2.1) is largely descriptive, with criteria for delineation not justified or mapped clearly. Recommend that River Styles reaches be used as a geomorphic framework for delineating reaches, characterising sites, targeting more detailed investigation and defining the natural character and processes for each river section (SEARs 20.4a). • Assessment of significance (based on stream condition) and likelihood/vulnerability to impact (based on fragility and recovery potential) should be considered as part of risk assessment. • Interpretation of geomorphic processes that are important for forming and maintaining present river character and condition (geomorphic values) are not described in detail, particularly relevant for 'upstream impacts' and 'downstream impacts' sections (SEARS 20.4a). Report should interpret these processes and use this to identify any reaches which may be close to a threshold of change (e.g. change in River Style or condition) and where that change could be triggered by change in flow regime (project operations). • Identification of 'erosion' or 'deposition' is not enough to identify risk to geomorphic values – should consider processes contributing to characteristic river behaviour and how those processes might contribute to a change in river character or condition (including habitat availability and quality). • Report should identify in detail the sources and stores of sediment in reaches which will be directly or indirectly affected by changes in water level (SEARs 20.4d). Where these cannot be quantified, they should be identified and mapped corresponding to River Styles

Key issue and desired performance outcome (from SEARs)	Requirement	DPIE Water comment
	operation. 5. The Proponent should identify any requirements for baseline monitoring of hydrological attributes. 6. The Proponent should detail a framework for managing water releases from the dam that are capable of meeting the objectives of the project (in terms of flood mitigation), ensures impacts to upstream and downstream areas and ecosystems are minimised. The framework shall include consideration of the potential rates of rise and fall in the river, timing of water releases. These shall include consideration of antecedent, conditions within the river, flooding impacts, and transparent and translucent flows. 7. The Proponent should assess the potential impact on groundwater and surface water users, details of how existing water rights will be protected, including with respect to availability, quantity and quality of the water, noting the interjurisdictional users within the potentially impacted area. This would include an assessment of environmental availability, both regulated and unregulated use, licenced and rules-based sources of such water. 8. The Proponent should consider and discuss the rate at which flood waters would potentially recede following a probable maximum flood event, the impact on vegetation both upstream and downstream from the flood and the impact on water quality over time as flood waters are released from the dam throughout the catchment. Geomorphology and river management should be taken into account.	reaches. With this information, risk to instream features from changing erosion/deposition with fluctuating lake level can be more readily assessed. • Identification of erosion and deposition zones on longitudinal profiles (e.g. in Figure 20) appear to be based solely on the relatively high and low elevation points along the profile. This method is unfamiliar to DPIE - Water. The proponent should provide references if it is supported by literature, and confirm if these have been verified visually or ground-truthed. It is unclear whether the illustrated high and low points are relevant, or artefacts of data quality. • The EIS could be improved by the use of a DEM to produce a more accurate longitudinal profile than Near Map imagery. Until a more accurate longitudinal profile is produced and the storage/source types are identified along the profile, the inundation extents and possible impacts of inundation cannot be assessed adequately. • The proposal will not change daily minimum flow operations, and is likely to attenuate higher flows and release them over a longer period. Significantly most of the downstream entitlement is for water utilities, unlikely to be impacted by reduced flood flows. Access to water for irrigation and other users is also not expected to be impacted. The Warragamba River MZ uses dam discharge to define Very Low Flow class, but this project is not expected to impact low flow discharges. • Inadequate consideration of inundation impacts (including recession of floods as per SEAR 20.8) is discussed above. Flood releases have not been proposed as per SEAR 20.6, also discussed above.
<u>Mitigation issues</u> **(Related to various SEARs, mainly:** **3. Assessment of Key Issues**		• The EIS postpones consideration of alternatives for floodwater management of the FMZ to a post-authorisation "detailed operational protocol" involving consultation with stakeholders. Flood and flow management present both the largest threat to

Key issue and desired performance outcome (from SEARs)	Requirement	DPIE Water comment
20. Water – Hydrology **21. Water - Quality**		downstream environments due to scour and erosion, and the best opportunity to minimise impacts through designed flow releases. These details are fundamental to assessing the impacts of the proposal and should be provided to enable full impact assessment (SEARs 2.2 & 3.1) • Deferral to the 'Catchment Erosion Management Plan' not yet developed (Appendix L) is insufficient as a mitigation action. SEARs 3.2e requires that mitigation actions be detailed in the EIS. It is not possible to assess mitigation plans that have not been submitted for assessment. Furthermore, residual impacts cannot be estimated and offset (SEARs 3.2f) using the deferred approach. • Sect 5.4.2: 'Bank stability monitoring' (plan to be developed) is supported as part of an appropriate mitigation strategy, but not in isolation. Monitoring actual degradation and then identifying a remedy is treating symptoms, not causes. Following earlier comments, recommended analysis should identify sites or reaches of high potential for adjustment, that may require additional protective or proactive mitigation measures (eg revegetation or rehabilitation to build resilience, adjustments to designed flow releases).

END ATTACHMENT B

DOC20/428148

5 June 2020

Mr Dominic Crinnion
Team Leader
Social and Other Infrastructure Assessments
Department of Planning, Industry and Environment
GPO Box 39
Sydney NSW 2001

Dear Mr Crinnion

Warragamba Dam Raising (SSI 8441)
Consistency Review of Draft Environmental Impact Statement

I am writing to you in reply to your invitation to the EPA to provide advice on the consistency of the draft Environmental Impact Statement (EIS) with the Secretary's Environmental Assessment Requirement (SEARs).

The EPA has reviewed the draft EIS against the relevant SEARs for the proposal. **Appendix A** (attached) provides the EPA's advice on the consistency of the EIS against relevant SEARs. These are provided in a series of tables and cover:

- 11. Noise & Vibration – Amenity
- 15. Soils
- 20. Water – Hydrology
- 21. Water – Quality

The EPA acknowledges that a final EIS will be referred for review during exhibition and looks forward to a merit review at that time.

Should you require clarification of any of the above please contact Anna Timbrell on 9274 6345 or email anna.timbrell@epa.nsw.gov.au

Yours sincerely

B. Treharne

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APPENDIX A

11. NOISE AND VIBRATION

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
11. Noise and Vibration – Amenity Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on acoustic amenity. Increases in noise emissions and vibration affecting nearby properties and other sensitive receivers during operation of the project are effectively managed to protect the amenity and well-being of the community.	1. The Proponent must assess construction and operational noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines. The assessment must include consideration of impacts to sensitive receivers including small businesses, and include consideration of sleep disturbance and, as relevant, the characteristics of noise and vibration (for example, low frequency noise).	EIS Main Report – Chapter 19 App L – Section 5	No – Further information is required on whether any modifying factors for annoying noise characteristics are applicable for both the operational noise and construction noise assessments, in accordance with the Noise Policy for Industry Fact Sheet C and Interim Construction Noise Guideline Section 4.5.
	2. The Proponent must demonstrate that blast impacts are capable of complying with the current guidelines, if blasting is required	EIS Main Report – Chapter 19 App L – Section 5.5	Yes – assessment shows guidelines can be satisfied with reduced MIC values.
12. Noise and vibration – structural Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on the structural integrity of buildings and items	1. The Proponent must assess construction and operation noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines. The assessment must include consideration of impacts to the structural integrity and heritage significance of items (including Aboriginal places and items of environmental heritage).	EIS Main Report – Chapter 19 App L – Section 5.3	No Comment – EPA does not address vibration impacts to structures.

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
including Aboriginal places and environmental heritage. Increases in noise emissions and vibration affecting environmental heritage as defined in the *Heritage Act 1977* during operation of the project are effectively managed.	2. The Proponent must demonstrate that blast impacts are capable of complying with the current guidelines, if blasting is required.	EIS Main Report – Chapter 19 App L – Section 5.5	

Additional comments from EPA

- Section 5.2.1 of the App L Noise and Vibration Impact Assessment states that both CONCAWE and ISO9613 noise models have been used to predict noise impacts. As these models are independent of each other, the assessment should clarify how they have been used together, and identify any potential issues arising from this.
- Section 5.2.1 of the App L Noise and Vibration Impact Assessment states that all ground (that is not water surface) has been assumed to be absorptive. It is unlikely that this ground is 100% absorptive, and that adopting a fully absorptive ground surface value will likely underestimate noise impacts. An intermediate value, such as 50% absorptive, may be more appropriate for this assessment. The assessment should clarify the exact value of the ground absorption coefficient used and justify why the adopted value is appropriate for this assessment.
- The App L Noise and Vibration Impact Assessment states in Section 5.4 that up to 180 heavy vehicle movements and up to 250 light vehicle movements may occur during the morning and afternoon peak hours during peak construction. This is a significant number of hourly movements which does not appear to be reflected in the modelled traffic volumes in Table 5-8 of the assessment. The assessment should clarify whether the number of movements above (180 heavy vehicles and 250 light vehicles per hour) represents an hourly value, or a daily value as suggested by the traffic volume table. The assessment should be revised to account for any changes if necessary.

15. SOILS

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
15. Soils The environmental values of land, including soils, subsoils and landforms, are protected. Risks arising from the disturbance and excavation of land and disposal of soil are minimised, including disturbance to acid sulphate soils and site contamination.	1. The Proponent must verify the risk of acid sulphate soils (Class 1, 2, 3 or 4 on the Acid Sulphate Soil Risk Map) within, and in the area likely to be impacted by the project.	EIS Main Report – Chapter 22 App N1 – Section 4.1	No comment.
	2. The Proponent must assess the impact of the project on acid sulphate soils (including impacts of acidic runoff offsite) in accordance with the current guidelines.	EIS Main Report – Chapter 22 App N1 – Section 4.2	No comment.
	3. The Proponent must assess whether the land is likely to be contaminated and identify if remediation of the land is required, having regard to the ecological and human health risks posed by the contamination in the context of past, existing and future land uses. Where assessment and/or remediation is required, the Proponent must document how the assessment and/or remediation would be undertaken in accordance with current guidelines.	EIS Main Report – Chapter 22 App N1 – Section 6	No – further information is required. Chapter 22 of the EIS included a desktop study to assess whether the land is likely to be contaminated and Appendix N1 included a soil and contamination assessment report. The soil and contamination assessment report identified the need for management measures to avoid disturbance of known encapsulated contaminated materials. However, the actual measures were not included in the EIS, therefore not satisfying this SEAR. To satisfy this SEAR, the EIS should include unexpected finds protocol and a contaminated site management plan to avoid disturbance of known encapsulated contaminated materials and document measures to manage works that could transect areas with potentially contaminated soils.
	4. The Proponent must assess whether salinity is likely to be an issue and if so, determine the presence, extent and severity of soil salinity within the project area.	EIS Main Report – Chapter 22 App N1 – Section 5.2 App N1 – Section 5.3	No comment.

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
	5. The Proponent must assess the impacts of the project on soil salinity and how it may affect groundwater resources and hydrology.	EIS Main Report – Chapter 22 App N – Section 5.4	No comment.
	6. The Proponent must assess the impacts on soil and land resources (including erosion risk or hazard). Particular attention must be given to soil erosion and sediment transport consistent with the practices and principles in the current guidelines.	EIS Main Report – Chapter 22 App N2: • Bank erosion has been addressed for the Upstream Zone (**Section 5.1.1**), Lake Burragorang Zone (**Sections 5.2.1** and **5.2.2**) and Downstream Zone (**Section 5.3.1**). • Sediment transport in the Upstream Zone (**Section 5.1.2** and **5.1.3**), Lake Burragorang Zone (**Sections 5.2.3** and **5.2.4**) and Downstream Zone (**Section 5.3.2**). • Relevant guidelines have been identified in **Section 2.2** and the desktop, site and data analysis approaches used in this assessment in line with common industry practice are described in **Sections 2.3, 2.4, 2.5**, respectively.	No comment.
	7. Attention must also be given to direct and indirect increase in erosion, siltation, impact on riparian vegetation of increased sediment loads and reduction in stability or river banks or water courses both upstream and downstream in the event of a flood. Consideration must be given to the amount of time areas are inundated and the impact of soil during and after these events.	EIS Main Report – Chapter 22 App N2: • Erosion / siltation / stability – as above. • The potential for increased sediment load has been addressed in **Section 5.2.3** (Lake Burragorang Zone) and **Section 5.3.3** (Downstream Zone). • The impact of sediment load on vegetation will be assessed in the Biodiversity report.	No comment.

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
	8. Consideration should also be given to areas inundated by probable maximum flood levels and the potential for the project to impact how siltation remains deposited in these areas, as well as the potential impact on existing vegetation and changes in soil characteristics. The Proponent should detail, in the event that a probable maximum flood level event occurs, how soil and areas affected by changed hydrological regimes as a result of the project will be managed and/or remediated.	EIS Main Report – Chapter 22 App N2: • **Section 5.3.3** addresses how siltation remains deposited on the floodplain. • The potential for increased sediment load has been addressed in **Section 5.2.3** (Lake Burragorang Zone) and **Section 5.3.3** (Downstream Zone). • The impact of sediment load on vegetation will be assessed in the Biodiversity report.	No comment.
	9. The Proponent must detail the capacity of the site to support the increased size of the structure.	EIS Main Report – Chapter 4	No comment.

20. WATER – HYDROLOGY

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
20. Water – hydrology Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised. The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems including estuarine and marine water (if applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved). Sustainable use of water resources.	1. The Proponent must consider potential alternatives for managing flood waters and justify the selection having regard to the relative environmental impacts.	EIS Main Report – Chapter 4 and Chapter 30	No comment.
	2. The Proponent must describe (and map) the existing hydrological regime for any surface and groundwater resource (including reliance by users and for ecological purposes) likely to be impacted by the project, including stream orders, as per the FBA. Mapping must include upstream and downstream tributaries that may potentially be impacted, including:	EIS Main Report – Chapter 15 App H1 – Section 3.1 and 3.2	No comment.
	(a) the extent of regional flood up to the probable maximum flood;	EIS Main Report – Chapter 15 App H1 – Section 3.2	No comment.
	(b) flood planning area, the area below the flood planning level (area below the 100 year ARI plus freeboard);	EIS Main Report – Chapter 15 App H1 – Section 3.2	No comment.
	(c) hydraulic categorisation (floodways and flood storage areas); and	EIS Main Report – Chapter 15 App H1 – Section 3.2	No comment.
	(d) hazard categorisation. The extent of mapping/modelling used needs to be identified and rationalised.	EIS Main Report – Chapter 15 App H1 – Section 3.2	No comment.

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
	3. The Proponent must prepare a detailed water balance for ground and surface water including the intake and discharge locations, where relevant, volume, frequency and duration of flooding events (1 in 5 year, 1 in 10 year, 1 in 20 year, 1 in 100 year, and probable maximum flood) and at times of non-flood.	EIS Main Report – Chapter 15	No comment.
	4. The Proponent must assess (and model if appropriate) the impact of the construction and operation of the project and any ancillary facilities (both built elements and discharges) on surface and groundwater hydrology in accordance with the current guidelines, including:	EIS Main Report – Chapter 15	No comment.
	(a) natural processes within rivers, wetlands, estuaries, marine waters and floodplains that affect the health of the fluvial, riparian, estuarine or marine system and landscape health (such as modified discharge volumes, durations and velocities), aquatic connectivity and access to habitat for spawning and refuge;	EIS Main Report – Chapter 15 App H1 – Section 4.3 App N2: • Impact assessment is divided into Construction and Operation sections (**Sections 4** and **5**, respectively). • Sediment deposition changes to aquatic habitat are assessed in **Section 5.1.3** (Upstream Zone) and **Section 5.3.2** (Downstream Zone). • Erosion / siltation / bank stability – See Soil 6 response • Destruction of riparian vegetation – See Soil 7 response	No comment.

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
	(b) impacts from any permanent and temporary interruption of groundwater flow, including the extent of drawdown, barriers to flows, implications for groundwater dependent surface flows, ecosystems and species, groundwater users and the potential for settlement;	EIS Main Report – Chapter 15 App H1 – Section 4.2	No comment.
	(c) changes to environmental water availability and flows, both regulated/licensed and unregulated/rules-based sources;	EIS Main Report – Chapter 26 App H1 – Section 4.3	No comment.
	(d) direct or indirect increases in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses;	EIS Main Report – Chapter 15 App N2 – see (a) above	No comment.
	(e) minimising the effects of proposed stormwater and wastewater management during construction and operation on natural hydrological attributes (such as volumes, flow rates, management methods and re-use options) and on the conveyance capacity of existing stormwater systems where discharges are proposed through such systems; and	EIS Main Report – Chapter 15 App H1 – Section 4.2 and 4.3	No comment.
	(f) water take (direct or passive) from all surface and groundwater sources with estimates of annual volumes during construction and operation.	EIS Main Report – Chapter 15 App H1 – Section 4.1 and 4.4	No comment.
	5. The Proponent must identify any requirements for baseline monitoring of hydrological attributes.	EIS Main Report – Chapter 15 App H1 – Section 4.2 and Section 5	Yes
	6. The Proponent must detail a framework for managing water releases from the dam that	EIS Main Report – Chapter 15	No comment.

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
	are capable of meeting the objectives of the project (in terms of flood mitigation), ensures impacts to upstream and downstream areas and ecosystems are minimised. The framework shall include consideration of the potential rates of rise and fall in the river, timing of water releases. These shall include consideration of antecedent, conditions within the river, flooding impacts, and transparent and translucent flows.	App H1 – Section 1.3.3	No comment.
	7. The Proponent must assess the potential impact on groundwater and surface water users, details of how existing water rights will be protected, including with respect to availability, quantity and quality of the water, noting the interjurisdictional users within the potentially impacted area. This would include an assessment of environmental availability, both regulated and unregulated use, licenced and rules-based sources of such water.	EIS Main Report – Chapter 15 App H1 – Section 4.3	Yes.
	8. The Proponent must consider and discuss the rate at which flood waters would potentially recede following a probable maximum flood event, the impact on vegetation both upstream and downstream from the flood and the impact on water quality over time as flood waters are released from the dam throughout the catchment. Geomorphology and river management should be taken into account.	EIS Main Report – Chapter 15 App H1 – Section 4.2.3 App N2: • River management (focussed on addressing the identified potential impacts) is addressed in **Section 5.4**. • (Also see between 5.1 and 5.3)	No comment.

21. WATER – QUALITY

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
21. Water – quality The project is designed, constructed and operated to protect the NSW Water Quality Objectives where they are currently being achieved, and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project to the extent of the project impact including estuarine and marine waters (if applicable). The project should not adversely affect drinking water quality.	1. The Proponent must:	App Q – Water Quality Statistical Analysis (13 pp)	
	(a) state the ambient NSW Water Quality Objectives (NSW WQO) and environmental values for the receiving waters relevant to the project, including the indicators and associated trigger values or criteria for the identified environmental values;	EIS Main Report – Chapter 27.2.5	Yes, appropriate policies and methodologies are referenced e.g. the NSW WQOs and environmental values are identified. However, the specific sources of the indicators and associated trigger values presented is unclear and does not include the full list of water quality parameters potentially impacted by the proposal (see EPA comment below). These issues will need to be addressed as part of the assessment process. **EPA Comment** Upstream catchment (within Lake Burragorang) WQO's are based on the Raw Water Supply Agreement between WaterNSW and Sydney Water and the *Australian Drinking Water Guidelines.* Downstream WQO's based on the Healthy Rivers Commission guidelines, the *Hawkesbury-Nepean Analysis Toolkit* (Sydney Water 2018) and the ANZECC (2000) guidelines. It is difficult to determine which guideline (e.g. ANZECC or HRC) has been applied to each parameter. For example, Table 27-6 has TN 0.5 mg/L within the main river, which is inconsistent with the ANZECC guidelines (0.35mg/L). It would be beneficial to present the source of each guideline value so that they can be compared against the current ANZG (2018) guidelines that is the appropriate reference source.

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
			Protection levels are not identified for the downstream receiving environments. Not all indicators that could be impacted during construction and operation are provided (e.g. suspended solids, pH and turbidity (Table 27-6)). This will need to be addressed during the assessment process.
	(b) identify and estimate the quality and quantity of all pollutants that may be introduced into the water cycle by source and discharge point and describe the nature and degree of impact that any discharge(s) may have on the receiving environment, including consideration of all pollutants that pose a risk of nontrivial harm to human health and the environment;	EIS Main Report – Chapter 27.3.2.4 and 27.5.3.6	Yes, the draft EIS broadly identifies the pollutants that may be introduced into the water cycle and the nature of their impact. However, further detail on the quality and quantity of pollutants that may be introduced during construction will be required as part of the assessment process. Consideration of the potential impacts of these matters is also limited (see EPA comment below). **EPA Comment** Further information on the construction phase pollutants, potential impacts and appropriate management and mitigation measures will be required as part of the assessment process. This includes (but not limited to): • process water management • concrete batching plants • controlled blasting activities • hydro-blasting activities • underwater excavations • boat ramp upgrades • dewatering activities (such as the dissipation pool) and any water diversions • use of epoxy resins • discharge of concrete cooling pumping system

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
			• use of sediment basins and water treatment plants • road and bridge upgrades (including piling). The EIS currently defers much of these details to the detailed design phase.
	(c) identify the rainfall event that the water quality protection measures will be designed to cope with;	EIS Main Report – Chapter 27.4.2	Yes, appropriate policies are referred to however the draft EIS lacks additional details on the intended use, duration, location and operation of these basins. **EPA Comment** The draft EIS indicates basins will be sized to accommodate the 90th percentile, 5 day-rainfall evens. No further details are provided (e.g. locations, discharge quality and overflow frequency). Depending on the receiving environment, intended use and duration of discharge, the basins may need to be larger (while acknowledging any site constraints). The EIS refers to a Water Treatment Plant, but no further details on its intended use is provided.
	(d) assess the significance of any identified impacts including consideration of the relevant ambient water quality outcomes;	EIS Main Report – Chapter 27.4.1, 27.5.3 and 27.5.4	Yes, the draft EIS broadly identifies the impacts to water quality. However, further will be required as part of the assessment process with reference to the ANZG (2018) guidelines (refer to 1(b) above).

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
	(e) assess cumulative water quality and connective flow impacts on upstream and downstream areas and provide mitigation measures;	EIS Main Report – Chapter 27.5.3, 27.5.4 and 27.6 App Q	Yes, the draft EIS broadly identifies the cumulative impacts to water quality during operation. However, further will be required as part of the assessment process (refer to 1(b) above).
	(f) demonstrate how construction and operation of the project will, to the extent that the project can influence, ensure that:		
	• where the NSW WQOs for receiving waters are currently being met they will continue to be protected; and	EIS Main Report – Chapter 27.5.4.2	Unclear – The draft EIS is largely focussed on the operation phase. Further information will be required as part of the assessment process to appropriately consider construction impacts and mitigation measures. Refer to 1(b) above.
	• where the NSW WQOs are not currently being met, activities will work toward their achievement over time;	EIS Main Report – Chapter 27.5.3	Unclear – The draft EIS is largely focussed on the operation phase. Further information will be required as part of the assessment process to appropriately consider construction impacts and mitigation measures. Refer to 1(b) above.
	• identify how potential concrete, dust and other by products of the construction phase will be managed during construction activities, to ensure that water quality is maintained throughout the works. Mitigation measures should be discussed for stormwater and wastewater management during and after construction;	EIS Main Report – Chapter 27.4	Yes, the draft EIS broadly identifies the impacts to water quality. However, further information will be required as part of the assessment process (refer to 1(b) above).

CATEGORY / DESIRED PERFORMANCE OUTCOME	ITEM	WHERE ADDRESSED IN EIS	ARE SEARS ADDRESSED? (YES/ NO / UNCLEAR / NO COMMENT) + EPA COMMENT
	(g) justify, if required, why the WQOs cannot be maintained or achieved over time;	EIS Main Report – Chapter 27.5.4.2, 27.5.3 and 27.4	Refer to 1(b) above
	(h) demonstrate that all practical measures to avoid or minimise water pollution and protect human health and the environment from harm are investigated and implemented;	EIS Main Report – Chapter 27.4 and 27.6	Refer to 1(b) above
	(i) identify sensitive receiving environments (which may include estuarine and marine waters downstream) and develop a strategy to avoid or minimise impacts on these environments; and	Biodiversity appendices: App F4, App F1 and App F2	No comment.
	(j) identify sensitive upstream environments that become 'receivers' during times of flood and may become inundated. Develop a strategy to avoid or minimise impacts on these environments.	Biodiversity appendices: App F1 and App F4	No comment.

Dominic Crinnion

From: Emma Dortins
Sent: Friday, 5 June 2020 2:16 PM
To: Dominic Crinnion; Emma Hately
Cc: Natalie Blake; Steven Meredith
Subject: Warragamba dam - summary feedback following EIS meeting

Hi Dominic and Emma,

Thank you for the opportunity to review the draft EIS documents for the raising of the Warragamba Dam.

We note that an extensive archaeological survey has been undertaken, to which Niche, and several key Aboriginal stakeholders have contributed a great deal of time and expertise. HNSW has identified the following concerns with the report. We note that although many sites have been recorded, a clear view of the cultural values of the place and the potential impact of the proposal on these sites cannot be obtained from the report.

Heritage NSW revised dot-points post meeting

- Clear modelling of what the inundation likelihoods actually are at various levels - you have explained well that rain events will not necessarily equate to high inundation events. Can this be integrated into modelling? Then we can have a clearer understanding of what the distinctions between potential impact; periodic temporary impact; and impact on sites values.

- Not an adequate assessment of the cultural values (tangible and intangible) of the site.

- Consultation: Clear opposition and concerns from the RAPs documented, these concerns have not been expressly noted and considered in the stated direct and indirect mitigation measures (though they have been responded to in tables included, we consider the responses problematic overall as they repeatedly reference the NPW guidelines, we don't consider that these guidelines have been met). Heritage NSW also endorses Ben Cox's requested clarification on the RAPs opinions on archaeological testing.

- Archaeology: the categorisation of low, medium and high significance archaeological sites is not considered to be valid in its current form. Non-justified categorisation, in particular, ie. '…features or art had no distinctiveness or uniqueness, were given a low scientific (archaeological) significance rating due to the limitation of further scientific information being gleened [sic] from these sites'. p. 205; is a dangerous precedent. Discussion demonstrated this disparity with the agreed significance of one the three sites of high significance identified as rock art and the potential scientific work that could be considered on this alone. The absence of test excavation, further investigation and consideration of cultural values in determining the potential significance ('high' or otherwise), absence of extrapolation of potential site distribution over non-surveyed area (noting it is not feasible to survey the whole area). We acknowledge that the table(s) provide relevant data, however analysis of this data is necessary for the cultural values and potential impact to be clearly understood.

- It is inappropriate to consider this highly significant landscape as a series of isolated, low, medium, high, sites without a documented understanding of the cohesiveness, and the intactness of this rare landscape (including the already inundated Burragorang Valley). For such a highly complex place, it would be considered appropriate by HNSW for an anthropologist to be engaged to provide an analysis of overall cultural values.

- Heritage NSW considers that short term inundation will affect Aboriginal cultural heritage, the report does not adequately argue otherwise.

- There is a significant opportunity to positively impact the local community, the indirect mitigation measures below need a re-think. Perhaps the engagement of a dedication interpretation strategist, along with RAPs, local council etc to consider a range of possible options. See responses in table below to currently proposed mitigation measures.

Stated 'indirect' mitigation measures for the harm to AHC	
1. An Aboriginal Cultural Heritage Management Plan (ACHMP) should be developed for the Project. The ACHMP should be developed and managed in consultation with the RAPs and relevant regulatory authorities. The ACHMP should include, but not be limited to the following: ✦ Protocols for the involvement of the RAPs in cultural heritage investigations conducted under the ACHMP. A communications protocol that describes clear methods of communication, including expectations of suitable notification and response time, between the proponent and the RAPs. ✦ Procedures for the management and reporting of previously unknown Aboriginal heritage sites that may be identified during the life of the Project. ✦ A regular review process for the ACHMP.	• This is stating the intention of an ACHMP, generic and no evidence that this has been developed in consultation with RAPs
2. To mitigate impacts from the project WaterNSW should contribute to the greater understanding and recognition of Aboriginal culture and history of the Warragamba area by: ✦ Considering additional cultural heritage investigations within the upstream catchment and within the Subject Area (upstream catchment and impacted area) WaterNSW to provide material to assisting and supporting National Heritage Listing (NHL) and World Heritage List (WHL) listing attempts ✦ Considering opportunities for the Aboriginal community to be involved in the management of cultural sites and the landscape. ✦ Highlighting traditional and historical Aboriginal heritage of the Warragamba area through displays and interpretation at suitable locations– this information should be prepared with the assistance and endorsement of the RAPs. ✦ Highlighting traditional and historical Aboriginal heritage of the Warragamba area through establishing and facilitating educational sessions focusing on Aboriginal heritage for school students in Warragamba – preparation and delivery of these should involve Elders endorsed by the RAPs.	• Many issues with this, generic, blend of already expected site management tools irrespective of type or significance of site. Inadequate mitigation measures of a landscape whose values are not articulated.

3. A GIS database of Aboriginal heritage sites within the Subject Area should be maintained and kept up-to-date by WaterNSW (i.e. the Project Sites Database).	• Fundamental management tool, not a mitigation measure, indirect or otherwise.
4. Protocols for heritage awareness training to be incorporated into the site inductions for both employees and sub-contractors involved in the construction of the Project, operation of the dam and activities in the catchment of Lake Burragorang. Registered Aboriginal Parties should be involved in the development and presentation of the cultural awareness training.	• Principal expectation, not a mitigation measure for the loss of ACH and potentially insensitive to the knowledge-holders and their families.
2. To mitigate impacts from the project WaterNSW should contribute to the greater understanding and recognition of Aboriginal culture and history of the Warragamba area by: ✦ Considering additional cultural heritage investigations within the upstream catchment and within the Subject Area (upstream catchment and impacted area) WaterNSW to provide material to assisting and supporting National Heritage Listing (NHL) and World Heritage List (WHL) listing attempts ✦ Considering opportunities for the Aboriginal community to be involved in the management of cultural sites and the landscape. ✦ Highlighting traditional and historical Aboriginal heritage of the Warragamba area through displays and interpretation at suitable locations– this information should be prepared with the assistance and endorsement of the RAPs. ✦ Highlighting traditional and historical Aboriginal heritage of the Warragamba area through establishing and facilitating educational sessions focusing on Aboriginal heritage for school students in Warragamba – preparation and delivery of these should involve Elders endorsed by the RAPs.	• Many issues with this, generic, blend of already expected site management tools irrespective of type or significance of site. Inadequate mitigation measures of a landscape whose values are not articulated.
3. A GIS database of Aboriginal heritage sites within the Subject Area should be maintained and kept up-to-date by WaterNSW (i.e. the Project Sites Database).	• Fundamental management tool, not a mitigation measure, indirect or otherwise.
4. Protocols for heritage awareness training to be incorporated into the site inductions for both employees and sub-contractors involved in the construction of the Project, operation of the dam and activities in the catchment of Lake Burragorang. Registered Aboriginal Parties should be involved in the development and presentation of the cultural awareness training.	• Principal expectation, not a mitigation measure for the loss of ACH and potentially insensitive to the knowledge-holders and their families.

Regards,

Emma

Emma Dortins
Senior Team Leader Regional Heritage Operations South Metro
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Please note: I am working flexible hours during COVID 19 period. I am regularly checking email.

I acknowledge and respect the traditional custodians and ancestors of the lands I work across

Heritage NSW and coronavirus (COVID-19)

Heritage NSW has taken steps to protect the safety, health and wellbeing of our staff, communities and customers. Whilst our offices remain open, we have put in place flexible working arrangements for our teams across NSW and continue to adapt our working arrangements as necessary. Face-to-face meetings and field work/site visits with our customers are subject to rules on gatherings and social distancing measures. We thank you for your patience and understanding at this time.

Department of Primary Industries

Our Ref: FE20/593

Your Ref: SSI-8441

Date 26 June 2020

Dominic Crinnion
Department of Planning, Industry and Environment

Email: dominic.crinnion@dpie.nsw.gov.au

Dear Dominic,

Proposal: Warragamba Dam Raising Project - Draft EIS (Consistency Review)

Thank you for your referral of 24 June 2020 seeking comments on the proposal from the NSW Department of Primary Industries – Fisheries (DPI Fisheries).

DPI Fisheries is responsible for ensuring that fish stocks are conserved and that there is no net loss of key fish habitats upon which they depend. To achieve this, DPI Fisheries ensures that developments comply with the requirements of the *Fisheries Management Act 1994* (FM Act) (namely the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the Act, respectively), and the associated *Policy and Guidelines for Fish Habitat Conservation and Management (2013)*. DPI Fisheries is also responsible for ensuring the sustainable management of commercial, recreational and Aboriginal cultural fishing, aquaculture, Marine Parks and Aquatic Reserves within NSW.

The Project

The project would increase the inundation extent in Lake Burragorang associated with flood events, and the EIS identifies that this would be associated with reduced flow velocities, increased sedimentation, increased turbidity, and increased nutrient loads within the flood mitigation zone (FMZ) and the upstream study area. The potential impacts (of inundation on the endangered Macquarie perch (*Macquaria australasica*) habitat and spawning habitat) are discussed in the EIS but require further investigation. The assessment of significance for Macquarie perch suggests that:

- Changed flood behaviour due to the project will not exacerbate the impacts already imposed on this species by the current reservoir height, and
- The project will not change the distribution of harmful invasive species in the upstream study area.

However, mapping of the probable maximum flood (PMF) inundation extent for the operation phase of the project suggests a substantial change from the existing conditions in Kedumba River, one of the two catchments where Macquarie perch were detected based on eDNA sampling and therefor expected to be found in relatively large numbers. The potential decrease in critical Macquarie perch habitat and the potential for dispersal of exotic species, particularly Redfin perch and Trout, into areas where they are not currently present requires a detailed assessment.

The Department recommends the inclusion of the distribution data available on the Departments website to determine potential impacts of the project rather than rely on the eDNA results.

https://www.dpi.nsw.gov.au/fishing/threatened-species/threatened-species-distributions-in-nsw/freshwater-threatened-species-distribution-maps

DPI Fisheries
PSFI, Private Bag 1, Nelson Bay
Email: ahp.central@dpi.nsw.gov.au
ABN 20 770 707 468

The Department does not consider that the information is presented in a way that is helpful in determining the requirements for a test of significance under Part 7a of the *Fisheries Management Act*.

Mapping of Aquatic habitats

1. Despite the geomorphology assessment stating that "Creeks to the west of the lake (Cedars Creek, Coxs River, Kedumba River, Kowmung River) have noticeably higher erosion risk classification in the With Project Scenario", the associated potential impacts on aquatic ecology in the FMZ are not discussed in the EIS.
2. In relation to the mapping of Macquarie perch habitat and spawning habitat in the Flood Mitigation Zone, particularly in Coxs River and Kedumba Creek, the EIS would be improved by a more detailed assessment of the decrease in critical habitat that would occur under a PMF. This would include quantifying the extent of the potential areas of deposition from a large flood and a more detailed discussion on the potential effects on spawning habitats that may be subject to deposition. Of particular concern is the statement that the geomorphic assessment could "not establish quantitatively if the sediment transport regime for high flow events would change and if the magnitude of change would be great enough to alter the regime from one of erosion and transport/bedload transport to one of deposition.
3. The description of preferred Macquarie Perch habitat is not considered accurate, they do not require fast flowing water, some of the most abundant populations persist in impoundments (Dartmouth, Cataract), they do require flowing water habitats for spawning but can persist in still water an then migrate to suitable spawning habitats.
4. Sites that were identified in the Appendix of the aquatic habitat report were not included in the final report (sites 6,7,8 and 10).
5. There is inference that sites with carp may not support Macquarie perch. At all the remaining sites for Macquarie Perch in the NSW MDB they co-exist with carp, whilst not ideal, it does not preclude them
6. The EIS could improve the assessment of the potential spread of exotic predator species (redfin and trout), particularly if the FMZ lifts water levels enough to allow redfin perch to access Macquarie Perch habitat.
7. Noting the predicted changes to the hydrograph during operation of the dam and the potential for increased erosion risk downstream, detailed mapping of aquatic habitats which may be impacted by the altered hydrological regime is recommended as required by SEAR 20. This should indicate locations likely to be impacted by increased sedimentation.

- Impacts on Aquatic Ecology

  The potential operation related impacts on macrophytes in the FMZ are not assessed in section 4.2.2 of the aquatic ecology assessment.

  The potential impacts of the project on instream habitats and macrophytes in the FMZ should be assessed and quantified, along with any related potential impacts on macroinvertebrate and fish communities.

- Monitoring Program

  Although the EIS states "existing monitoring programs would be maintained and augmented as required" there is little detail provided. While not specifically required in the SEARS, the proponent should consider providing further detail on the proposed ongoing monitoring program including a detailed sampling design, developed in consultation with Fisheries NSW.

DPI Fisheries
PSFI, Private Bag 1, Nelson Bay
Email: ahp.central@dpi.nsw.gov.au
ABN 20 770 707 468

The monitoring program should allow for quantified assessment of impacts of FMZ operation on habitat availability and quality, and aquatic communities including macroinvertebrates and fish.

If you require any further information, please do not hesitate to contact me on 4916 3931.

Yours sincerely,

Scott Carter
Senior Fisheries Manager – Coastal Systems Central/Metro
Authorised delegate of the Minister for Primary Industries

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Energy, Climate Change & Sustainability (ECCS) key biodiversity issues and comments

Biodiversity - Upstream assessment (*WDR EIS APP F1 - Biodiversity Assessment Upstream 200504a for submission*) and Construction site assessment (*WDR EIS APP F3 - Biodiversity Assessment Report - Construction Area 200310 - for submission*) and relevant parts of the Biodiversity Offset Strategy (*WDR EIS APP F6 - Biodiversity Offset Strategy 200504 - for submission*)

- The rationale and conclusion for considering all upstream impacts from temporary inundation as indirect impacts is not supported. Furthermore, the proposed use of clause 8.4.1.4(e) of the FBA to apply an adaptive management approach to offsetting and assessing impacts above the 20% AEP only when they occur goes beyond the EES Group advice provided in September 2019. This was indicated in advice subsequently provided in November 2019 on the Biodiversity Assessment Framework (revision 4). Consideration of how the adaptive management approach under the FBA should be applied in the assessment is recommended.

- The BOS does not propose to provide any upfront offsets for species credit species for upstream impacts - this includes for species that have been detected by surveys (eg Regent Honeyeater breeding habitat). The assessment provides species polygons for all species credit species assumed to be present based on PCT mapping, but the credit requirements have not been calculated. The intention is that impacts will be monitored, and offsets provided if impacts are detected. Given the lack of surveys so far, impacts will generally not be able to be detected. Offsets for predicted impacts within the 20% AEP may need to be provided upfront for species credits, as well as ecosystem credits. The CoAs will need to specify post-approval surveys to ensure impacts are able to be detected.

- Both assessments have mis-interpreted attachment C of the SEARs with regards to ‘entities which are specifically excluded from matters for further consideration’. The assessments have interpreted the requirement as entities that don’t require offsetting. In fact, the entities are considered unlikely to be made extinct in the nominated subregions, so further consideration by the consent authority is not required. These errors should be corrected in the assessments. Where these species and TECs are impacted, the assessments should be redrafted with additional information required by the BAM for entities requiring further consideration.

- The information for further consideration required for *Genoplesium baueri* in the construction site and upstream assessments has not been provided.

- It is noted that the expert reports for the Giant Barred Frog (construction site assessment) and other amphibians (upstream assessment) have not been provided.

Biodiversity - Downstream Ecological Assessment (*WDR EIS APP F2 - Downstream Ecological Assessment 200423 - for submission*) and relevant parts of the Biodiversity Offset Strategy (*WDR EIS APP F6 - Biodiversity Offset Strategy 200504 - for submission*)

- The SEARs require application of the DEC 2004 survey guidelines. However, the number of vegetation plots and targeted species survey sites was very small. Also, the plots/surveys that were undertaken were not evenly distributed across the landscape given limited access, as surveys were only carried out on public land. The surveys are therefore inconsistent with the guidelines. There is a risk that significant threatened species populations will be impacted without assessment. While it is understood that surveys can't be comprehensive given the scope of the project, acknowledgement of this limitation in the assessment is recommended.
- Section 8.2 of the Downstream Assessment states a compensatory package of measures would be delivered for offsetting of impacts in downstream areas. Section 7.3 of the BOS states these measures would meet the principles for the use of biodiversity offsets in NSW. However, ECCS does not consider that principles 2, 4 and 5 would be meet. In relation to principle 2, offset requirements are not based on a reliable and transparent assessment of losses and gains as the FBA has not been applied and there has been no quantification of losses. For principle 4, funding SOS actions is not additional to other requirements, as SOS is an existing requirement. Principle 5 is not met as SOS sites are not necessarily secured and managed primarily for conservation. The funding of SOS actions at sites does not therefore provide an enduring offset. Further consideration of measures that meet the biodiversity offsets principles is recommended.
- A table in the assessment showing the number of plots undertaken per PCT should be included.
- Section 4.5 in the assessment states the Precautionary Principle was used to ensure all the biodiversity and conservation values of the assessed vegetation and habitat was captured. Further information is requested on how vegetation condition class determined for sites that could not be accessed.
- Table 6-4 in the assessment lists PCT and whether impact risk is high, medium or low. For many of the PCTs listed as having low risk, it is stated the PCT *'is unlikely to be substantially impacted by the change'*. Further information supporting this conclusion is required.
- Table 6-5 in the assessment states that the impact risk for *Eucalyptus benthamii* is medium. However, given its habitat is restricted to riparian areas and the flooding requirement for recruitment, the impact risk should be high. Further information justifying the allocation of a medium impact risk is required.
- Table 6-6 of the assessment states that the impact risk for Southern Myotis is low as it is *'unlikely to be impacted by changes in flooding extents and wetland inundation'*. Justification on why the risk category should not be

higher given this species generally roosts close to water, and its habitats will be impacted.

- The assessment of significance for the Freshwater Wetlands on Coastal Floodplains PCT concludes that the reduction in flooding extent and frequency in the 10% AEP event, and increase in flood frequency within the FMZ discharge area, is unlikely to have an adverse effect on the composition of the PCT. This conclusion appears to be based on the small percentage of impact (3.6%) of the predicted extent of the community. Although the percent of PCT being impacted may be relatively small, the impact at individual sites is substantial, given the strong correlation between the existence of the PCT and the flooding regime. Further justification for the significance impact assessment is recommended.
- The assessment of significance for Cumberland Plain Woodland PCT in Appendix J of the assessment is incomplete.
- There is only one mitigation measure proposed in the assessment to manage impacts, being a discharge protocol for the FMZ for when inundation occurs. No mitigation measures have been proposed to address other identified impacts eg bank erosion and slumping, reduced water quality, displacement of habitat, spread of exotics, spread of disease and pathogens. It is recommended these be considered and included.

EES has identified the following critical areas that are not adequately addressed in the EIS, as required by the **SEARs.**

Although the NPW Act refers specifically to Aboriginal objects and places, the investigation requires a broader focus than just the objects or places. It must also uncover cultural and scientific knowledge about their context. Objects and places in the landscape don't exist in isolation. Without their context, they may have no meaning, or their meaning may be diminished or altered. This is why proponents must investigate and assess the cultural heritage values of any area that may be affected by the proposed activity.

It is not possible to document every circumstance and define the appropriate investigative method to use for each and every investigation and assessment of Aboriginal cultural heritage. However, when investigating and assessing Aboriginal cultural heritage the decision-making process used must rely on a sequence of collecting and analysing information. (from s2 of the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* OEH 2011)

While the assessment undertaken for the EIS has broadly followed the process outlined in the SEARs the level of assessment undertaken is not appropriate for the scale and significance of the area and does not provide sufficient or adequate information to inform a decision.

Relevant SEARs

- General 3 & 4
- Heritage 10 (1) (3) (4) (5)
- Socio-Economic, Land-use and Property 14 (1), (2) and (3)
- Attachment A – 9 & 10 in particular

Key Issues

Significance assessment SEARs 3, 4, 10 and 14 (key issues, desired performance outcome, specific assessment requirements, current guidelines) and Attachment A

The investigation and assessment of Aboriginal cultural heritage should make use of all relevant disciplines. The assessment of cultural significance is more than a component of an archaeological assessment or investigation. It cannot be assumed that any one practitioner will have the full range of skills required to investigate and assess cultural significance and harm. During this task it may be necessary to engage additional practitioners with special expertise. (*Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* OEH 2011 ['Guide to assessing'])

- The SEARs have not been addressed.
- The report provided is a record of sites recorded with a significance rating based on the contents of each site. It has not been demonstrated that significance has been assessed for individual Aboriginal objects, the nominated Aboriginal place or the cultural values.
- Without a comprehensive and informed significance assessment the degree of likely impact cannot be determined and the SEARs cannot be addressed.

Impact assessment SEARs 10 (key issues, desired performance outcome, specific assessment requirements, current guidelines) and Attachment A (9) and SEAR 14

- Impacts to Aboriginal objects (tangible impacts) - it is not clear that SEARS 3 (1), 10 (1) and Attachment A (9) have been addressed as the findings in the report have not been supported by the information provided.
- Impacts to cultural values (intangible) have not been addressed – SEARs 3(1) SEARS 3 (1), 10 (1), Attachment A (9) and SEAR 14 (1,2 and 3).
- The Department rejects the finding that short term inundation will not impact on Aboriginal objects and values. There is no data or evidence presented to support this finding. This could have been investigated through archaeological investigation of areas flooded to varying extents within the current dam footprint. The impact of loss of cultural heritage to this extent on Aboriginal stakeholders should also have been investigated through the proposed anthropological study.

Consultation with Relevant Government Agencies and Regional OEH (now EES) officers – General SEAR 4 and SEAR 10. Heritage (1)

- SEAR 4 and SEAR 10 (1) have not been addressed.
- EES (then OEH) GSB officers provided advice and recommendations in 2018 about studies that should be undertaken for this project, including an anthropological study and specialist rock art study. This advice has not been incorporated into the report, either through completion of the recommended studies or discussion as to why the advice has not been followed.

Conservation, Mitigation and Management – SEARs 10 (key issues, desired performance outcome, current guidelines) and Attachment A (10)

A conservation outcome is a deliberate response to protect Aboriginal heritage values, including Aboriginal objects at risk of being damaged (s2.6 of Guide to assessing). After exhausting the options for avoiding harm and providing sustainable conservation outcomes for Aboriginal objects and declared Aboriginal places, the next step is to develop management strategies to minimise the harm (s2.7 of Guide to assessing).

- The key issue and desired performance outcome of **SEAR 10. Heritage** has not been met. The requirements of the guidelines listed in **SEAR 10. Heritage** have not been addressed. The requirements outlined in **Attachment A (10)** have not been addressed.
- No specific conservation, mitigation or management recommendations have been made. The Department does not agree with the decision to defer all further archaeological investigation, management and mitigation to an ACHMP that is to be developed post-approval. Specific management and mitigation measures should be clearly stipulated as part of the EIS (pre-approval).
- The generic measures put forward as mitigation, e.g. creation of a GIS database and baseline recording of rockshelters etc are management tools and should not be considered as mitigation against the loss of heritage.
- Conservation, Mitigation and management measures need to be developed and discussed with stakeholders pre-approval to determine what can be done and whether conservation and mitigation is possible.

- The inadequacies in assessment of impact and significance discussed above need to be rectified prior to the development of conservation, mitigation and management measures.

Recommendations

- Produce a stand alone Anthropological report to address identification and assessment of cultural values, how they relate to the archaeology and landscape and the impact of the proposal on the cultural values
- Further archaeological assessment of PADS, specific site types incl comparative analysis of rock art, scar trees, PADs, other artefacts, and the impact of flooding both temporary and permanent on the archaeological record
- Integration of all of the above into an assessment of the impacts and significance of what will be impacted and what can be avoided
- Development of conservation, mitigation and management options for the above.
- Develop a CHMP plan prior to submission.

Department of Agriculture, Water and Environment

Comments on Warragamba Dam Raising Draft EIS

MNES (Chapter 12 and Appendix F5)

1 MNES ASSESSMENT (CHAPTER 12 AND APPENDIX F5)

1.1 General Requirements

The stated extent of occurrence and extent of impact on threatened species and ecological communities is inconsistent across various chapters and appendices of the EIS. The MNES Chapter (12) or appendix (F5) needs to **provide a clear table outlining the following information for each species and ecological community occurring in the upstream, construction and downstream area**:

- extent in the construction area, upstream and downstream (for the 1 in 5 year, 1 in 100 year and PMF event)
- area (hectares) impacted in the construction area, upstream and downstream (for the 1 in 5 year, 1 in 100 year and PMF event)
- Proposed mitigation measures
- Proposed offset for any residual impacts (see separate comments provided on offsets)
- PCT's need to be converted to the equivalent ecological community and the corresponding hectares impacted by the project needs to be provided. The basis for determining equivalence also needs to be outlined in the MNES chapter/appendix i.e. based on Conservation Advice, or dominant species etc.
- A conclusion should be provided at the end of the MNES chapter to summarise significant impacts to species proposed mitigation, residual impacts and offsets.
- The table at the start of each chapter which references where the SEARs requirements are addressed in the EIS– in some cases refers to entire Appendices (100's of pages). Can this be refined so that it is easier to check which sections have addressed the specific SEARs?

1.2 Reference to Commonwealth Guidelines and Policy Statements

The Assessment of Significance in Appendix F5 refers to Commonwealth Conservation Advice, National Recovery Plans and Threat Abatement Plans, for only some species. These documents need to be discussed in relation to all species in this section. The EIS also needs to clarify if Commonwealth survey guidelines have been used where no relevant NSW survey guidelines for certain species exists, as required by the SEARs Attachment A, requirement 15b. Further relevant guidelines and policy documents can be found on the Department's website: http://www.environment.gov.au/epbc/policy-statements.

Relevant Commonwealth policy documents should be discussed in relation to all EPBC Act ecological communities and threatened species in the Assessment of Significance Section.

1.3 Survey methodology

Section 4.4 of Appendix F5 needs to clearly state which threatened species (particularly fauna) were surveyed and if the above survey guidelines were used (see point 2 above). The EIS states only Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft (DEC, 2004) were used for fauna surveys.

The EIS needs to provide justification for why species were not surveyed, particularly if suitable breeding or foraging habitat is known to occur in the project area, and an unlikely significant impact is concluded. Some examples are provided below, and further detail in Attachment A.

- Fletcher's Drumstick – species is listed as vulnerable and suitable habitat is listed as Box Gum Woodland in Conservation Advice. EIS states it is only likely to occur within 1 hectare upstream. SPRAT states it is known to occur in the upstream area, however no targeted surveys were undertaken to confirm presence of this species, and unlikely significant impact concluded.

- Koala – the EIS notes that limited previous surveys have been conducted in the area, suitable habitat exists, low field survey effort, EPBC referral guideline score of 9 (highly likely to have a significant impact), however a low animal density estimate is used to calculate a likely loss/displacement of 168 individuals, therefore no significant impact is concluded. Justification is required in the EIS for low survey effort given suitable habitat exists and few existing records is likely due to minimal surveys being done in the past.
- See separate comments under offsets advice regarding survey in the construction area for the FBA.

There also appears to be inconsistencies between sections within Appendix F5 as to whether species were surveyed or not or if they were recorded within the project area.

- Giant Burrowing Frog (App F5 App A) - Assessment of Significance assumes presence as species was not recorded during surveys. Table 5.6.3 states it was recorded downstream. Table 6.3 states it has a high likelihood of occurrence in the construction and downstream area and moderate upstream. If surveys were conducted, then the guidelines for survey methodology need to be referenced. The EIS concludes no significant impact to this species (this is also an error see comments under 4 below).
- Dural Land Snail – F5 App A Assessment of Significance states that no targeted searches for the species was undertaken and it is assumed to occupy suitable habitat. App F5 Table 6.3 states that the species was recorded downstream. The EIS concludes no significant impact to the species (though this is also an error see comments under 4 below).

1.4 MNES Assessment of Significance

The EIS assessed the impacts of the proposed action on species that were recorded in the project area or that were considered to have a moderate or high likelihood of occurrence in the project area. **The EIS needs to assess the impact on all species that could occur in the project area, including those with low likelihood of occurrence (as required by SEARs). The reasons for why there is a low likelihood of occurrence for these species needs to be clearly documented in the EIS.**

There are errors between the Assessment of Significance section and Table 7-2 in Appendix F5 for conclusions of significant of impact for species such as Giant Burrowing Frog, Dural Land Snail and Broad-headed Snake. This needs to be amended so there is a clear understanding of which species are likely to be significantly impacted and require offsetting.

For species listed on the DAWE's bushfire impact priority list of species requiring urgent management intervention, the assessment of significance will need to be re-considered particularly in relation to bushfire impact on species populations and the loss of habitat and number of individuals displaced as a result of the project. Consideration also needs to be given to the impact of threats such as invasive species following bushfire and spread of pathogens due to inundation.

If specific surveys were not conducted for species that have a moderate or high likelihood of occurrence in the project area or species habitat exists in the project area, DAWE questions the validity of concluding an unlikely significant impact e.g. Little-johns tree frog, giant burrowing frog or swift parrot.

DAWE has the following specific comments regarding the assessment of significance. Detailed comments are provided in Attachment A:

- *Macquarie Perch* – unlikely significant impact concluded in EIS, App F5 Assessment of Significance. However, eDNA surveys were only conducted at 5 sites (assessment could have been more rigorous and use traditional fish survey methods), the EIS dismisses the risk of aquatic disease even though the project area contain pest species, night and day construction impacts were not assessed, the impact of food chain interactions on the species was not assessed (due to impacts on macroinvertebrates such as dragonfly larvae), impact of environmental flows on downstream populations not assessed (particularly in the event of an aquatic disease outbreak). The Assessment of significance for this species should be included in Appendix F5 MNES and reconsidered in light of the above information and bushfire impacts as it is a priority species.

- *Giant Burrowing Frog* – the EIS states no significant impact, however the species is cryptic and downstream area is considered to be highly suitable habitat, second and third order streams in this region are known to be important breeding habitat, species is vulnerable to any changes in hydrology and introduction of disease (chytrid fungus The project could have significant impact on this species.
- *Swift Parrot* – although it is an ecosystem credit species and will be offset up to the 1 in 5 year extent, the EIS concludes no significant impact to this species in Appendix F5. The EIS states that the project will likely modify, destroy, remove or decrease the availability or quality of habitat of up to 3,035 hectares of foraging habitat within the upstream/construction study are (the area of occupancy of the Swift Parrot may be reduced by approximately 49%) and up to 962 hectares of foraging habitat within the downstream study area. Habitat loss and degradation constitutes a key threat to the Swift Parrot. The project could have significant negative impact on the recovery of this critically endangered species.
- *New Holland Mouse* – unlikely significant impact concluded in the EIS. Conclusions regarding significant impact and available habitat adjacent to site may need to be revisited following analysis of bushfire impacts. EIS states that species prefers early to mid-serial stage regeneration such as following fire and is competitive in vegetation 1-6 years old. Fire may have made this area more suitable to this species, and its population may increase in the project area. The EIS currently concludes unlikely significant impact to this species.

*1.5 **Ecological Communities***

The following information is requested to make a full assessment of impact on EPBC Act listed TEC's:

- The AEP appears to be related to rainfall event probability and does not account for pre-event storage or catchment conditions**.**
- **A more realistic modelling of AEP of changes to inundation, both upstream (increased inundation) and downstream (both increases and decreases in inundation depending on location) is required to fully assess significant impacts**. This needs to consider pre-event catchment conditions for runoff and probable storage levels under proposed storage operations under a range of future scenarios.
- The EIS needs to clarify whether the significant impacts due to changes in inundation can be mitigated or offset. The EIS itself finds that several TECs are at risk of significant impact or even extinction. Mitigation through management of related threats such as weed management, sediment and erosion control, control of pests and diseases and rehabilitation may reduce the significance of any hydrological impacts.
- **Although the EIS does refer to relevant recovery plans/conservation advice regarding threats for each TEC, how these threats will be managed during and post any temporary inundation, or as a result of reduced inundation events needs to be stated in the EIS.**
- For the Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion an estimated 1011 ha remained in 2002. The EIS states that "An estimated 405.32 hectares of this CEEC occurs within the downstream study area." and "No areas within the locality would be fragmented or isolated by the Project as all mapped extents could be impacted by the Project." This suggests that the only remaining known areas of this TEC are within the study area, and the EPBC offset requirement to deliver an overall conservation outcome that improves or maintains the viability of the protected matter may not be possible.
- **The EIS needs to clarify the remaining total extent and condition of the Cooks River/Castlereagh Ironbark Forest (spatial distribution) and provide clear mitigation measures for this CEEC.**
- Similarly, the critically endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest and endangered Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion have approximately 30% of their estimated distribution within the downstream study area where they are likely to have significant impacts due to changes in inundation.
- **The EIS needs to outline the mitigation measures for EPBC listed TECs likely to be significantly impacted by the proposal. e.g. Saving our Species programs are proposed to be funded as part of the mitigation measures for downstream impacts – specific**

programs/measures for at risk ecological communities and species should be detailed in the EIS.

- Ecological communities found in the upstream and downstream areas of the proposal are listed on the Department's priority list of matters for urgent management intervention.
- **The EIS needs to assess the combined impact of the bushfires and the proposal on these TECs, propose possible mitigation measures and assess whether the changes in inundation due to the project may change the frequency and intensity of bushfires in the EPBC listed TECs**.
- **The impact of the environmental flows structure on downstream MNES needs to be analysed in the EIS.**
- See Attachment A for more detailed advice regarding ecological communities.

1.6 Assessment against the SEARS

- A review of the EIS against the SEARs relating to MNES is provided in Attachment B.

ATTACHMENT A - Detailed comments on assessment of species and ecological communities

Threatened Species

Macquarie Perch and freshwater species

- EPBC species of focus that have been assessed by proponent:
    - *Macquaria australasica* (Macquarie Perch)
    - *Prototroctes maraena* (Australian Grayling)
    - *Epinephelus daemelii* (Black Rockcod)

Other species of potential interest (noting that these species have all been translocated into the surrounding areas):

    - *Maccullochella macquariensis* (Trout Cod)
    - *Maccullochella peelii peelii* (Murray Cod)
    - *Bidyanus bidyanus* (Silver Perch)

- Legislation and policies used in planning as well as the databases used for research (SPRAT, Protected Matters Search are sufficient.
- Other guidelines that may be of use, especially during the development/construction is *National policy guidelines for the translocation of live aquatic animals*, as there may be situations that arise where such activity will be required.
- The methodology used could have been more rigorous. E-DNA surveys at only 5 sites as well as observations for habitat assessments in which any fish observed was recorded.
- Whilst acknowledging that eDNA provides efficiency, traditional fish survey methods would have been more beneficial. For instance, we know that part of *E. daemelii's* juvenile stage is spent in estuaries (Listing advice DoEE 2012) and while not in the immediate project construction zone; an egg, larval or juvenile survey would have determined the species reach, especially when no confirmed sightings were recorded.
- The EIS dismisses any potential risk from aquatic disease. However, knowing that the construction, upstream and downstream areas contain many pest species as well as natives (e.g. Australian Bass), disease/biosecurity risk is a factor that needs to be assessed. eDNA would have determined the presence of viral diseases/pathogens (whether they are viable or not). If pathogens were detected, then the appropriate mitigations would need to be addressed. For instance, changes in water conditions/chemistry from the project could be the trigger which induces stress in a species that may be a carrier of a virus/pathogen (e.g. betanodavirus in Australian Bass). As a result, an outbreak could ensue.
- eDNA survey detected *Retropinnidae* DNA and reference it against the NCBI database which determined it not to be from the Australian Grayling, however, the survey also detected *Osmeriformes* DNA and this was not referenced against NCBI, therefore we do not know the exact species detected. This is critical as Australian Grayling is taxonomically part of this order (https://www.iucnredlist.org/species/18383/123378802).
- Under Warragamba Dam Habitat Assessment (Appendix F4). "*A moderate sized carp was also observed*" and "*Animal activity included snakes with some large fish that were likely carp upstream of dam*". A traditional fish survey would have better determined presence of species as a lot of assumptions were made on the fact that some "sites" could not hold/hold less Macquarie Perch due to an observation of Carp.
- The assessment should address potential impacts and mitigation efforts to the different life cycles of threatened species, not just adults. A traditional fish survey would have determined the presence of eggs and larvae. For instance, the proponent suggests that the Macquarie Perch will not be affected in the upstream and direct construction areas of the project as no suitable habitat for the species occurs within these areas and the chances of indirect impacts (i.e. water turbidity) are unlikely.

However, this does not address difference in life cycle for the species, including any potential impacts during certain stages of their life cycle or spawning periods.

- Excerpt from the Macquarie Perch Recovery Plan:
  Preferred juvenile habitat in rivers is not well documented. Juveniles of 10–30 mm length inhabit pools in the Cotter River and are benthic and/or semi-pelagic during the day and inactive at night (Ebner & Lintermans 2007; Ebner et al., 2008; 2009; Broadhurst et al., 2012). Again, reflecting the necessity of traditional fish surveys, as well as the need to address night and daytime construction activities on potential diurnal impacts.
- Macquarie Perch feeds on a variety of benthic insects and insect larvae including dragonfly larvae. Noting that the project will potentially affect two dragonfly species (Adam's emerald and Sydney hawk), affecting food chain interactions.
- Proposed mitigation measures need to consider reporting structures in the event of a fish kill, biosecurity incident or extreme weather event.
- Appendix F4 Section 3.2.1.5 Habitat Condition –The EIS should provide the criteria which was previously used to assess the Hawksbury-Nepean catchment habitat conditions.
- If the following is the baseline prior to start of construction, then how will the project be measured against it? Will progress update (e.g. every 6, 12 months, etc.) identify how the habitat is faring?
  'This assessment determined that about 57 percent of the upstream catchment was in 'good' condition or within a protected area. The remaining 43 percent was characterised in moderate to poor condition (Alluvium, 2017). Most of the catchments classified as 'poor' condition were in the far-southern portion of the catchment.'
- The following may be the case, but just because there is an existing risk then it shouldn't mean that further risks shouldn't be addressed. The idea is not to compound existing risks.
  '*With regard to potential impacts on aquatic ecology due to increased turbidity from bank erosion, a practical consideration is identifying the contribution of the Project in the context of numerous other influences on downstream bank stability such as contributions from downstream major tributaries such as the Grose River. There is likely already an existing risk.'*
- Appendix F4 Section 4.2.2.3 Geomorphic impacts – Proponent states no significant impacts with regards to water quality from increased turbidity due to these processes. However, they proponent should be aware of heavy metal contaminations. Excerpt from the Macquarie Perch Recovery Plan; '*Furthermore, the nutrients and toxic substances attached to sediment particles also pose a threat to Australian native fish species (Cadwallader 1978; 1979; Lintermans 1991a; ACT Gov 1999; Horner 2000; Burton et al., 2004). Silt and clay particles can absorb, transport and store metal contaminants (Stone & Droppo 1994) so that deposited sediments act as a sink for heavy metals, with contaminated sediment potentially continuing to pose a pollution problem long after land disturbances first occurred (Trimble 1981; Mol & Ouboter 2004).'*

Regent Honeyeater (*Anthochaera Phrygia)*

- The EIS concludes a significant impact to this species and the decline or loss of a breeding population of the size of the Burragorang Valley population would have serious ramifications for the Regent Honeyeater's entire population.
- The EIS states that :
  - a minimum of 21-25 individuals (5-7% of the estimated global population) will be impacted. However, it is estimated that the local population could be indirectly impacted by the project could range from 21-200 individuals (5-50% of the global population).
  - the area of occupancy around Lake Burragorang (upstream) is likely to be reduced by up to 3,078 ha as a result of the Project. Overall, a total of 5,844 hectares of known or potential breeding habitat may be adversely impacted.
- The EIS states that no significant impact to Regent Honeyeater is expected downstream, however no surveys were conducted. The EIS states that the species has rarely been seen in the area since 1980's however there have been recent reported sightings of breeding in this area as recently as this year.

- The Regent Honeyeater is known to be adversely impacted by the presence of Noisy Miner and the breeding area is currently free of this invasive species, which makes it particularly valuable to the Regent Honeyeater. The construction and subsequent change in vegetation after inundation could cause the area to be subject to Noisy Miner invasion. However, the EIS claims that the project is unlikely to cause the introduction or establishment of invasive species. The Department does not agree with this statement.
    - The EIS needs to consider bushfire impact to this species and if breeding habitat remains in the upstream area.
- The EIS needs to clearly state how impacts to this species will be mitigated or offset.

Swift Parrot (*Lathamus discolor)*

The EIS states no significant impact to Swift Parrot, however the Department considers that the project could have a significant impact on this species:

- The Project will likely modify, destroy, remove or decrease the availability or quality of habitat of up to 3,035 hectares of foraging habitat within the upstream/construction study area (the area of occupancy of the Swift Parrot may be reduced by approximately 49%) and up to 962 hectares of foraging habitat within the downstream study area.
- Habitat loss and degradation constitutes a key threat to the Swift Parrot and this large area and degree of habitat loss is considered to be a significant impact to the species. Loss of foraging habitat on the mainland is threatening the breeding cycle of the species due to the loss of foraging resources necessary to result in a successful migration to Tasmania. The project could have significant negative impact on the recovery of this critically endangered species.
- No targeted surveys for this species were conducted.

Giant Burrowing Frog (*Heleioporus australiacus)*

The EIS states no significant impact to Giant Burrowing Frog, however the Department considers that the project could have a significant impact on this species:

- Extremely cryptic species but has been recorded in the downstream impact zone. The Sydney sandstone region is known to be a stronghold for this species, and it is rarely sighted in other parts of its range.
- The EIS claims that the project contains only 3.6 ha of non-breeding habitat but this is considered extremely unlikely – the second and third order streams in this region are known to be important breeding habitat for this species and the surrounding habitat is also critical to survival as the adults spend 95% of their time in the leaf litter up to 300m from the breeding sites. Amphibian experts emphasise that this species is very difficult to find and may only be found by targeted night surveys in perfect climatic conditions (a few days after heavy rain).
- The species breeds in minor streams, with the eggs being laid in burrows or crevices in shallow streams. Tadpoles take 3-12 months to develop, during which time they migrate to pools, so this species is very vulnerable to <u>any</u> changes in hydrology. It may spend 95% of its time in non-breeding habitat but any changes to the breeding habitat (such as inundation) would result in significant impacts to the most important populations of the species that are known to be extant in this region.
- The project (construction and increased traffic, both vehicles and human) may also cause the introduction of disease (chytrid fungus) to previously uninfected populations and refuges. This would likely cause high rates of mortality within frog populations. The introduction of disease should be considered to be a potential significant impact.
- No targeted surveys were conducted for this species.

Littlejohns Tree Frog (*Litoria littlejohni)*

The EIS claims that the species is unlikely to occur in the project area and unlikely to be significantly impacted, however the Department considers that the species may occur and is likely to be significantly impacted:

- This species is a forest dependent, pond-breeding frog with a patchy distribution, but the majority of records are from within the Sydney Basin Bioregion. Despite its relatively broad distribution, there are very few species records, and it is considered one of the least known frogs in NSW. However, it is thought to have similar habitat and breeding requirements as the Giant Burrowing Frog. This species would likely be significantly impacted as per the Giant Burrowing Frog.
- The EIS has no analysis of the impacts to this species as it was not considered to occur and no targeted surveys have been done for this species. Surveys for this species should be conducted.

Stuttering Frog (*Mixophyes balbus)*

- Changes in hydrology associated with the dam would likely impact this species but no significant populations are known to be in the project area.
- However, it is noted that no surveys for this species have been done and there was no analysis of potential impacts to this species in the EIS.

Green and golden Bell Frog (*Litoria aurea*)

The Green and Golden Bell Frog was recorded in the downstream area and the EIS concludes that the project will have a significant impact on this species. The following points should also be considered in the impact assessment and mitigation measures:

- Predation by the introduced Plague Minnow or Mosquito Fish *Gambusia holbrooki* is a recognised threat to the Green and Golden Bell Frog. *G. holbrooki* is already present in the study area, however, changes to inundation periods as a result of the Project could aid the spread of this invasive species.
- The EIS states that "The Project is unlikely to result in an invasive species that is harmful to the Green and Golden Bell Frog becoming established in its habitat, however, it may increase the distribution of *G. holbrooki* across the study area." This is contradictory, and the establishment of invasive species should be considered as a significant impact.
- Other key threats from the project that could be considered significant impacts include habitat loss (please clarify how much actual habitat will be lost - see General requirements about clearly stating impacts).
- Habitat fragmentation, altered hydrology and altered water quality are other key threats to the species from the project.

Greater glider (*Petauroides volans)*

The EIS concludes no significant impact to the Greater Glider, however the Department considers that this species could be significantly impacted:

- Chapter 8 – Biodiversity Upstream states that the Greater Glider was recorded in the study area, but the locations are not included in a map.
- Chapter 12 – MNES states that the Greater Glider has been recorded, but there is no significant impact, it does not state how or why this conclusion was reached.
- Appendix F5 states that there are relatively few records of Greater Glider from the area, but that is not consistent with Department records (ERIN Maps or ALA). It is then states that the species was not detected in the project area, which is not consistent with other areas in the EIS and the appendices.
- Appendix F5 states that more than 200 hectares of greater glider habitat will be impacted by the project, resulting in the loss of approximately 238 individuals. The loss of this many individuals is significant, and may result in a fragmented population, or a long term decrease in the size of the population, especially considering the cumulative impacts of the bushfires and this project.
- The EIS also states the greater glider can move through less-preferred habitat, however the Conservation Advice states that greater gliders are particularly susceptible to fragmentation due to low dispersal ability, especially in poor quality or non-native forest.
- The species impact should be re-assessed with regard to bushfire impacts. It is likely that the combined impact of the bushfires and the proposed action will affect the long-term recovery of the

Greater Glider in the area. The bushfires impacted known Greater Glider habitat and the proposed action will likely impact areas that are now refuges. No ground surveys have been conducted post fires, however, if any habitat remains around the project area then it is likely to be habitat critical to the survival of the species in the area.
- Mitigation, compensation/offset measures should be proposed for this species.

Koala *(Phascolarctos cinereus)*

The EIS concludes the Project is unlikely to have a significant impact on the Koala, however this should be re-assessed with reference to bushfire impacts to the species:

- EPBC referral guidelines do not specify survey effort for Koala, however it does state that surveys for animals or signs (scats) must be undertaken in a manner which maximises the chance of detecting the species, and failure to detect animals or sign in a single survey does not necessarily mean the koala is absent; spatial and temporal replication of the survey is required in order to infer true absence;
- The survey effort in the EIS appears low - 3 hours of KSAT survey conducted, combined with 15 hours of call playback and desktop analysis of previous records (noting that not many previous surveys are likely to have been done in the project area) to conclude only 0.3 animals/ha.
- Approximately 843 ha of habit could be affected and based on 0.2 animals/ha, approx. 168 individual Koalas would be lost/displaced (14% of population in the Project area). Project will cause of loss of foraging resource. Koalas within project area likely part of a much larger population.
- Score of 9 from EPBC Koala Referral Guidelines = habitat critical to survival of the Koala is present, and an important population is present. The Project Study Area contains foraging habitat that may be utilised by the Koala. EPBC Act referral guidelines state that the loss of 20 hectares or more of high quality habitat critical to the survival (habitat score of > 8) is highly likely to have a significant impact for the purposes of the EPBC Act (would require referral).
- The EIS concludes that the project is not likely to have a significant impact on the population of the Koala in the Project Area (upstream only) because a viable, connected population would remain in the Locality. Bushfires in the project area and beyond is likely to have impacted the surrounding population.
- The assessment should consider the impact of bushfire on the regional koala population and if any remaining unburnt/less severely burnt areas of the project area could now be refuge areas.

Painted Honeyeater (*Grantiella picta*)

- The EIS concludes no significant impact to this species.
- DAWE SPRAT database states species likely to occur, EIS states that it was recorded upstream and there is abundant habitat, however no surveys were conducted.
- Bushfire has likely removed all the abundant foraging habitat in the upstream area. The EIS should examine if there are any remaining refuge areas within the project area that may now provide habitat for this species?
- This species is not on the Department's priority list of bushfire impacted species.

White-throated Needle-tail (*Hirundapus caudacutus)*

- Threatened species assessment should be conducted instead of migratory assessment for this species. Migratory species was not a controlling provision for this assessment.
- The EIS considers that an ecologically significant proportion of the population will forage aerially above the project area and that loss of vegetation as a result of the project will not have significant impact to this species as suitable habitat is available elsewhere.
- Bushfire would have removed the abundant vegetation in the project area and adjacent. How has this impacted this species?
- This species is not on the Department's priority list of bushfire impacted species.

Superb Parrot *(Polytelis swainsonii)*

- Project area is not within mapped distribution, though preferred habitat is box gum woodland which occurs upstream.
- No survey conducted and no significant impact concluded.
- EIS needs to clearly state the justification for species that were surveyed and those that weren't particularly if they have a moderate or high likelihood of occurrence or if suitable habitat exists in the project area.

Large-eared Pied Bat (*Chalinolobus dwyeri)*

- The EIS concludes an unlikely significant impact is expected for this species
- Cave roosting sites are unlikely to be impacted but foraging habitat is likely to have been impacted by bushfire.
- Predation by red fox could be exacerbated by bushfires and fires around roost sites are identified as a threat in the Recovery Plan.
- Habitat in the project area and adjacent is considered critical habitat and 744 ha of foraging habitat could be impacted by inundation.
- Surveys conducted downstream and species recorded upstream – were Australian Government 'Survey Guidelines for Australia's Threatened Bat's' used?
- The combined impact to the foraging habitat from the project and recent bushfires adjacent to the site may have a significant impact on the species.
- The EIS (Appendix F5) states that the project will conserve foraging habitat and will contribute to research into the species – this is not discussed or proposed as part of the EMP or offsets strategy.
- This species is not on the Department's priority list of bushfire impacted species.

Long-nosed Potoroo (*Potorous tridactylus tridactylus)*

- The EIS states that surveys were conducted for this species. Please clarify survey method used – "Australian Government Survey Guidelines for Australia's Threatened Mammals" or a relevant NSW guideline.

New Holland Mouse (*Pseudomys novaehollandiae*)

- The EIS concludes unlikely significant impact to this species.
- Uncertainty exists around the potential presence of this species in the project area due to lack of existing records. DAWE SPRAT database indicates that it may occur in the project area The EIS concludes that it occurs due to presence of associated PCT's. It is not clear if surveys were undertaken, and the EIS concludes that it is unlikely that an important population exists in the area. See previous comments regarding concluding unlikely significant impact if no surveys have been conducted and if likely habitat exists.
- There are errors on pg. 386 of Appendix F5 in relation to extent of impact in table vs text.
- Pg. 388 in Appendix F5 refers to the Southern Brown Bandicoot instead of the New Holland Mouse in the text.
- Conclusions regarding available habitat adjacent to site may need to be revisited following analysis of bushfire impacts. EIS states that species prefers early to mid-serial stage regeneration such as following fire and is competitive in vegetation 1-6 years old. Fire may have made this area more suitable to this species, and its population may increase in the project area.

Hal (*Haloragodendron lucasii*)

- The EIS concludes unlikely significant impact to this species. Species is also a bushfire priority species.
- DAWE SPRAT database shows that species is unlikely to occur in the area, though a close relative of the species is expected to occur in the Blue Mountains area.

- SPRAT states that it is associated with TEC's found in the project area though no surveys for the species were conducted.
- Species assessment should be revisited in light of bushfire impact to species.

Cambage Kunzea (*Kunzea cambagei*)

- No survey undertaken and Assessment of Significance concludes unlikely significant impact. EIS concludes that it does not coincide with any relevant PCT' in the project area.
- DAWE SPRAT database indicates it is known to occur in the upstream area.
- Conservation Advice states that it coincides with box gum woodland – which occurs in the upstream area.
- EIS needs to revisit this conclusion particularly if no surveys were undertaken and it is known to occur in the upstream area.

Leionema lachnaeoides

- Unlikely significant impact concluded in the EIS and DAWE SPRAT database does not indicate it occurs in the project area (has a restricted distribution, limited to where it has been previously surveyed). No surveys were conducted however if species was found upstream it would be an important population.
- The EIS indicates that suitable habitat occurs for this species within 1 hectare of the upstream area and this area would be impacted by the project. What is the suitable habitat upstream that is less than 1 hectare, was this area inaccessible to survey? The Conservation advice for the species indicates that any suitable habitat is critical to the survival of the species. A significant impact could therefore be concluded since no targeted surveys were conducted.
- The Conservation Advice for the species identifies further surveys for this species in the Blue Mountains LGA as an action.

Ecological Communities
Generally the identification of TECs and of possible impacts are in line with relevant listing advice and/or conservation advice for all possible TECs and is supported by relevant survey and mapping.

Upstream Impacts

The only affected TEC in the upstream study area is the critically endangered *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*, which would be affected by temporary inundation during operation of the flood mitigation zone. The change (increase) in days inundated under a range of AEP range from approximately 5 to 11 days, while the area affected ranges from 230 ha (1 in 5 year event) to 900 ha (1 in 100 year event). The EIS has identified this as a potentially significant impact on this TEC.

Construction Impacts

Construction activities will result in clearing of 1.7 ha of Shale Sandstone Transition Forest of the Sydney Basin Bioregions. This is less than 0.1% of estimated remaining extent of this TEC.

Downstream impacts

Impacts are variable, with some areas would experience a decrease in extent and duration of flooding, other areas may see an increase in duration of temporary flooding due to the discharge of water from FMZ after the flood peak had passed.

The draft EIS provides extensive assessment of likely EPBC listed TECs, the type of impact and the significance of the impact. The EIS takes a precautionary approach and based on consideration of the criteria in the significant assessment guidelines, the EIS finds that the Project could potentially have a significant impact on the following TECs:

- Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (study area is 30% of TEC)**

- Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (100%?) **
- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (29% - risk of extinction) *
- Shale Sandstone Transition Forest of the Sydney Basin Bioregion (7% - risk of extinction) *
- Western Sydney Dry Rainforest and Moist Woodland on Shale. (3% - risk of local extinction) *

* The floodplain community would be subject to extended inundation in the FMZ discharge area and some areas would experience reduced flooding extents. Fringing vegetation and erosion impacts may result in temporary modifications to the community.
**The floodplain community would be primarily subject to reduced flooding extents which may result in modifications to the community.

The following information is requested to make a full assessment of impact on EPBC Act listed TEC's:

- It would be helpful if all information pertaining to the EPBC listed TECs were found in one section as currently it is spread over several chapters.
- The AEP appears to be related to rainfall event probability and does not account for pre-event storage or catchment conditions**. A more realistic modelling of AEP of changes to inundation, both upstream (increased inundation) and downstream (both increases and decreases in inundation depending on location) is required to fully assess significant impacts**. This needs to consider pre-event catchment conditions for runoff and probably storage levels under proposed storage operations under a range of future scenarios.
- It is not clear in the EIS is whether the significant impacts due to changes in inundation that the EIS reports can be mitigated or offset. The EIS itself finds that several TECs are at risk of significant impact or even extinction. Mitigation through management of related threats such as weed management, sediment and erosion control, control of pests and diseases and rehabilitation may reduce the significance of any hydrological impacts. Although the EIS does refer to relevant recovery plans/conservation advice regarding threats for each TEC, it is unclear how these will be managed during and post any results in temporary inundation, or as a result of reduced inundation events.
- For the Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion an estimated 1011 ha remained in 2002. The EIS states that "An estimated 405.32 hectares of this CEEC occurs within the downstream study area." and "No areas within the locality would be fragmented or isolated by the Project as all mapped extents could be impacted by the Project." This suggests that the only remaining known areas of this TEC are within the study area, and the EPBC offset requirement to deliver an overall conservation outcome that improves or maintains the viability of the protected matter may not be possible. **The EIS needs to clarify the remaining total extent and condition of the Cooks River/Castlereagh Ironbark Forest (spatial distribution) and provide clear mitigation measures for this CEEC.**
- Similarly, the critically endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest and endangered Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion have approximately 30% of their estimated distribution within the downstream study area where they are likely to have significant impacts due to changes in inundation. **The EIS needs to outline the mitigation measures for EPBC listed TECs likely to be significantly impacted by the proposal.**
- The Department found the following TECs identified in the EIS to be of HIGH priority in the Greater Sydney region due to bushfire impacts. This assessment was based on combination of the % of the community within the fire extent within the region, and the sensitivity of the vegetation types to fire:
    - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
    - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion
- In progress advice on TECs to the expert panel (Bushfire response) (15th April 2020) the following communities were high priority for fire response:
    - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion
    - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion

    - Shale Sandstone Transition Forest of the Sydney Basin Bioregion Western Sydney Dry Rainforest and Moist Woodland on Shale.
    - **Based on the fire assessment above, the EIS needs to assess the combined impact of the bushfires and the proposal on these TECs, propose possible mitigation measures and whether the changes in inundation due to the project may change the frequency and intensity of bushfires in the EPBC listed TECs**.
- The progress advice to the expert panel recommended the following candidate management actions to reduce fire-related risks of declines and extinctions and promote post-fire recovery in the TECs mentioned above.
    - Post-fire ground surveys to quality impacts
    - Protection of burnt areas from future fires
    - Predator control
    - Weed survey, treatment and removal
    - Strategic research developing and assessing management options. Changed fire regimes (i.e. changes to the frequency, spatial extent and intensity) are a threat to most of these TECs and could be compounded by changes in inundation regimes from the Project.
- **In developing the proposed adaptive management plan, the relevant conservation advice, recovery plans and best management practice guidelines for each TEC, as well as the full range of threats outlined in MNES Appendix F5, Appendix A, should be addressed.**

ATTACHMENT B - MNES Chapter 12 SEARs Requirement – Adequacy Review

EIS Chapter 12, Table 12-1. Secretary's Environmental Assessment Requirements: Biodiversity related MNES

Desired performance outcomes	Secretary's Environmental Assessment Requirements	Where addressed	Adequacy
1. Environmental impact assessment process The process for assessment of the proposal is transparent, balanced, well focused and legal.	1.2 The project requires approval under the EPBC Act and is being assessed under the Bilateral Agreement	Chapter 12 Appendix F5	Yes, the project will go through an approval process under the EPBC Act
6. Biodiversity The project design considers all feasible measures to avoid and minimise impacts on terrestrial and aquatic biodiversity. Offsets and/or supplementary measures are assured which are equivalent to any remaining impacts of project construction and operation.	6.4 The Proponent must identify whether the project as a whole, or any component of the project, would be classified as a Key Threatening Process in accordance with the listings in the Threatened Species Conservation Act 1995 (TSC Act), Fisheries Management Act 1994 (FM Act) and Environment Protection and Biodiversity Conservation Act 2000 (EPBC Act).	Chapters 8,9,10,11,12 Appendices F1, F2, F3, F4, F5	Discussed in Section 7.5 of App F1 (see Table 7-14) and section 8.10 of Ch08 (see Table 8-38) Section 6.10 of App F2 (see Table 6-9) and section 9.11 of Ch09 (see Table 9-20) Section 7.5 of App F3 (see Table 7-7) and section 10.6.5 of Ch10 (see table 10-27) KTP not discussed in relation to EPBC Act in App F4 or Ch11 App F5 discusses NSW KTP but does not make it clear if/when the document is referring to EPBC Act KTP. Not discussed in Ch12. **Please review these references for application of Key threatening process relating to the EPBC Act.**
13. Protected and Sensitive Lands The project is designed, constructed and operated to avoid	13.1 The Proponent must assess the impacts of the project on the water catchment and processes (and the impact of processes on the project) including, but not limited to:	Chapters 8,9,10,11,12 Appendices F1, F2, F3, F4, F5	Appendix A of App F5 discusses Critical Habitat under the EPBC, but in many places **uses** '**habitat critical to the survival of' and 'critical habitat'**

Desired performance outcomes	Secretary's Environmental Assessment Requirements	Where addressed	Adequacy
or minimise impacts on protected and sensitive lands.	(d) land or waters identified as Critical Habitat under the TSC Act, FM Act or EPBC Act;		**interchangeably** even though they mean different things No mention of critical habitat identified under EPBC Act in any of the other chapters/appendices

EIS Chapter 12, Table 12-2. SEARs Attachment A requirements for biodiversity-related MNES

Requirements	Where addressed	Adequacy
1.To meet requirements, the project must be assessed in the manner specified in Schedule 1 to that agreement including that the assessment documentation contains: (i)An assessment of all impacts that the action is likely to have on each matter protected by a provision of Part 3 of the EPBC Act. (ii)Enough information about the proposal and its relevant impacts to allow the Commonwealth Minister to make an informed decision on whether or not to approve. Information addressing the matters outlined in Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations (2000) – see requirement 4 below	Chapter 12 Appendix F5	(i) Yes, but **only detailed discussion of potential impacts on species and TECs that are assessed as potentially being significantly impacted by the Project. Matters not likely to be impacted are not discussed and reasons for not being assessed are not explained**. (ii) **Inconsistencies in extent of impacts on species and TECs across different chapters/appendices of the EIS.**
2. In the circumstance that a proposal has been determined to be a 'controlled action' requiring full assessment, the decision will identify which MNES protected under the EPBC Act have triggered for assessment. These are called the controlling provisions. Proponents are only required to provide an assessment of protected matters under the controlling provisions that have been triggered. Following is the list of controlling provisions: • listed threatened species and communities (sections 18 and 18A).	Chapter 12 Appendix F5	One biodiversity related EPBC controlling provision (section 18 and 18A) An assessment of EPBC listed threatened species and ecological communities has been undertaken in this chapter/appendix

Requirements	Where addressed	Adequacy
		Significant Impact guidelines against any mapped TECs and any species that were assessed as having a moderate or likelihood to occur or that are known to occur. **Migratory species assessment has been conducted – Migratory species is not a controlling provision.**
3. The proponent must consider each of the protected matters under the triggered controlling provisions that may be significantly impacted by the development. The Department of the Environment has provided a list of threatened species and communities that are considered to be at risk of impact from the proposal at Attachment 1. Note that this may not be a complete list and it is the responsibility of the proponent to undertake an analysis of the significance of the relevant impacts and ensure all protected matters that are likely to be significantly impacted are assessed for the Commonwealth Minister's consideration	Chapter 12 Appendices F1, F2, F3, F4, F5	All species on the list provided by the Department that are considered to be at risk of impact from the proposal have been assessed for occurrence in the project area and for likelihood of significant impact (if considered likely to occur) In addition to the Department's list the proponent has identified an additional 24 flora species that the project could potentially significantly impact.
4. Assessment documentation prepared for the purposes of approval under the EPBC Act must, in addition to providing sufficient information for a decision, address the matters outlined in Schedule 4 of the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cwlth.). The following includes requirements that have been identified as additional to the requirements prescribed in Schedule 2 of the NSW *Environmental Planning and Assessment Regulations 2000*. Proponents are advised to check that requirements in Schedule 4 of the EPBC Regulations have been appropriately addressed.	Section 12.2.2 Section 12.2.5 Section 12.2.6 Section 12.2.7 Section 12.2.8	Schedule 4 covers the following matters: • general information • a description of the Project, identifying specific matters • relevant impacts • proposed safeguards and mitigation measures • other approvals and conditions • the environmental record of the person proposing to take the action • information sources. **Sections listed - 12.2.5, 12.2.6, 12.2.7 or 12.2.8 do not seem relevant to this requirement.**
9.The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including:	Chapter 12 Appendices F1, F2, F3, F4, F5	i. Section 8 Appendix F5 and section 12.6/12.7 in Ch12 provides a summary of potential impacts in each study area. Section 7 of Appendix F1 gives a detailed impact assessment for upstream biodiversity including direct and

Requirements	Where addressed	Adequacy
i. a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts; ii. a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; iii. analysis of the significance of the relevant impacts; and iv. any technical data and other information used or needed to make a detailed assessment of the relevant impacts.		indirect impacts and long term and short term impacts. Section 6 Appendix F2 gives an impact assessment for downstream biodiversity – **long term vs short term impacts not explicitly discussed**. Section 7 of Appendix F3 gives a detailed impact assessment for construction area biodiversity including an assessment of direct and indirect impacts – **long term vs short term impacts not discussed**. Section 4 of Appendix 4 discusses potential impacts of the project on aquatic environments – brief mention of direct and indirect impacts, **no discussion of short-term vs long term impacts** ii. Statement in Appendix F1 that nature of edge effects is unpredictable and variable over space and time (p. 275). That the variable and unpredictable impacts of myrtle rust as a standalone impact make impact assessment difficult (p. 277). Appendix K to Appendix F1 has maps showing area of threatened species or communities with potential for serious and irreversible impacts. Section 6.4 Appendix F2 discusses irreversible impact risks for biodiversity features. **No statement of unpredictable or irreversible impacts in Appendix F3. No mention of unknown, unpredictable or irreversible impacts in Appendix F4.** iii. Significant impact guidelines have been applied to species assessed as having a moderate to high likelihood or occurrence in the study area or are known to occur (see Appendix in F5) iv. Appendices include threatened species habitat polygons, plot and transect data and floristic data.

Requirements	Where addressed	Adequacy
Avoidance, mitigating and offsetting		
10.For each of the relevant matters protected that are likely to be significantly impacted by the development, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including: i. a description, and an assessment of the expected or predicted effectiveness of the mitigation measures, ii. any statutory policy basis for the mitigation measures; iii. the cost of the mitigation measures; iv. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing; v. the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	Appendices F1, F2, F3, F4, F5	i. **Not addressed in Appendices F1, F2, F3, F4 or F5**. ii. Statutory basis given for EMP – special provision of the *Water NSW Act 2014* requires WaterNSW to prepare in EMP with specific requirements (section 6.2 App F1). **No other statutory basis for mitigation measures discussed** iii. **Not addressed in Appendices F1, F2, F3, F4 or F5** iv. An Environmental Management Plan has not yet been developed for the Project and an outline should be provided in the EIS. **Comments regarding mitigation measures and monitoring relating to species, EC's and OUV has been provided in detailed advice from DAWE.** v. Table 6-4 in App F1, Table 7-1 in App F2, Table 6-6 in App F3, Table 4-2 in App F4, states who is responsible for each mitigation measure. Otherwise not discussed
11. Where a significant residual adverse impact to a relevant protected matter is considered likely, the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy.	Chapter 13 Appendix F6	Chapter 13/Appendix F6 outline the Projects offset approach (see Table 1-1 App F6) Conservation benefit associated with the proposed offset strategy only discussed briefly in relation to the Downstream offset strategy (Ch13 p. 24). **Further discussion required to meet this requirement.**
12. For each of the relevant matters likely to be significantly impacted by the development the EIS must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any: i. conservation advice or recovery plan for the species or community,	Appendices F1, F2, F3, F4, F5	App F1- Conservation advices referenced for only three species in section 7.7.3 of App F1 (threatened species and populations). Recovery plans referred to in text for one TEC in section 7.7.2 and one flora species in section 7.7.3. Included in the references list for some other

Requirements	Where addressed	Adequacy
ii. relevant threat abatement plan for a process that threatens the species or community iii. wildlife conservation plan for the species iv. management plan for Ramsar wetland v. management plan for a World Heritage property or National Heritage place; vi. Marine Bioregional Plan; vii. any strategic assessment.		species. Conservation advices for TECs referenced in in section 4.4.2 in App F1. App F2 - Conservation advice for species mentioned in the reference list for the assessment of significance for some species in Appendix F of App F2 – not referenced in the text itself. Some Commonwealth recovery plans mentioned in Appendix F of App F2 (but mostly NSW recovery plans). App F3 - In App F3, a recovery plan only referenced specifically regarding Green and Golden Bell Frog in Appendix I. Conservation advice for TECs referenced throughout section 4.4.2 and in Table 7-10 in App F3. App F4 - Conservation advice not mentioned App F4. Relevant recovery plans referenced in section 3.6.2 App F4 discussion about threatened species and communities. App F5 = Some relevant conservation advices and recovery plans and threat abatement plans for flora and fauna species referenced when applying the significant impact guidelines in Appendix to App F5. Conservation advice for TECs referenced in section 5.5. Wildlife conservation plans not referenced in App F1, App F2, App F3, App F4 or App F5 Threat abatement plans not referenced in App F1, App F2, App F3 or App F4 Relevance of Western Sydney Strategic Assessment not discussed in relation to project. **Conservation Advice, Recovery Plans and Threat abatement Plans need to be referenced consistently for all matters. Other relevant Aust Gov policies and**

Requirements	Where addressed	Adequacy
		guidelines need to be referenced/discussed as required.
Key Issues: Biodiversity (threatened species and communities)		
14. The EIS must identify each EPBC Act listed threatened species and community likely to be significantly impacted by the development. Provide evidence why other threatened species and communities likely to be located in the project area or in the vicinity will not be significantly impacted in accordance with the Matters of National Environmental Significance - Significant impact guidelines 1.1 (2013) EPBC Act.	Appendices F1, F2, F3, F4, F5	Appendix A to App F5 applies the Significant Impact Guidelines to all EPBC listed species and communities assessed as being moderately to highly likely to occur or known to occur. **There is no discussion on why other species were not considered likely to occur or how this conclusion was reached** (i.e Greater Glider). Table 7-2 in App F5 also gives a conclusion/justification for likelihood of significant impact – however **some of the conclusions in Appendix A and in Table 7-2 are not consistent with other areas of the EIS e.g. Broad Headed Snake and Dural Land Snail.** Section 7.7.3 in App F1 discusses significance of impact on some species (does not apply SIGs) Table 6-5 in App F2 looks at the impact risk for flora species considered to have a moderate or high likelihood of occurrence or has been previously recorded in the 10% AEP – addresses likelihood of significant impact in 'justification' column Appendix F to App F2 provides Assessments of Significance for threatened species and communities listed under the BC Act – this assessment addresses the heads of consideration under the Section 5a of the EP&A Act – not the SIGs under the EPBC Act – also only looking at whether significant impact likely within the 10% AEP event changed flood extent.

Requirements	Where addressed	Adequacy
		Section 7.7.3 in App F3 loosely discusses significance of impact on some species (does not apply SIGs, just uses the word significant/not significant when describing some impacts) Statement of significant/not significant impact given in Expert Report for some species in Appendix Appendix D of App F4 provides an assessment of significance for aquatic biodiversity applying the SIGs and giving conclusions of significance.
15. For each of the EPBC Act listed threatened species and communities likely to be significantly impacted by the development the EIS must provide a separate: a. description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans; b. details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements; c. description of the relevant impacts of the action having regard to the full national extent of the species or community's range; and d. description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action; e. identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account;	Appendices F1, F2, F3, F4, F5	(a) **Mapping for species just shows habitat, doesn't define breeding, foraging, important population or habitat critical for survival** (App F1). See 12. above for reference to Conservation Advice, Recovery Plans and TAPs (b) Survey methodology is documented in App F1 and App F5. No surveys conducted in Construction area. Assumed loss of EC's and associated species in this area. Surveys for some species undertaken and survey effort for fauna summarized in Table 5-10, against DEC 2004 guidelines. **MNES Appendix F1 identifies if survey was conducted or not but doesn't identify if these comply with the Aust Gov Guidelines and policy statements. Inconsistencies throughout EIS if species were surveyed or not.** (c) **impacts are discussed mainly in relation to the local population not the national extent. This discussion will now need to take into account bushfire impacts**. (d) **avoidance and mitigation discussed in general sense. Specific mitigation measures for impacted**

Requirements	Where addressed	Adequacy
f. a description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established. g. details of how the current published NSW Framework for Biodiversity Assessment (FBA) has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts; and h. details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the development in accordance with the FBA and/or mapping and descriptions of the extent and condition of the relevant habitat and/or threatened communities occurring on proposed offset sites;		**species not discussed (see DAWE advice relating to EMP outline).** (e) **Residual adverse impacts not adequately addressed**. Offsets proposed (ecosystem only). Doesn't explain how residual impacts to all impacted MNES will be offset. (f) as above, not clearly addressed. (g) As above, some species offsets not proposed/identified adequately. MNES proposed to be offset for construction area only. (h) As above for MNES. If biobank sites are proposed then this has not been included. Up front purchase of credits does not include species credits, which would relate to most MNES. **See DAWE specific comments relating to BOS**.
16. Any significant residual impacts not addressed by the FBA may need to be addressed in accordance with the Environment Protection and Biodiversity Conservation Act 1999 Environmental Offset Policy.	Appendix F6	Section 2.1 "The FBA does not provide guidance for assessing direct impacts that are not associated with the clearing of native vegetation, notably this includes downstream impacts on hydrology and environmental flows on surface vegetation and groundwater dependent ecosystems. Consequently, additional assessment requirements for the downstream impacts associated with dam operation were outlined within the Secretary's Environmental Assessment Requirements (SEARs)". Attachment B to the SEARs Section 2.5 discusses the EPBC Environmental Offsets Policy

Requirements	Where addressed	Adequacy
		Error in section 8.2.1 – section is about EPBC Environmental Offsets Policy, but the text refers to the NSW Biodiversity Offset Policy for Major Projects. Section 8.2 gives an evaluation of the proposed offset strategy against the EPBC Offset Policy Downstream impacts are not proposed to be offset under FBA – a number of TEC;s and species could be impacted. Some TEC's may not be able to be offset. **EMP should identify baseline monitoring strategy and Saving our Species projects that could assist in mitigating and managing impacts to these TECs/species.** Upstream – certain species not proposed to be offset in upfront package, this would involve a number of MNES. See DAWE specific comments re Offsets.

Department of Agriculture, Water and Environment

Comments on Warragamba Dam Raising Draft EIS

Hydrology

The following comments on the hydrological modelling, surface water and groundwater impacts from the project have been provided by the Department of Agriculture, Water and Environment's Office of Water Science (OWS). Detailed comments are provided in Attachment A.

Surface Water and Groundwater

- Further information on proposed flood releases and environmental flows is necessary to allow a thorough assessment of potential impacts.
- Discharges after a flood event are proposed to occur as soon as practical. Further information is required to determine how proposed releases align with environmental objectives (e.g. is an extended flood tail proposed, and how would this affect fish breeding events?).
- The assessment of potential impacts to groundwater is not adequate, and further information is necessary to determine subsequent impacts to alluvial aquifers and wetlands.
- The EIS states that alluvial aquifers along the Nepean and Hawkesbury Rivers are responsive to rainfall and streamflow. Only a preliminary assessment of groundwater impacts has been undertaken, where the proponent concludes that changes in the frequency of floodplain inundation will not impact on the groundwater system. Justification does not appear to be provided for this conclusion, particularly given the stated connectivity between alluvial aquifers and surface water. The OWS considers that further information is required to determine potential impacts on alluvial aquifers. For example, an assessment of how changes in the frequency of floodplain inundation may affect the groundwater system, and further discussion of how discharge of the flood mitigation zone may mitigate impacts on aquifers.

Water Dependent Ecosystems

- Further information is required in the EIS on the proposed environmental flow regime and impacts to wetlands and the Greater Blue Mountains World Heritage Area (GBMWHA).
- The EIS states that separate approval would be sought for the final environmental flow regime (SMEC 2020a, p. 15-6). Details of the final environmental flow regime should be included as part of this EIS, to allow for a holistic assessment of the proposed regime on the downstream environment and to increase confidence in the understanding of the potential impacts of the project.
- The EIS states that the extent of downstream wetlands is minor, and that the wetlands may be supplied through natural groundwater recharge (SMEC 2020d, p. 64). However, the EIS does not appear to have provided an assessment of the potential groundwater dependence of these wetlands in the documentation.
- To clarify predicted impacts, it is recommended the EIS includes individual tables in the MNES chapter of the EIS, providing further detail on potential impacts to each aquatic MNES and any associated habitat. The tables should include:
    - the extent in hectares of species habitat or TEC to be impacted under the 1 in 5 year, 1 in 100 year and PMF events for all three areas;
    - details of proposed mitigation measures; and
    - details of proposed offsets (see paragraph 16).

Mitigation Measures

- Further detailed information is required to determine whether the proposed mitigation measures will be appropriate given the likely impacts, and whether these measures can be achieved. ‘

- The final environmental flow regime should be provided to allow assessment of its potential impacts on the downstream environment and to determine if it is an appropriate mitigation measure.

Bushfire Impact

- Bushfires have the potential to reduce soil infiltration due to the formation of a hydrophobic layer and promote surface runoff and erosion. A detailed numerical assessment of these potential impacts (i.e. through incorporation of monitoring data into a sensitivity analysis) should be included in future monitoring and management, as they currently do not appear to be discussed in the EIS.

Hydrological Modelling

- Overall OWS has confidence in the regional scale predictions being representative of potential impacts (particularly for smaller scale flood events), given flood modelling has been undertaken in the Hawkesbury-Nepean for approximately 40 years. However, there are some issues, particularly at the local scale, that require further consideration.

- Downstream environment hydraulic model: flood behaviour was quantified using a quasi-two-dimensional RUBICON model. The RUBICON model has been reviewed by Australian and international experts (SMEC 2020b, p. 16), and OWS considers that it would be useful if these reviews could be provided in an appendix.

- Flooding was also modelled through the development of a TUFLOW model of the Hawkesbury-Nepean floodplain. The TUFLOW model is linked to the data and outputs of the Regional Flood Study. Both spatial and temporal data has been used to calibrate the model. However, variation between measured data and predictions do not appear to be discussed in detail within the EIS for either dam water levels or downstream flooding.

- Further, clarification is required regarding the hydrological modelling approach as historical streamflow records indicate that 2012-13 recorded the fifth highest inflows in the recorded period, where it is unclear whether recent large inflows have been incorporated into the model.

- Assumptions and limitations used in the models that may affect predictions for this project do not appear to be discussed other than as specified in relation to the TUFLOW model. In particular, the impacts on current predictions from the assumptions and limitations inherent in previous models needs to be clearly identified and discussed.

- Limitations associated with the accuracy of flood depth and the complex nature of the catchments are acknowledged in the Regional Flood Study which suggests that results (within channel) should be confirmed using detailed survey and modelling.

Attachment A – OWS comments on hydrology, surface water, groundwater and water dependent ecosystems

Hydrological Modelling – General Comments

1. Overall OWS has confidence in the regional scale predictions being representative of potential impacts (particularly for smaller scale flood events), given flood modelling has been undertaken in the Hawkesbury-Nepean for approximately 40 years (SMEC 2020a, p. 15-10). **However, there are some issues, particularly at the local scale, that require further consideration.** Due to this 40 years of experience, the modelling and analysis generally appears appropriate and includes the following models:

   a. Hydrological model: runoff and streamflow were modelled using RORB software, where a sub-routine program (DAMROU) was added to model the Lake Burragorang Reservoir and gate operations at the dam. The model is largely unchanged from the 1996 Flood Study since no large floods have occurred since this study which require additional calibration. However, the design rainfall inputs were updated with data since that time, and the model was calibrated to available data mainly at stations upstream of the dam. Calibration estimates were used for downstream parameters (SMEC 2020b, p. 14).

   b. Upstream environment hydraulic model: the RORB model between the dam and the inflow gauges was calibrated with flow behaviour from prior to the dam's construction using the existing MIKE11 one-dimensional model which was originally developed in the 1990's (SMEC 2020b, p. 16).

   c. Downstream environment hydraulic model: flood behaviour was quantified using a quasi two-dimensional RUBICON model, which includes a river length of 360 kms (see SMEC 2020, Figure 2-3, pp. 16 – 18) and was calibrated against ten historical flood events (SMEC 2020b, p. 16). The model is also largely unchanged from the original 1996 model, except for the addition of the M4 culverts (WMAWater 2019, p. 4), however the model is noted as being extensively reviewed and endorsed by numerous Australian and international experts (SMEC 2020b, p. 16).

   d. Monte Carlo simulation: Monte Carlo analysis from the Regional Flood Study (WMAWater 2019) were input into the hydrological model, and then these results were input into the hydraulic models (SMEC 2020b, p. 19). A modelling output showing historical data is provided at Attachment A which demonstrates a good fit between the Monte Carlo simulations and historical data (SMEC 2020b, p. 21).

   e. Water balance modelling: whilst detailed water balance modelling was not considered necessary (based on historic data, the FMZ would have only been used for 52 days between 1998 – 2018) (SMEC 2020b, p. 146), water balances from previous modelling undertaken by SMEC (2002) have been updated to 2020 (SMEC 2020b, pp. 41 – 44 and 62 – 65). Results for the upstream catchment indicate that upstream inflows do not differ between the timeframes, however, downstream outflow demand is approximately 7 GL larger in 2020 at the Warragamba WFP (SMEC 2020b, Table 3-2, p. 42). Results for the downstream catchment indicate that total inflows and extractions will increase in 2020 by approximately 12 GL and 20 GL respectively (SMEC 2020b, Table 3-9, p. 63).

   f. Supplementary flood risk analysis: flooding was also modelled through the development of a TUFLOW model of the Hawkesbury-Nepean floodplain (WMAWater 2020, p. 4). The TUFLOW model is linked to the data and outputs of the Regional Flood Study (WMAWater 2019) (WMAWater 2020, p. 4), where different Mannings numbers were applied as a means of a sensitivity analysis (WMAWater 2020, Table 1, p. 5). It is important to note that the Probable Maximum Flood (PMF) is an estimate as there has been no flood of this size, and hence data, to use to calibrate this part of the model (WMAWater 2020, p. 5).

      i. OWS notes that:

- The EIS modelling and analysis discussed above is a summary of the Regional Flood Study (WMAWater 2019), which is available on the NSW Planning, Industry and Environment website;
- For this project, the scope of modelling was to assess changes in flooding and hydrological characteristics of waterways, including impacts on water users and the effects of climate change (SMEC 2020b, p. 2); and
- The RUBICON model has been reviewed by Australian and international experts (SMEC 2020b, p. 16), and **considers that it would be useful if these reviews could be provided in an appendix.**

ii. OWS notes that both spatial and temporal data has been used to calibrate the model, including 93 pluviographs, 376 daily rainfall gauges, > 100 stream gauging stations, and daily time series of Lake Burragorang lake levels from 1960 (hourly time-series data of releases for calibration events) (SMEC 2020a, p. 15-11).

- **However, variation between measured data and predictions do not appear to be discussed in detail within the EIS for either dam water levels or downstream flooding.**
- Within the Regional Flood Study, modelled compared to observed results are provided of flows, peak flood profiles/staged hydrographs and rate of rise/peak travel times for selected sites (WMAWater 2019, App. 2). Whilst a good fit is largely obtained, **OWS notes that some sites (generally upstream) do not contain observed hydrographs (e.g. Nattai River at causeway, Kowmung River at Cedar Ford). Ideally these should be presented**. Further, it should be noted that some flows are slightly underpredicted (e.g. Wollondilly River at Jooriland) and the Monte Carlo analysis does not appear to show a relationship with observations at all sites (e.g. rate of rise at Windsor; WMAWater 2019, Diagram 7, p. 86).
- **Further, clarification is required regarding the hydrological modelling approach (discussed in paragraph 1.a.) as historical streamflow records indicate that 2012-13 recorded the fifth highest inflows in the recorded period (SMEC 2020b, Figure 3-7, p. 32), where it is unclear whether recent large inflows have been incorporated into the model**.

iii. **Assumptions and limitations used in the models that may affect predictions for this project do not appear to be discussed other than as specified in paragraph 1.f. above. In particular, the impacts on current predictions from the assumptions and limitations inherent in previous models needs to be clearly identified and discussed**. OWS also notes that limitations associated with the accuracy of flood depth and the complex nature of the catchments are acknowledged in the Regional Flood Study which suggests that **results (within channel) should be confirmed using detailed survey and modelling** (WMAWater 2019, p. 114).

iv. OWS notes that proposed updates to the model do not appear to be discussed.

Surface water and Groundwater

Surface Water

2. The OWS considers that the assessment of potential impacts to surface water is generally adequate, **noting that further information on proposed flood releases (see paragraph 3.a.) and environmental flows (see paragraph 8) is necessary to allow a thorough assessment of potential impacts.**
3. The proposal is predicted to increase the lake surface area from 75 km2 to 94 km2 (SMEC 2020a, Table 15-10, p. 15-55), where inundation time is expected to increase from an average

of 4.2 to 11.2 days under the PMF scenario (SMEC 2020a, Table 15-11, p. 15-56). The OWS notes:

a. discharges after a flood event are proposed to occur as soon as practical (SMEC 2020a, p. 15-81). **Further information is required to determine how proposed releases align with environmental objectives (e.g. is an extended flood tail proposed, and how would this affect fish breeding events?);**

b. the FMZ is predicted to delay and reduce the extent of flooding downstream (SMEC 2020a, p. 15-57; SMEC 2020a, Table 15-12, p. 15-58). For example, at Junction3 the flood peak is predicted to reduce by 11.4 m and 2.98 m for the 5 % AEP and PMF respectively (SMEC 2020b, Table 4-3, p. 110); and

c. the project is likely to increase areas rated as at medium-risk of erosion and sediment transport, and decrease areas rated as at high-risk (SMEC 2020a, p. 15-77).

4. The OWS notes the downstream geomorphic environment is substantially modified due to other water users and development (SMEC 2020a, p. 15-24). As the downstream area is already modified, the OWS considers that the impacts to surface water will be limited.

Groundwater:

5. **The OWS considers that the assessment of potential impacts to groundwater is not adequate, and further information is necessary to determine subsequent impacts to alluvial aquifers (paragraph 6.a.) and wetlands (paragraph 9.b.).**

6. The proponent states that alluvial aquifers along the Nepean and Hawkesbury Rivers are responsive to rainfall and streamflow (SMEC 2020e, p. 21). **The OWS notes that only a preliminary assessment of groundwater impacts has been undertaken, where the proponent concludes that changes in the frequency of floodplain inundation will not impact on the groundwater system (SMEC 2020a Flood chapter, p. 15-77).**

a. Justification does not appear to be provided for this conclusion, particularly given the stated connectivity between alluvial aquifers and surface water. The OWS considers that further information is required to determine potential impacts on alluvial aquifers. For example, an assessment of how changes in the frequency of floodplain inundation may affect the groundwater system, and further discussion of how discharge of the flood mitigation zone may mitigate impacts on aquifers (paragraph 6.b.).

b. The proponent considers that groundwater resources at the edge of large-scale flooding extents are mostly dependent on local catchment sources and rainfall for aquifer recharge with the exception of the perched water table landforms associated with the Agnes Bank and northern Castlereagh areas. Overbank flood events are important to replenish these aquifers (SMEC 2020e, p. 103).

i. The proponent considers that the discharge of the flood mitigation zone would allow for the recharge of aquifers connected to the main river channel and inundated low-lying areas, mitigating impacts on aquifers from the reduction of overbank flooding (SMEC 2020e, pp. 103 – 104).

Water Dependent Ecosystems

7. The OWS considers that the assessment of impacts to terrestrial GDEs (paragraph 10) and aquatic species and habitat (paragraphs 12 and 13) is generally adequate. **However, further information on the proposed environmental flow regime (paragraph 8), and impacts to wetlands (paragraph 9.b.) and the Greater Blue Mountains World Heritage Area (GBMWHA) (paragraph 11.a.) is required.**

8. The OWS notes that a separate approval would be sought for the final environmental flow regime (SMEC 2020a, p. 15-6). **The OWS considers that details of the final environmental**

flow regime should be included as part of this EIS, to allow for a holistic assessment of the proposed regime on the downstream environment and to increase confidence in the understanding of the potential impacts of the project.

a. The OWS notes that the NSW Government has undertaken an environmental flows scenario assessment. Three scenarios were assessed using WNSW's water supply system model (Wathnet), a hydrological system simulation model (IQQM) and HSPF (Hydrologic Simulation Program Fortran) (NSW Government 2018, p. 8). Scenario's included a base case (do nothing), lowering the FSL by 5 m to create airspace and raising the dam wall by 14 m and keeping the FSL at the current level (NSW Government 2018, Table 1, p. 9). Noting that this modelling was undertaken in June 2018, and the models discussed in paragraph 1 supersede other regional studies (WMAWater 2019, p. III), a thorough review has not been undertaken to assess confidence in the 2018 model's predictions.

    i. As noted in paragraph 8, a separate approval is being sought for environmental flows associated with this project. **OWS considers that the inclusion of information in paragraph 8a on possible e-flow scenarios (NSW Government 2018) within the EIS requires clarification.**

    ii. The OWS notes the proponent appears to have considered the effect of temperature pollution and is proposing to address this through the multi-level offtake method. The OWS supports the consideration and mitigation of all downstream impacts, and **considers that additional information is required to address questions on how the proposed releases align with environmental objectives (as identified in paragraph 3a).**

9. The proponent has assessed wetlands in the area using a desktop analysis (SMEC 2020d). There are approximately 50 floodplain wetlands that are associated with the Hawkesbury-Nepean River downstream of Pheasants Nest and Broughtons Pass Weirs to the confluence of the Colo River, with the majority found between Richmond and Wisemans Ferry (SMEC 2020d, Figure 15-13). Important wetlands include Pitt Town Lagoon and Longneck Lagoon, which are examples of the endangered Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. There are no Ramsar listed wetlands, however, some wetlands north of Agnes Banks are listed under State Environmental Policy (Coastal Management) 2018. The proponent notes that these wetlands provide habitat for birds and frogs (SMEC 2020e, p. 66).

    a. Wetlands may be affected by altered hydrology from the project. This would include a decrease in the frequency of flooding at some wetlands, whilst other wetlands would experience an increased duration of low-level flooding (SMEC 2020a, p. 15-24). The proponent considers that wetlands downstream of the dam area are mostly dependent on local catchment flows (SMEC 2020e, p. 66) but notes that wetlands associated with the Agnes Bank area likely require overbank flooding events to provide flushing flows (SMEC 2020e, p. 103).

    b. The proponent states that the extent of downstream wetlands is minor, and that the wetlands may be supplied through natural groundwater recharge (SMEC 2020d, p. 64). **However, the proponent does not appear to have provided an assessment of the potential groundwater dependence of these wetlands in the documentation.**

10. The proponent has identified potential terrestrial GDEs within the area of the project based on a review of the Groundwater Dependent Ecosystem Atlas (Bureau of Meteorology 2019) against potentially groundwater dependent vegetation communities in the area (SMEC 2020f, Table 4-14, pp. 100 – 126; SMEC 2020f, App. K, pp. 1489 – 1573; SMEC 2020e, p. 56, Table 5-2, pp. 57 – 59, Figures 5-2 and 5-3, pp. 60 – 61). The proponent has ground-truthed some of these communities (SMEC 2020f, Figure 4-1, pp. 52 – 53; SMEC 2020f, App. K, pp. 1234 – 1315) but has not examined their level of groundwater dependence. Considered impacts appear

reasonable (SMEC 2020e, Tables 6-3 and 6-6, pp. 81 – 101), however, confidence in predictions could be increased through the proposed development of a flood mitigation zone discharge protocol, as noted in paragraph 15.

11. Further, the OWS notes that most of the Blue Mountains National Park is also in the GBMWHA and some small areas of the GBMWHA would be impacted by increased temporary inundation (SMEC 2020b, p. 4). Details of the scale and length of inundation are provided (SMEC 2020h, pp. 24 – 32, 35 – 37, 42 – 43 and 47 – 50). Water is part of the listing criteria for the area.

    a. The OWS considers that some of the potential impacts to the GBMWHA due to the changed flood regime should be further considered within the EIS.

        i. **For example, the proponent states that the extent of the GBMWHA only extends down to the full supply level of Lake Burragarong or to the banks of potentially impacted waterways in some areas (SMEC 2020h, p. 24). It is not clear whether this would still be the case following the dam raising.**

        ii. **Further, the proponent considers that the project would not have a significant impact on water quality in Warragamba Dam or other parts of the Hawkesbury-Nepean River (SMEC 2020h, p. 56) but does not provide information on impacts to water quality specific to the GBMWHA "Water catchment" value**.

12. The proponent has provided a summary of aquatic habitat and associated species in the project area based on a desktop analysis and some field surveys (SMEC 2020d). The proponent notes that the study area surrounding and upstream of Lake Burragorang is almost entirely made up of native vegetation (SMEC 2020f, p. 28) in good condition (SMEC 2020f, p. 206), although the vegetation surrounding the created lake is not typical riparian vegetation (SMEC 2020f, p. 41). Conversely, the proponent considers that the downstream area has been heavily modified (SMEC 2020d, p. 36) and contains areas of habitat characterised as being in 'poor' condition (SMEC 2020d, p. 28). A summary of aquatic vegetation in the area is provided (SMEC 2020d, pp. 36 – 40). Areas of state-mapped key fish habitat occur throughout the area, including within the downstream study area (SMEC 2020d, pp. 28 and 36).

    a. Potential impacts to EPBC Act-listed aquatic species are summarised (SMEC 2020d, Table 4-1, p. 67).

    b. Potential impacts to species and communities occurring in the upstream area have been identified and assessed (SMEC 2020f, Tables 7-6 – 7-99, pp. 227 – 273). The EPBC-Act listed Giant Burrowing Frog and Littlejohn's Tree Frog are believed to occur in the area (SMEC 2020f, Table 7-8, pp. 262 – 267).

    c. Potential impacts to species and communities occurring in the downstream area have been identified and assessed (SMEC 2020e, Tables 6-4 – 6-6, pp. 787 – 101, Appendix A, pp. 1 – 60). Aquatic MNES identified or considered likely to occur include the Australasian Bittern, Australian Painted Snipe, Curlew Sandpiper and Green and Golden Bell Frog (SMEC 2020e, Appendix A, pp. 1 – 58).

    d. A desktop survey of EPBC Act-listed fish species in the downstream area is provided (SMEC 2020d, Table 3-7, pp. 56 – 59).

13. The proponent has provided an overview of the potential impacts of the project on the aquatic environment.

    a. Potential impacts to the upstream area are detailed (SMEC 2020d, pp. 59 – 66). Construction related impacts include the use of instream structures altering the natural flow regime (SMEC 2020d, pp. 61 – 62); removal of large woody debris to enable construction works, removing habitat for aquatic species (SMEC 2020d, p. 59); earthworks and construction activities that expose sediments, leading to sedimentation of aquatic habitat

(SMEC 2020d, pp. 60 – 61); and storage of construction equipment and materials, specifically the risk of a chemical spill (SMEC 2020d, p. 62).

b. Potential impacts to the downstream area relate to changes to the hydrological regime, which include reduction in peak flood extents and durations and a reduction in peak flood flows, and an increase in low level flooding and flows during the discharge of the FMZ. Potential impacts due to the regime change include changes to vegetation communities, bank erosion and slumping, increased turbidity, and displacement of fauna dependent on riparian or wetland habitats (SMEC 2020e, p. 70 and Table 6-3, pp. 81 – 85).

c. The proponent considers the operation and use of the flood mitigation zone may lead to impacts through flooding in the downstream and upstream areas of the project. The proponent considers the primary risks are bank erosion (SMEC 2020d, p. 64), damage to aquatic vegetation (SMEC 2020d, pp. 62 – 63) and potential spread of pest flora and fauna (SMEC 2020d, pp. 65 – 66).

d. The proponent notes that project construction will impact on the state-mandated 50 m buffer zone around Lake Burragarong, which is a 9th order stream and state significant biodiversity link (SMEC 2020f, pp. 44 and193).

e. The proponent considers that the project may lead to fragmentation and patch size impacts through changes to vegetation and erosion caused by changed flow regimes (SMEC 2020e, p. 104), impacting some aquatic species (SMEC 2020e, pp. 145 – 146). Given the highly modified state of the downstream area and the extent of the 2019-2020 bushfires (discussed below), the OWS considers that intact aquatic vegetation in the downstream area is particularly valuable within the landscape.

   i. **To clarify predicted impacts, the OWS recommends the addition of individual tables in the MNES chapter of the EIS, providing further detail on potential impacts to each aquatic MNES and any associated habitat**. The tables should include:

      - the extent in hectares of species habitat or TEC to be impacted under the 1 in 5 year, 1 in 100 year and PMF events for all three areas;
      - details of proposed mitigation measures; and
      - details of proposed offsets (see paragraph 16).

Mitigation Measures

14. The proponent has provided general information on the proposed mitigation measures and offsets (see paragraphs 15 and 16). **The OWS considers that more detailed information is required to determine whether the measures will be appropriate given the likely impacts, and whether these measures can be achieved.**

    a. As noted in paragraph 8, **the final environmental flow regime should be provided to allow assessment of its potential impacts on the downstream environment and to determine if it is an appropriate mitigation measure.**

15. The proposed mitigation and management measures primarily include development of a discharge protocol for the FMZ to minimise reduction of the flood extent, bank stability during construction and monitoring/management as part of an adaptive management plan (SMEC 2020d, Table 4-2, pp. 68 – 69; SMEC 2020e, Table 7-1, p. 111; SMEC 2020f, pp. 370 – 371).

    a. The OWS notes that these proposed mitigation and management measures, including specific timeframes, are yet to be developed.

b. **As part of the proposed discharge protocol for the FMZ, justification of how the discharge protocol will mitigate downstream impacts on aquatic MNES and their habitat is required.**

16. Offsets are proposed for the project. However, the OWS notes that species credits are not currently proposed to be delivered as part of the upfront biodiversity compensatory package (SMEC 2020f, p. 374).

Bushfire Impact

17. The proponent has acknowledged that 2019-2020 summer bushfires burnt a large proportion of the study area (SMEC 2020f, p. 15 and Figure 1-8, p. 17) but has not addressed the impact in any detail. However, while there will be impacts to surface run-off, both in terms of quantity and quality, these will be short-term while re-growth occurs.

18. As part of the climate change assessment within the EIS, the proponent has considered the likely impacts of climate change on 'extreme fire weather days' in the area. The assessment indicates from 2030 to 2070 the annual number of extreme fire weather days will increase from 9 to 11 days a year to 10 to 15 days per year (SMEC 2020g, p. 24-25). The OWS considers this good practise in predicting the likelihood of future events and their impacts for the project.

19. **Bushfires have the potential to reduce soil infiltration due to the formation of a hydrophobic layer and promote surface runoff and erosion**. **The OWS considers it preferable for detailed numerical assessment of these potential impacts (i.e. through incorporation of monitoring data into a sensitivity analysis) to be included in future monitoring and management, as they currently do not appear to be discussed by the proponent**.

Climate Change Modelling

20. An assessment of potential climate change impacts is included as part of the Regional Flood Study (WMAWater 2019). Changes in rainfall patterns are predicted to be the main impact of climate change within the project area (SMEC 2020g, Table 3-1, pp. 24 – 25), where the assessment included NARCliM, Centre for Australian Weather and Climate Research and NSW Climate Impact Profile projections (SMEC 2020g, p. 23).

    a. The proponent notes that modelling changes in rainfall patterns is challenging due to temporal variability. The proponent also notes that natural climate variability (i.e. from the El Niño-Southern Oscillation) is projected to remain the major influence for rainfall changes in the coming decades (DotE, 2018) and that projections for extreme rainfall are more confident. However, the magnitude of these increases cannot be confidently projected (DotE, 2018) (SMEC 2020g, p. 25). The OWS generally agrees with the proponent's assessment.

21. The OWS notes that a key outcome from Stage 1 of the State Infrastructure Strategy 2012-2032 was that no single mitigation option would address all the flood risk present in the Hawkesbury-Nepean Valley (SMEC 2020g, p. 1). To address flooding risks, the proponent's risk management as part of the EIS includes establishing the context (scope), identifying risks (risk screening), analysing risks (risk assessment), evaluating risks (risk assessment), and treating risks (adaptation) (SMEC 2020g, p. 28).

    a. A risk assessment, including mitigation measures, are proposed as part of the project. The OWS notes that the proponent has proposed adaptive catchment management, flood drawdown framework priorities and allowing for flexible development timings to mitigate risks (SMEC 2020g, Table 6-1, pp. 39 – 40). **However, details of these proposed mitigation measures, including implementation timing, do not appear to be provided. As such, the OWS is unable to comment on the veracity of the risk assessment**.

22. The proponent has used the CSIRO's future climates tool to simulate a series of increased rainfall conditions forecast for the area at rates of high and medium emissions for the years 2030 and 2090 (SMEC 2020b, pp. 142 – 146). The proponent further uses these predictions to account for the increased probability of 100-year event floods of the year 2090.

    a. The OWS notes the proponent has generally undertaken an appropriate assessment of the likely effects of climate change on flood events in the area (WMAWater 2019, pp. 99 – 106).

References

Department of Agriculture, Water and the Environment (DAWE) 2020. Wildlife and threatened species bushfire recovery research and resources. Available [online]: http://www.environment.gov.au/biodiversity/bushfire-recovery/research-and-resources, accessed 13 May 2020.

Department of Planning, Industry and Environment (DPIE) 2020. Guideline for applying the Biodiversity Assessment Method at severely burnt sites. Available [online]: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/guidelineforapplyingbiodiversityassessmentmethodatseverelyburntsitesassessmentreports200104.pdf, accessed 19 May 2020.

Department of the Environment (DotE) 2018. Climate Change in Australia. Available [online]: https://www.climatechangeinaustralia.gov.au/en/climate-projections/future-climate/regional-climate-change-explorer/sub-clusters/?current=ECSC&tooltip=true&popup=true, accessed 19 May 2020.

Hose GC, Sreekanth J, Barron O and Pollino C 2015. Stygofauna in Australian Groundwater Systems: Extent of knowledge. CSIRO, Canberra.

NSW Government 2018. *Warragamba Dam Environmental Flows. Scenario Assessment Summary.* Dated June 2018.

SMEC 2020a. *Warragamba Dam Raising. Environmental Impact Assessment – Chapter 15: Flooding and hydrology [draft].* Dated 27 April 2020, report number 30012078. Prepared for WaterNSW.

SMEC 2020b. *Warragamba Dam Raising. Environmental Impact Assessment – Appendix H: Flood and Hydrology [draft]*. Dated 14 April 2020, report number 30012078. Prepared for WaterNSW.

SMEC 2020c. Warragamba Dam Raising. *Environmental Impact Assessment – Chapter 18: Aboriginal Cultural Heritage [draft]*. Dated 20 March 2020, report number 30012078. Prepared for WaterNSW.

SMEC 2020d. *Warragamba Dam Raising. Environmental Impact Assessment – Appendix F4: Aquatic Ecology [draft]*. Dated 30 April 2020, report number 30012078. Prepared for WaterNSW.

SMEC 2020e. *Warragamba Dam Raising. Environmental Impact Assessment – Appendix F2: Downstream Ecological Assessment [draft]*. Dated 24 April 2020, report number 30012078. Prepared for WaterNSW.

SMEC 2020f. *Warragamba Dam Raising. Environmental Impact Assessment – Appendix F1: Biodiversity Assessment Report – Upstream [draft]*. Dated 4 May 2020, report number 30012078. Prepared for WaterNSW.

SMEC 2020g. *Warragamba Dam Raising. Environmental Impact Assessment – Appendix G: Climate Change [draft]*. Dated 14 April 2020, report number 30012078. Prepared for WaterNSW.

SMEC 2020h. *Warragamba Dam Raising. Environmental Impact Assessment – Appendix J: World Heritage Area Assessment [draft].* Dated 1 May 2020, report number 30012078. Prepared for WaterNSW

WMAWater 2019. *Hawkesbury-Nepean Regional Flood Study.* Prepared for Infrastructure NSW. Available [online]: https://flooddata.ses.nsw.gov.au/dataset/hnv-rfs-report, accessed 18 May 2020.

WMAWater 2020. *Warragamba EIS – Flood Risk Assessment*. Dated February 2020. Prepared for WaterNSW.

Department of Agriculture, Water and Environment

Comments on Warragamba Dam Raising Draft EIS

Aboriginal Cultural Heritage Assessment Report

Provided to NSW DPIE on 10 June 2020

ABORIGINAL CULTURAL HERITAGE

Aboriginal Cultural Heritage is described as a component of the integrity description in the GBMWHA OUV. The following are the key areas the Department considered were inadequate in the Aboriginal Cultural Heritage Assessment (ACHA). A summary of main points is provided below and detailed comments are provided in Attachment A.

1. Consultation with community

- There is a lack of clear evidence that a process to ascertain free, prior and informed consent (FPIC) has occurred with Traditional Owners and other Indigenous persons with rights or interests in the project area.
- Whilst acknowledging the consultation undertaken to date, a consistent theme in the public comments is that opposition or concerns may have not been effectively addressed. Best practice is that the proponent provides clear evidence that Traditional Owners and other Indigenous persons with rights or interests have had opportunity to have their concerns voiced, appropriately heard, and answered clearly and transparently.
- **Evidence that engagement with TOS has informed the significance of the cultural landscape. The Department considers Indigenous heritage sites and their respective significance should be determined by the Traditional Owners and their representative bodies. Further evidence of engagement with Traditional Owners has informed the significance of the cultural landscape is required (for example, endorsement from the Traditional owners of the significance rating system).**

2. Adequacy of survey knowledge

- Management and mitigation strategies relating to Indigenous cultural heritage appear to be formulated from partial surveys conducted before the 2019-2020 bushfires.
- To accurately understand, assess, and mitigate impacts against Indigenous cultural heritage values within the project area, the **Department recommends the Proponent re-conduct comprehensive heritage surveys, with full engagement of the Traditional Owners**, to fully understand the cultural landscape and the impacts of the proposed action. **This is of importance when considering that the cultural landscape may have been significantly altered following the 2019-2020 bushfires**.
- This survey should employ principles outlined in the Australian Government *Engage early- Guidance for proponents on best practice Indigenous engagement for environmental assessments under the Environment Protection and Biodiversity Conservation Act 1999.*
- **WaterNSW should conduct further studies to meet requirements of the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* to accurately assess the cultural landscape**, and the direct or indirect damages to Indigenous cultural heritage sites as a result of the project.
- The Department disagrees with the estimates that the proposed action will result in only a partial or no loss of heritage value from the initial inundation and the longer-term effects of infrequent flooding events. **Further study into the impacts such as the 'bathtub effect' on Indigenous heritage values within the project and flooding area is requested from the Proponent**.
- The significance of the Indigenous cultural sites recorded in the ACHA was determined by individual assessment, including clusters of sites which RAPs state should have been recognised as cultural landscapes. **Comparative analysis should also be undertaken with similar cultural landscapes**

to create a more accurate report on the heritage values identified, and the associated impacts.

- The Department also considers that the sampling strategy and the percentage of area surveyed to complete the ACHA to be inadequate. As outlined in the ACHA, 27 per cent of the approximate 5280-hectare project area was surveyed. A high density of sites was located, which indicates that it is possible that 1213 sites could be present and affected by the proposed action.

3. Status of cultural values

- 2014-15, the GBMWHA Advisory Committee and the NSW Government recommended that an NHL assessment include cultural associations. Although an NHL assessment has been delayed, an assessment of the potential National Heritage values of adjacent areas and additional values of the Greater Blue Mountains National Heritage area remains on the Australian Heritage Council's workplan.
- The 'lack of understanding of the cultural heritage values' within the GBMWHA is reiterated in the *Greater Blue Mountains World Heritage Area Strategic Plan Addendum 2016 (p.1).* **Given this acknowledgement of the presence and lack of knowledge of cultural heritage values in this area, it is important that they be, as best possible, effectively understood, surveyed, and appropriately protected in situ, with the cultural importance of the sites determined by the Traditional Owners**.

4. Significant Heritage vs Non-Significant Heritage

- In the ACHA, a methodology employs a 'Statement of significance', which presents Aboriginal sites within the Subject area within a significance rating table.
- The ACHA fails to properly consider the significance of these sites for the Traditional Owners or the information which is known only to the Traditional Owners - as reflected in the Registered Aboriginal Party (RAP) comments included in the ACHA. See Attachment D for examples.
- **The Department considers Indigenous heritage sites and their respective significance should be determined by the Traditional Owners and their representative bodies (see 1.).**

5. Compliance with the GBMWHA Strategic Plan

- The *Greater Blue Mountains World Heritage Area Strategic Plan Addendum 2016* further recognises the importance of Traditional Owner leadership in the management of the GBMWHA.
- The Department has concerns that several of the RAPs consider the proposal to raise the Warragamba Dam wall, for the temporary storage of flood waters, as an unacceptable impact to Aboriginal cultural heritage values. **This would be inconsistent with the requirement of Traditional Owners, and persons with rights or interests to "fully participate in planning, and decision-making for the park", as is articulated in the *Greater Blue Mountains World Heritage Area Strategic Plan Addendum 2016*** for the holders of the Gundungurra Indigenous Land Use Agreement.
- See Attachment A for examples of concerns raised by RAPs.

It is recommended that WaterNSW works together with the Department and NSW DPIE to develop an action plan for the Aboriginal Cultural Heritage Assessment Report to be made adequate, culturally focussed with views of stakeholders incorporated and addressed.

Attachment A –Detailed Comments on Aboriginal Cultural Heritage

The Department has considered the assessment of Aboriginal Cultural Heritage in relation to the Outstanding Universal Value, National and World Heritage values of the property and considers it is inadequate in the current form.

Summary of cultural heritage values of the Greater Blue Mountains World Heritage Area

The cultural significance of the Greater Blue Mountains World Heritage Area (GBMWHA) is recognised in the GBMWHA *Statement of Integrity*; "An understanding of the cultural context of the GBMWHA is fundamental to the protection of its integrity. Aboriginal people from six language groups, through ongoing practices that reflect both traditional and contemporary presence, continue to have a custodial relationship with the area. Occupation sites and rock art provide physical evidence of the longevity of the strong Aboriginal cultural connections with the land. The conservation of these associations, together with the elements of the property's natural beauty, contributes to its integrity."

As noted in the Greater Blue Mountains World Heritage Area Strategic Plan Addendum 2016 *(p.1),* "The Greater Blue Mountains region contains, or is closely associated with, a number of areas that have received statutory recognition as 'Aboriginal places' under the NSW National Parks and Wildlife Act 1974 since World Heritage Listing in 2000. These include:

- the Three Sisters and The Gully at Katoomba
- Blackfellows Hand or Maiyingu Marragu near Lithgow
- Kings Tableland near Wentworth Falls
- Red Hands Cave and Euroka near Glenbrook
- Shaws Creek at Yellow Rock Mount Yengo near Wollombi.
- Of these, The Three Sisters, Kings Tableland, Red Hands Cave, Euroka and Mt Yengo are within the Greater Blue Mountains World Heritage Area."

As noted in the *Greater Blue Mountains World Heritage Area Strategic Plan 2009 (p. 13), "*known sites within the GBMWHA and National Heritage List (NHL) area provide evidence of at least 14,000 (and possibly 22,000) years of Aboriginal occupation of the area, but traditional beliefs connect Aboriginal people with the landscape back as far as the creation stories. Several prominent landscape features with spiritual significance are linked with creation stories, for example Mt Yengo in Yengo National Park and the Coxs and Wollondilly River valleys (Blue Mountains National Park)".

Recorded sites of archaeological significance include a widespread sample of the Sydney Region's distinctive Aboriginal rock art, which incorporates two synchronous forms (i.e. pigment and engraved forms) on a scale unique in Australia. Several scientifically important rock art sites with an unusually large number of individual motifs have been recorded within the GBMWHA and continue to be revealed, such as the Eagles Reach site. Given the wilderness nature of the area and the limited archaeological surveys to date, there is enormous potential for uncovering further significant sites which will contribute to a better understanding of Aboriginal use of the area over many millennia.

In 2016 (*Greater Blue Mountains World Heritage Area Strategic Plan Addendum 2016)*, NSW Government reported that 1376 Aboriginal sites were recorded across the reserves that make up the Greater Blue Mountains property.

Key Issues with the Aboriginal Cultural Heritage Assessment Report

- **Consultation with community**: There is a lack of clear evidence that a process to ascertain free, prior and informed consent (FPIC) has occurred with Traditional Owners and other Indigenous persons with rights or interests in the project area. Whilst acknowledging the consultation undertaken to date, a consistent theme in the public comments is that opposition or concerns may have not been effectively addressed. Best practice is that the proponent provides clear evidence that Traditional Owners and other Indigenous persons with rights or interests have had opportunity to have their concerns voiced, appropriately heard, and answered clearly and transparently.

Although FPIC is not required under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), it is a requirement under the United Nations Declaration on the Rights of Indigenous Peoples' (UNDRIP) which Australia announced its support for in 2009. Although UNDRIP is non-binding, Australia accepted UNDRIP in 2009 as a framework for better recognising and protecting the rights of Aboriginal and Torres Strait Islander Australians.

- **Adequacy of survey knowledge:** Management and mitigation strategies relating to Indigenous cultural heritage appear to be formulated from partial surveys conducted before the 2019-2020 bushfires. To accurately understand, assess, and mitigate impacts against Indigenous cultural heritage values within the project area, the Department recommends the Proponent re-conduct comprehensive heritage surveys, with full engagement of the Traditional Owners, to fully understand the cultural landscape and the impacts of the proposed action. This survey should employ principles outlined in the Australian Government *Engage early- Guidance for proponents on best practice Indigenous engagement for environmental assessments under the Environment Protection and Biodiversity Conservation Act 1999.* Cultural heritage surveys should, where possible, be conducted comprehensively prior to EIS submission, and consist of direct involvement from Traditional Owners and Indigenous groups with rights and interest in the area. This is of importance when considering that the cultural landscape may have been significantly altered following the 2019-2020 bushfires.
- **Status of cultural values**: As noted in the *Greater Blue Mountains Strategic Plan 2009*, the '1999 Nomination of the Greater Blue Mountains Area for inscription on the World Heritage List document included cultural values; but the World Heritage Committee did not consider that they met the threshold of outstanding universal value'. In 2014-15, the GBMWHA Advisory Committee and the NSW Government recommended that an NHL assessment include cultural associations. Although an NHL assessment has been delayed, an assessment of the potential National Heritage values of adjacent areas and additional values of the Greater Blue Mountains National Heritage area remains on the Australian Heritage Council's workplan. The 'lack of understanding of the cultural heritage values' within the GBMWHA is reiterated in the *Greater Blue Mountains World Heritage Area Strategic Plan Addendum 2016 (p.1).* Given this acknowledgement of the presence and lack of knowledge of cultural heritage values in this area, it is important that they be, as best possible, effectively understood, surveyed, and appropriately protected in situ, with the cultural importance of the sites determined by the Traditional Owners.
- In assessing the EIS, the Department encourages WaterNSW to consider the precautionary principle. As referenced in the EPBC Act, the precautionary principle requires decision-makers to take a risk-based approach to decision-making. The principle provides a framework for government to set preventative policies where existing science is incomplete or where no consensus exists regarding a threat. In applying this principle to this EIS, the Department considers that the existing science presented in the EIS is incomplete, however, additional information can be obtained through further engagement with Traditional Owners, and more substantive archaeological surveys. The Department advises the proponent to undertake such activities.

<u>The adequacy of the assessment of impacts from the proposed action on Indigenous Cultural Heritage.</u>

The EIS outlines potential impacts resulting from infrequent inundation with floodwaters from periods of hours to upwards of two weeks. As noted in Appendix K - Aboriginal Cultural Heritage Assessment (ACHA), potential impacts to Aboriginal cultural heritage sites covered under the GBMWHA Statement of Integrity may include

- stone artefact sites subject to changed ground conditions such as waterlogging or erosion;
- sandstone shelter sites subject to altered conditions that may detrimentally effect deposits and rock art;
- scarred trees subject to more frequent flooding;
- axe grinding grooves and engravings frequently submerged, altering natural conditions and possibly their preservation; and

- Aboriginal ceremony and dreaming sites and Aboriginal resource and gathering sites having their accessibility altered, and physical aspects of the sites may also change.

From a review of the listed potential impacts, the Department considers there may be impact to the Aboriginal cultural heritage sites, covered under the GBMWHA Statement of Integrity, within the temporary flooding impact zone.

The Department notes WaterNSW proposal to ameliorate unavoidable impact via the alternative measures listed, which include:

- highlighting traditional and historical Aboriginal heritage of the Warragamba area through displays and interpretation at suitable locations– proposed to be prepared with the assistance and endorsement of the RAPs;
- highlighting traditional and historical Aboriginal heritage of the Warragamba area through establishing and facilitating educational sessions focusing on Aboriginal heritage for school students in Warragamba- proposed to be prepared and delivered involving Elders endorsed by the RAPs;
- establishing a GIS database of Aboriginal heritage sites within the Subject Area, to be maintained and kept up to date by WaterNSW (i.e. the Project Sites Database); and
- establishing heritage awareness training to be incorporated into the site inductions for both employees and sub-contractors involved in the construction of the Project, operation of the dam and activities in the catchment of Lake Burragorang. Registered Aboriginal Parties proposed to be involved in the development and presentation of the cultural awareness training.

Whilst such efforts are noted, these cannot substitute for in-situ (on-County) conservation of Indigenous cultural heritage. Additional appropriate mitigation measures could include Conservation Agreements under the EPBC Act to provide on Country benefits to the heritage values, and/or Environmental Offsets, noting the use of environmental offsets are not to replace proper on-site practices, such as avoidance and mitigation.

Significant Heritage vs Non-significant Heritage

A further concern is the methodology employed by Niche Environmental and Heritage Consulting in determining significant heritage versus non-significant heritage. In the ACHA, Niche Environmental and Heritage Consulting outline a methodology employing a ‘Statement of significance’, which presents Aboriginal sites within the Subject area within a significance rating table. ACHA examples that ‘isolated Artefacts, individual or low numbers of axe grinding grooves and instances where art was indeterminate and where the artefacts, features or art had no distinctiveness or uniqueness, were given a low scientific (archaeological) significance rating due to the limitation of further scientific information being gleaned from these sites.’ It is noted that low significance of sites is determined by criteria such as ‘site or object contains only a single or limited number of features, and has no potential to meaningfully inform our understanding of the past beyond what it contributes through its current recording (i.e. no or low research potential)’.

The ACHA fails to properly consider the significance of these sites for the Traditional Owners or the information which is known only to the Traditional Owners - as reflected in the Registered Aboriginal Party (RAP) comments included in the ACHA :

- ‘Warragamba 74: the jumping woman story location is not significant as it is not a ‘dreamtime’ aboriginal story. Where is the methodology for assessing the significance of Aboriginal stories? Is there a sliding scale of scientific significance in Aboriginal stories? How does the author know this story is not based on a Dreamtime story? What consultation has she undertaken with the source for the story to understand this location to make the significance assessment?’
- ‘All sites known and unknown are Highly significant to Gundungurra People and our ongoing Connection to Ngurra (Country). To put such a Scientific rating to various sites, in your Draft, as “Low” is outrageous and unacceptable.’

The Department considers Indigenous heritage sites and their respective significance should be determined by the Traditional Owners and their representative bodies. Further evidence (for example, endorsement from the Traditional owners of the significance rating system) is required to refine the methodology.

The Department also considers that the sampling strategy and the percentage of area surveyed to complete the ACHA to be inadequate. As outlined in the ACHA, 27 per cent of the approximate 5280-hectare project area was surveyed. A high density of sites was located, which indicates that it is possible that 1213 sites could be present and affected by the proposed action.

The Department considers that the proponent should conduct further studies to meet requirements of the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* to accurately assess the cultural landscape, and the direct or indirect damages to Indigenous cultural heritage sites as a result of the project. The Indigenous Heritage Section disagrees with the estimates that the proposed action will result in only a partial or no loss of heritage value from the initial inundation and the longer-term effects of infrequent flooding events. Further study into the impacts such as the 'bathtub effect' on Indigenous heritage values within the project and flooding area should be considered by the Proponent.

The significance of the Indigenous cultural sites recorded in the ACHA was determined by individual assessment, including clusters of sites which RAPs state should have been recognised as cultural landscapes. Comparative analysis should also be undertaken with similar cultural landscapes to create a more accurate report on the heritage values identified, and the associated impacts.

An additional concern for the Department is the discrepancies between the archaeological site recording forms and what is presented in the ACHA. One example is Warragamba site 289 (Table 1 of the *ACHA - Appendix K*), which is listed in as a site of low significance, 'due to the condition of the axe grinding grooves, art and low number of artefacts the site'. However, in the site recording sheet both the axe grinding grooves and the rock artwork are in 'good to fair' condition. The method to grade the significance of sites remains unclear as Warragamba site 288 contains similar features to 289, for example rock artwork, grinding grooves, artefact scatter, etc however, is given 'high (archaeological) significance'. There are errors in recording the quantity of artefacts and features present at sites and mislabelled photographs of artefacts, these issues compound throughout the document. The Department is not satisfied with the level of detail to accurately record sites of Indigenous cultural heritage, or the level of importance placed on determining the significance of these heritage places.

To accurately understand, assess, and mitigate impacts against Indigenous cultural heritage values (protected by the GBMWHA Statement of Significance) within the project and flooding area, the Department recommends the Proponent conduct comprehensive heritage surveys, with full engagement of the Traditional Owners, to fully understand the cultural landscape and the impacts of the proposed action. This survey should employ "Engage Early" principles and consist of direct involvement from Traditional Owners and Indigenous groups with rights and interest in the area.

The assessment of the proposal against the approved management plan for the Blue Mountains World Heritage Area.

As outlined in the GBMWHA Strategic Plan 2009, the Strategic objectives for management of the GBMWHA are to:

"identify, protect conserve, present, transmit to future generations and, where necessary, rehabilitate the World Heritage values of the GBMWHA;

- integrate the protection of the GBMWHA into a comprehensive planning program;
- give the GBMWHA a function in the life of the Australian community;

- strengthen appreciation and respect for the GBMWHA's World Heritage values, particularly through educational and information programs, and keeping the community broadly informed about the condition of the World Heritage values of the GBMWHA;
- take the appropriate scientific, technical, legal, administrative and financial measures necessary for implementing these principles;
- provide for continuing community and technical input in managing the GBMWHA; and
- manage the broad range of values, both World Heritage and non-World Heritage, ensuring that achieving the long-term conservation of the reserves' World Heritage values is the over-riding principle."

In addition, the regulations to the EPBC Act prescribe Australian World Heritage management principles. The Australian Government and its agencies must take all reasonable steps to comply with these management principles, which state (Article 5 of the *World Heritage Convention*) "To ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage situated on its territory, each State Party to this Convention shall endeavor, in so far as possible, and as appropriate for each country:

I. adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programmes;
II. to set up within its territories, where such services do not exist, one or more services for the protection, conservation and presentation of the cultural and natural heritage with an appropriate staff and possessing the means to discharge their functions;
III. to develop scientific and technical studies and research and to work out such operating methods as will make the State capable of counteracting the dangers that threaten its cultural or natural heritage;
IV. to take the appropriate legal, scientific, technical administrative and financial measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage; and
V. to foster the establishment or development of national or regional centres for training in the protection, conservation and presentation of the cultural and natural heritage and to encourage scientific research in this field."

Within the approved *Greater Blue Mountains World Heritage Area Strategic Plan 2009*, it is noted that "the GBMWHA encompasses the traditional Country of at least six different Aboriginal language groups including several associated with the earliest contact with European settlers in Australia. Although no comprehensive surveys have been undertaken, a widespread and diverse sample of Aboriginal sites has been recorded, preserving a vital record of the social interactions and artistic activities within as well as between these different language groups".

The area is important to contemporary Aboriginal groups, with the importance of Traditional Owners leadership in the management of the GBMWHA recognised in the Greater Blue Mountains World Heritage advisory body, the GBMWHA Advisory Committee. The GBMWHA Advisory Committee is made up of scientific, technical, Aboriginal and community members appointed by the State and Commonwealth Environment Ministers, for the purpose of advising those Ministers. According to its Terms of Reference, membership of the GBMWHAC must consist of two local Indigenous/Traditional Owners.

The *Greater Blue Mountains World Heritage Area Strategic Plan Addendum 2016* further recognises the importance of Traditional Owner leadership in the management of the GBMWHA, noting on page one that "the National Parks and Wildlife Service (NPWS) acknowledges that the Indigenous peoples of Australia are the original custodians of the lands and waters, animals and plants of NSW and its many and varied landscapes. Under an Aboriginal joint management arrangement, the NSW Government and local Aboriginal people share responsibility for a park's management. This is to ensure that Aboriginal people can participate in planning and decision-making for the park, reserve or area while maintaining access to parks for everyone.

Aboriginal joint management options include memoranda of understanding, Indigenous land use agreements (ILUA), lease-back agreements or more informal arrangements with the NPWS". Aboriginal joint management is recognised in the *Gundungurra Indigenous Land Use Agreement*, signed in 2014, including 20 national parks and some of the GBMWHA. The ILUA acknowledges the Gundungurra people's custodianship, use and management of their traditional land and waters across an area of about 6942 square kilometres (about eight kilometres south of Lithgow and 18 kilometres north of Goulburn). The ILUA is listed as a management document for the Blue Mountains National Park on the NSW Planning, Industry and Environment website. The Gundungurra ILUA boundary is inclusive or some of the EIS project area and upstream study area.

The Department has concerns that several of the RAPs consider the proposal to raise the Warragamba Dam wall, for the temporary storage of flood waters, as an unacceptable impact to Aboriginal cultural heritage values. This would be inconsistent with the requirement of Traditional Owners, and persons with rights or interests to "fully participate in planning, and decision-making for the park", as is articulated in the *Greater Blue Mountains World Heritage Area Strategic Plan Addendum 2016* for the holders of the Gundungurra Indigenous Land Use Agreement.

Comments from the RAPs include:

- *"The first recommendation would be not to proceed with the proposed project, and hoping that common sense will prevail, and it will not go ahead."*
- *"We do not agree with the raising of the Warragamba Dam. We would like this record of our history and culture to be protected and not be flooded with water. Many of our sites have already been lost because of the dam and because of development across Western Sydney and there is an opportunity to protect this very significant area for the Darug people and future Australians."*
- *"Many recorded and unrecorded sites would be lost or damaged by raising the dam."*
- *"And finally the project should not go ahead due to the enormous amount of unavoidable destruction to our Heritage and environment."*
- *"We would like to record our objection to this development proceeding due to the significant cultural and environmental damage that would occur. We would also like to draw attention to the fact that the Aboriginal community, and I am sure the wider community generally does not believe that the destruction of Aboriginal cultural heritage on such a significant level is in keeping with the expectations and values we hold as a society."*
- *Furthermore, we would contest that the impact which will be attributed to this project does not align with the cost that will be borne by the Aboriginal community in the loss of such a significant heritage area."*

IUCN World Heritage Advice Note: Environmental Assessment

The IUCN EIS requirements are out of scope for assessment of Indigenous cultural values. Although the property is not World Heritage listed for its cultural values, Indigenous cultural values are referred to in the Statement of Outstanding Universal Value - Integrity. Therefore, noting the ICOMOS' Guidance on Heritage Impact Assessment for Cultural World Heritage Properties, the Department considers that requirements for assessment of impacts to OUV are not appropriately articulated or addressed in the current EIS. The ICOMOS EIS guidelines advise 'proposals should be tested against existing policy frameworks and the management plan for the property and surrounding area'. Considering this recommendation, please refer to the response to the adequacy of the assessment of the proposal against the approved management plan for the Greater Blue Mountains Area World Heritage Area.

In line with advice outlined in the ICOMOS guidelines, the Heritage Impact Assessment is an iterative process, noting the requirement for results of data collection and evaluation to be fed back into the design process of the EIS, or resulting in proposals for change. Of concern is the lack of data and archeological investigation following the unprecedented 2019-2020 bushfire season.

The Department agrees with the ICOMOS guidelines, noting ‘conservation is about managing sustainable change. Every reasonable effort should be made to avoid, eliminate or minimise adverse impacts on attributes that convey OUV and other significant places. Ultimately, however, it may be necessary to balance the public benefit of the proposed change against the harm to the place. In the case of WH properties this balance is crucial. The Heritage Impact Assessment (HIA) should include proposed principles and where possible proposed methods to mitigate or offset the effects of a development proposal or other agent of change. This should include consideration of other options for the development including site selection/location, timing, duration and design. The HIA should indicate fully how the mitigation is acceptable in the context of sustaining World Heritage values, including the authenticity and integrity of the WH property. Available guidance in the Operational Guidelines on periodic reporting should be consulted to help this process. It may be appropriate to undertake further consultation at this stage before finalising the HIA.’ For the reasoning outlined in responses 1-4, the Indigenous Heritage Section is not satisfied that the proposal has met this recommendation of the ICOMOS EIS guidelines.

The Department remains unsatisfied that the changes arising from the proposal have been adequately assessed for the impacts on the World Heritage Area’s integrity and authenticity. The Statement of Outstanding Universal Value is the baseline statement regarding integrity and authenticity in the GBMWHA. The relationship between attributes of OUV, authenticity and integrity requires further explanation and articulation within the EIS. Authenticity relates to the way attributes convey OUV and integrity relates to whether all the attributes that convey OUV are extant within the property and not eroded or under threat.

Department of Agriculture, Water and Environment

Comments on Warragamba Dam Raising Draft EIS

World Heritage Assessment

Provided to NSW DPIE on 10 June 2020

WORLD HERITAGE ASSESSMENT

The Department considers that the impacts of the proposed action on GBMWHA OUV, National and World Heritage values is not fully adequate. A summary is provided below and detailed comments are provided in Attachment A.

1. **The adequacy of the assessment of impacts from the proposed action on the OUV, National and World heritage GBMWHA.**

The Department requests that the EIS is amended as follows:

- **Assess the impact of the proposal on the plants and animals which are attributes of the Outstanding Universal Value (OUV) of the Greater Blue Mountains Area World Heritage property.** This includes (but is not limited to) all species, genera and families mentioned in the Statement of Outstanding Value. The proponent should also refer to the World Heritage nomination documents for further information. The OUV of the World Heritage property includes individuals and populations both inside and outside the World Heritage property where populations are contiguous. Note that OUV is a matter of National Environmental Significance (NES), and therefore all species that comprise attributes of OUV are also matters of NES.

- **Expand the assessment of visual impact to encompass both a fuller range of impacts** (for example the impact of dead vegetation and increased erosion) and a broader range of perspectives (views from the air and lesser known lookouts).

- **Expand the aspects of 'integrity' in the World Heritage Assessment to include all components of integrity** including: complexity of the geological structure, size of the area, adjoining public lands, recent additions to national parks, declared wilderness, wilderness quality, closed catchment area etc.

- **Assess the likely impact of the proposal on aquatic macroinvertebrates, which are food for several species which are attributes of OUV.**

- **Reflect revised taxonomy for Blue Mountains Perch.**

- **Map areas with World or National heritage values within the study area**, as has been done for areas of high biodiversity values in the 'Biodiversity Upstream' chapter.

- Revise all mentions of Department of the Environment and Energy (DoEE) to Department of Agriculture, Water and the Environment (DAWE).

- Other technical corrections as detailed in Attachment A.

2. **The adequacy of the assessment of impacts from the proposed action on Indigenous Cultural Heritage as a component of GBMWHA OUV.**

- Provide **clear evidence that Traditional Owners have provided Free, Prior and Informed Consent (FPIC)** for the proposal to proceed.

- **Conduct a more comprehensive survey of Indigenous cultural sites**. This should be accompanied by a cultural heritage impact assessment and management plan. The survey and

management plan should employ ‘Engage Early’ principles and consist of direct involvement from Traditional Owners and Indigenous groups with rights and interests

3. **The assessment of the proposal against the approved management plan for the Blue Mountains World Heritage Area.**

    - Assess the project against the **Desired Outcomes of the Management Plan**

    - **Reassess the impact on Wilderness** through upstream inundation**.**

4. **The impact of the proposed action and bushfires on OUV, National and World Heritage and Aboriginal Cultural Heritage.**

    - Conduct an analysis of the impacts of the proposal in light of the impacts of the 2019-2020 bushfires, particularly where species that have been impacted by the fires may also be impacted by the proposal. Species and ecological communities identified by the wildlife and threatened species bushfire recovery Expert Panel as requiring urgent management intervention should be a focus.

    - Assessment of impacts from bushfire on Aboriginal Cultural Heritage is provided in separate advice on that assessment.

    - The analysis of bushfire impacts should consider all components of OUV.

Attachment A – Detailed comments on World Heritage Assessment

The assessment of impacts of the proposed action on OUV, National and World Heritage values is not fully adequate. The proposal has not been adequately assessed for the impacts on the World Heritage Area's National and World Heritage Values and Outstanding Universal Values.

Species Assessment as a component of World Heritage/OUV

- Only species that are listed under the TSC Act and EPBC Act as threatened have been assessed.
- However, several species, genera and families are MNES in the study area because they are attributes of the Outstanding Universal Value (OUV) of the Greater Blue Mountains Area World Heritage property. Outside the World Heritage Area, they may still be considered attributes of the OUV where they are part of the same population. These taxa are named in the Statement of Outstanding Universal Value, parts of which are cited in different chapters of the EIS. They include:
    - Platypus *Ornithorhynchus anatinus* – particularly important as an aquatic animal that has been significantly impacted throughout its range as a result of recent bushfires and severe droughts
    - Echidna *Tachyglossus aculeatus*
    - Plant families: Myrtaceae, Fabaceae and Proteaceae
    - Plant genera: *Eucalyptus, Angophora, Corymbia, Wollemia, Pherosphaera, Lomatia, Dracophyllum, Acrophyllum, Podocarpus,and Atkinsonia*
- Not all of these taxa will occur in the affected area, and of those that do, some species have been assessed individually, particularly where they happen to be listed under the EPBC Act or the FM Act. However, it would be good to see a more comprehensive assessment of which species that are members of these taxa occur in the study area and how they may be impacted by the proposed project.
- The Biodiversity Upstream chapter includes thorough detail on biodiversity within the project proposal footprint, including a biodiversity assessment, environmental surveys, impacts assessments and landscape descriptions. The chapter includes biodiversity values maps which identify areas within the project proposal footprint that have high biodiversity values that are especially sensitive to the proposal (figures 8-14).
- These maps are helpful in determining areas of high biodiversity values, however they don't necessarily convert to where heritage values within the project proposal footprint are. It would be beneficial to include similar mapping for areas with heritage values within the project footprint.

Platypus

- In particular, the Platypus is a concerning omission from this assessment, because as an aquatic mammal both its food supply (aquatic macroinvertebrates) and nesting habitat (banks of creeks or rivers) are likely to be impacted both upstream and downstream of the project. The impact of the proposal on the Platypus needs to be included.

Eucalypt Diversity

- Eucalypt diversity is discussed in terms of only EPBC listed species and not the loss of diversity of eucalypts in general as a result of the proposal.

Aquatic Macroinvertebrates

- Chapter 11 Aquatic ecology summarises past trends in aquatic macroinvertebrate populations (many of which have a history of decline since 2001) but does not indicate the likely impacts of the project on these populations. Only two threatened species of macroinvertebrates are assessed.
- An indication of likely effects of the project on macroinvertebrate populations in general would be relevant to the possible impact of the project on platypus habitat quality (and habitat quality for a range

of other species that prey on macroinvertebrates, including the EPBC-listed Blue Mountains Perch *Macquaria sp. nov* 'hawkesbury') as discussed below, and is therefore a problematic omission from this chapter.

Macquarie Perch/Blue Mountains Perch

- The species is listed under the EPBC Act as part of the species 'Macquarie Perch' *Macquaria australasica* but since listing occurred, it has been identified as a separate species 'Blue Mountains Perch' or 'Hawkesbury *perch' Macquaria sp. Nov. 'hawkesbury taxon'*. This is relevant because the new species has a much smaller range than *Macquaria australasica* (the original species "in the broad sense") and therefore the newly identified species is likely to be much more vulnerable to changes in this catchment. This taxonomic change needs to be reflected in the assessment.
- Macquaria sp. Nov. 'hawkesbury taxon' is identified by the Threatened Species Commissioner as requiring priority interventions following the 2019-20 bushfires. Chapter 11 Aquatic Ecology identifies the risk to this species as low, but indicates that some impact may occur if there was disruption to riffle maintenance flows, which could occur during periods of temporary inundation or if there was an increase in the deposition of fine materials, which may subsequently alter bed structure by infilling the rocky substrate (Chapter 11 p 28). These changes are likely to cause problems by impacting the aquatic macroinvertebrate community, which lends weight to the argument, above, that an indication of the likely impacts on macroinvertebrate populations needs to be included in Chapter 11.

Downstream impact (Chapter 9)

- The impacts of the dam raising on the World Heritage values of the Blue Mountains, downstream of the dam are expected to be fairly minimal. Downstream of the dam, the Nepean River is excluded from the World Heritage areahttps://nationalmap.gov.au/#share=s-jHzzgt3V84OlLdYGP4knYVAmly4. So the only apparent impact to the World Heritage values would come from a change in the hydrogeological cycle. The EIS states that changes to this cycle could potentially alter vegetation community structure, promote the establishment of weeds such as Lantana, and change fire regime and fauna habitat.
- The EIS states that the Project would capture inflows from the Warragamba catchment, which would be temporarily stored until peak downstream flows had been reached. As the Warragamba catchment contributes to the majority (but not all) of flood flows in the downstream river, this would result in a reduction in flooding extents, depths and durations. The degree of reduction in downstream flooding from the Project is dependent on the magnitude of the flood event. For the larger events, namely the 1 in 100 chance in a year flood and greater, the Project would not be able to capture all inflows and Warragamba Dam would spill.
- Given this, there will be a change in the hydrogeological cycle with potential impacts on native vegetation that have adapted to the existing flooding regime. For example, for a 1 in a 5-year flood event the EIS states that there will be a reduction in inundation of approximately 1,068 hectares of native vegetation. Inundation provides an opportunity to recharge soil moisture and groundwater which the vegetation relies on.
- In addition, the EIS identifies that other areas may remain inundated for longer periods which again will lead to changes in the current hydrogeological system. From the information presented, the exact proportion of these affects to the World Heritage area are unknown. However, given the topography of the area, it is likely that only a small percentage of these inundation areas would occur with the World Heritage area.
- The Biodiversity Upstream chapter includes thorough detail on biodiversity within the project proposal footprint, including a biodiversity assessment, environmental surveys, impacts assessments and landscape descriptions. The chapter includes biodiversity values maps which identify areas within the project proposal footprint that have high biodiversity values that are especially sensitive to the proposal. There is a large area of threatened species/communities within this footprint that have a potential for serious and irreversible impacts (figure 8-14).

- These maps are helpful in determining areas of high biodiversity values, however they don't necessarily convert to where heritage values within the project proposal footprint are. Species composition and the presence of life cycle stages would be changed if the project is to go ahead and disruption of ecological processes may continue long after initial flow alteration, causing continued decline in biological diversity. These have irreversible and serious implications for biodiversity (and heritage values) within the proposed project footprint. It would be beneficial to include similar mapping for areas with heritage values within the project footprint.
- The IUCN World Heritage Advice Note: Environmental Assessment- Principle 1 states that *assessments should take place as early as possible in order to provide timely and effective input to decision-makers.* Assessments that take place late in the decision-making process or after the decision has been made cannot adequately inform decision-makers. In order to be in line with the IUCN Principle 1, all assessments should be presented to decision makers before an informed decision or advice can be provided on the proposal. As such, from a biodiversity perspective it is crucial to review these documents before advising on whether the EIS has adequately addressed impacts of OUV under the IUCN EIS requirements.

Visual amenity (Chapter 25 and Appendix P)

- Impacts on visual amenity have not been fully or adequately assessed. The assessment refers to 'swelling of the waterbody' in relation to raised water levels during floods, but does not refer to the potential visual impacts of extra eroded lake margins and of dead vegetation, especially larger shrubs and trees that if killed by the inundation, would remain for many years in a light grey sun-bleached condition.
- Nor does the assessment cover impacts on views from numerous less-visited lookouts and has focussed on only the two most frequently visited lookouts for assessment. Assessment from other lookouts should be included.
- Similarly, there has been no assessment of visual impacts from the air, from both aerial sight-seeing and commercial flights en route to/from Mascot and Western Sydney Airport.

The Department requests that the EIS amended as follows:

- Assess the impact of the proposal on the plants and animals which are attributes of the Outstanding Universal Value (OUV) of the Greater Blue Mountains Area World Heritage property. This includes (but is not limited to) all species, genera and families mentioned in the Statement of Outstanding Value. The proponent should also refer to the World Heritage nomination documents for further information. The OUV of the World Heritage property includes individuals and populations both inside and outside the World Heritage property where populations are contiguous. Note that OUV is a matter of National Environmental Significance (NES), and therefore all species that comprise attributes of OUV are also matters of NES.
- Expand the assessment of visual impact to encompass both a fuller range of impacts (for example the impact of dead vegetation and increased erosion) and a broader range of perspectives (views from the air as well as lesser-known lookouts)
- Expand the aspects of 'Integrity' in the World Heritage Assessment to include all components of Integrity including: complexity of the geological structure, size of the area, adjoining public lands, recent additions to national parks, declared wilderness, wilderness quality, closed catchment area etc.
- Assess likely impact of proposal on aquatic macroinvertebrates, which are food for several species which are attributes of OUV.
- Reflect revised taxonomy for Blue Mountains Perch
- Map areas with World or National heritage values within the study area, as has been done for areas of high biodiversity values in the 'Biodiversity Upstream' chapter.
- Revise all mentions of Department of the Environment and Energy (DoEE) to Department of Agriculture, Water and the Environment (DAWE).
- Other technical corrections as detailed below.

Protected and sensitive lands (Chapter 20)

- Page 20-12, section 20.3.2 It is incorrect to state that there are five places in the study area on the National Heritage List, there are only three. The two nominated places are not on the NHL, they are just located in that part of the AHDB. The Greater Blue Mountains Area – Additional Values nominated place is currently being assessed by the Australian Heritage Council for potential National Heritage values.
- Pages 20-25 to 20-28, section 20.5.1.1 (also 20.3.1.1). There is a confusion between criteria and values. The place is listed as it satisfies two World Heritage criteria, the values are identified under these criteria. The criteria are not the values.
- There is also a need for a section here on the Outstanding Universal Value of the GBMWHA, including integrity, and impacts of the proposal on those.
- Page 20-25 section 20.5 Assessment of potential Project operational impacts. This section should include sections on impacts on wilderness (both NSW declared wilderness and Commonwealth Wilderness Program delineated wilderness) and undisturbed streams – refer to Australian Natural Lands and Rivers archived database (NLA), detailed digital data is available from ERIN.

World Heritage Area Assessment (Appendix J)

- Page 20, section 4.1.1. There is a confusion between criteria and values. The place is listed as it satisfies two World Heritage criteria, the values are identified under these criteria. The criteria are not the values.
- Page 32 section 4.1.7.3 Impacts on upstream wilderness areas. This refers only to declared wilderness areas. It should also refer to Commonwealth Wilderness Program delineated wilderness (see comments above on chapter 20, section 20.5).
- Page 46, section 4.1.13 Visual impacts. See comments above on Chapter 25 and Appendix P Visual amenity.
- Page57-58 Wilderness. Also mention Commonwealth Wilderness Program delineated wilderness, see comments above.
- Pages 77-78, section 7 Impact summary. Reference to values/criteria – see comments above on section 50.5.1.1 of chapter 8.
- Pages 79-80 section 7.1.3 Integrity values. This section mentions only Aboriginal cultural heritage as a component of integrity. All the other components of integrity should also be mentioned/presented here: complexity of the geological structure, size of the area, adjoining public lands, recent additions to national parks, declared wilderness, wilderness quality, closed catchment area etc.

The adequacy of the assessment of impacts from the proposed action on Indigenous Cultural Heritage.

- See separate advice on this assessment

The Department requests that the EIS amended as follows:

- Provide clear evidence that Traditional Owners have provided Free, Prior and Informed Consent (FPIC) for the proposal to proceed.
- Conduct a more comprehensive survey of Indigenous cultural sites. This should be accompanied by a cultural heritage impact assessment and management plan. The survey and management plan should employ 'Engage Early' principles and consist of direct involvement from Traditional Owners and Indigenous groups with rights and interests.

Assessment of proposal against the GBMWHA Strategic Plan

- Pages 53 onwards Section 5 Assessment of the Project against the Strategic Plan. This section provides responses against the Management obligations and Management measures of the Strategic Plan, but not against the Desired Outcomes of the plan. If the project proceeds, there would be some inconsistencies with some of the Desired Outcomes, e.g., under Integrity, 'Wilderness and Wild Rivers are formally identified, declared and protected' (page 27 of the plan).
- The response to management measure 1.8 (page 62) re the maintenance and protection of wilderness, 'This management measure is not relevant or affected by the Project' is not agreed – there would be an impact on wilderness if the project leads to the loss of native vegetation through upstream inundation, as seems highly likely.
- The heading 'Desired outcomes' (of the Strategic Plan) on page 61 is not correct, the points below that heading are the Strategic Management Objectives of the plan.

The Department requests that the EIS amended as follows:

- Assess the project against the Desired Outcomes of the Management Plan
- Reassess the impact on wilderness through upstream inundation

The impact of the proposed action and bushfires on OUV, National and World Heritage and Aboriginal Cultural Heritage.

The Department requests that the EIS amended as follows:

- Conduct an analysis of the impacts of the proposal in light of the impacts of the 2019-2020 bushfires, particularly where species that have been impacted by the fires may also be impacted by the proposal. Species and ecological communities identified by the Wildlife and threatened species bushfire recovery Expert Panel as requiring urgent management intervention should be a focus.

Errors

1. The EIS refers to the Department of Environment and Energy (DoEE) – should be updated to DAWE or a statement outlining that it was DoEE at the time of drafting however now DAWE"
2. Biodiversity upstream – Section 8.2.10.3 page 8-17. First line states *"consultations with the he Office of Environment"* – needs correcting

Department of Agriculture, Water and Environment

Comments on Warragamba Dam Raising Draft EIS

Bushfire Impact Analysis

Provided to NSW DPIE on 15 June 2020

BUSHFIRE IMPACT ANALYSIS

1. Species and ecological communities

The EIS currently proposes to analyse the impacts of bushfire post approval, however **DAWE considers that this analysis should be provided in the EIS**. The EIS currently discusses the impact on species from the proposal in relation to local populations immediately surrounding the project area. There is limited discussion on the impact on species in relation to the national extent (required by SEARS App A No. 15). To be able to assess the impact on species in relation to the national extent, bushfire impacts on species populations need to be taken into account.

DAWE has compiled resources that would assist in this analysis, available on the Department's website: https://www.environment.gov.au/biodiversity/bushfire-recovery/priority-animals. The information provides priority lists of animals, invertebrates, plants and ecological communities requiring urgent management intervention. There are approximately 13 EPBC Act listed plant species and 12 EPBC Act fauna species that are likely or known to occur with the project area that are priority listed species.

The EIS will needs to analyse the impact of the proposal on these priority listed species and ecological communities that are likely to occur in the project area, taking into consideration the loss of habitat that has occurred adjacent to the project site due to bushfires. Some species where an unlikely significant impact has been concluded in the EIS may now be significantly impacted due to bushfire impacts on their national population. An example of this is the Greater Glider where the EIS states that more than 200 hectares of habitat will be impacted by the project resulting in the loss/displacement of approximately 238 individuals. The loss of this many individuals is significant, and may result in a fragmented population, or a long term decrease in the size of the population, especially considering the cumulative impacts of the bushfires and this project. DAWE will provide further detailed comments on species assessments.

The assessment should consider the role of refuge areas within the project area, as the EIS states that there is approximately 20% of the project area that has unburnt canopy and could provide refugia. **Mapping of the burnt area extent and the species distribution should be conducted as a minimum for a basis of analysis**. Burnt area extent data is available on DAWE website along with the priority list species information. **The analysis of bushfire impacts may indicate that field surveys could be required for targeted species. DAWE expects that this further detail assessment of the impact of bushfires should to be conducted prior to any approval of the project.**

2. Greater Blue Mountains World Heritage Area and OUV

The EIS also needs to analyse the impact of recent bushfires on species diversity as a function of the OUV statement for the GBMWHA. This includes an analysis of bushfire impacts on **all species listed in the OUV statement, as well as other components of OUV including; aboriginal cultural heritage, visual amenity, complexity of the geological structure, size of the area, adjoining public lands, recent additions to national parks, declared wilderness, wilderness quality, closed catchment area etc.**

It is recommended that WaterNSW provides a plan of how the combined impacts of the proposed action and bushfire impacts on listed species and ecological communities and Outstanding Universal Values of the GBMWHA will be analysed in the EIS.

Department of Agriculture, Water and Environment

Comments on Warragamba Dam Raising Draft EIS

Biodiversity Offset Strategy

Provided to NSW DPIE on 15 June 2020

BIODIVERSITY OFFSET STRATEGY

DAWE considers that the current Biodiversity Offset Strategy proposed in the EIS is unclear and does not adequately offset the impacts to EPBC Act listed threatened species and ecological communities from the project.

1. Construction Area

Floristic plots and transects were carried out to determine PCTs and associated ecosystem and species credit requirements. The EIS states that this has overestimated the species credit requirements as no specific surveys were conducted and that the construction area will be re-surveyed prior to construction to refine the credit requirements.

- **DAWE expects that species surveys should have been done as part of the FBA in the construction area and seeks clarification if this adequately meets the requirements of the FBA. Justification needs to be provided why species credit species were not surveyed. DAWE expects the FBA to be applied accurately and fully in the construction area.**

2. Upstream Area

The MNES Chapter clearly states on pg 12-10 that OEH and DoEE agreed that for the terrestrial biodiversity assessment:

- impacts to MNES would be assessed relative to the future probably maximum flood (PMF), that is with a raised dam
- offset requirements would be determined relative to the 1 in 100 chance in a year flood extent.

Compensation for impacts between the FSL and the 1 in 5 chance/year extent is proposed to be provided by ecosystem credits only (upfront retirement of credits). Appendix F5 states that this only covers the following EPBC Act listed fauna species (Appendix F5, Table 5-15) and the relevant EPBC Act flora species are not listed in Appendix F5:

- Spotted Quoll
- Swift Parrot
- Painted Honeyeater
- New Holland Mouse

The EIS states that there are 44 EPBC Act listed flora species and 11 fauna species that are predicted species credit species (Table 5-16, App F5). Currently these species would not be compensated under the proposed Biodiversity Offset Strategy between the FSL and the 1 in 5 chance/year flood extent.

DAWE would seek the offsets for impacts to nationally-listed species and communities to be secured through the endorsed NSW Biodiversity Offsets Scheme. The proposed offsets in the upstream area need explanation and justification for why the full commitment of offsets is not proposed.

The EIS needs to:

- **Clearly identify how all EPBC Act species that will be significantly impacted between the FSL and the 1 in 5 chance/year extent will be compensated**. The uncertainty associated with the approach to monitor the impact following an inundation event to determine species impact is not acceptable as it depends on the adequacy of detailed baseline surveys and monitoring for a broad range of species. The EIS has stated that surveys were not possible for a large part of the project area due to limited access.

- **The Department would expect WaterNSW to retire species credits for all impacted species within the FSL to 1 in 5 year extent when that level of inundation occurs, rather than monitor and determine impact and credit requirements**.
- **Clearly justify why offset requirements up to the 1 in 100 year extent has not been proposed as agreed on page 12-10 of Chapter 12 of the EIS.**
- **Clearly justify why upfront compensation for impacts between the FSL and the 1 in 5 chance/year extent are proposed, and not for a larger extent.**
- **There are key species with restricted distributions or breeding habitat that may be significantly impacted (with an increased risk of extinction) within the upstream area and the Biodiversity Offsets Strategy does not address how these impacts will be offset or compensated e.g. Regent Honeyeater, *E. benthamii, Kowmung Hakea.* Targeted actions should be identified for species with restricted distributions.**

3. Downstream

The impact in the downstream area is proposed to be managed via an adaptive management strategy. There are ecological communities within the downstream area that have their entire extent or a significant proportion of their extent within the potential impact zone and are at risk of extinction in an inundation event.

In particular this relates to Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion as the EIS states that "*An estimated 405.32 hectares of this CEEC occurs within the downstream study area." and "No areas within the locality would be fragmented or isolated by the Project as all mapped extents could be impacted by the Project*." This suggests that the only remaining known areas of this TEC are within the study area, and the EPBC offset requirement to deliver an overall conservation outcome that improves or maintains the viability of the protected matter may not be possible. Similarly, the critically endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest and endangered Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion have approximately 30% of their estimated distribution within the downstream study area where they are likely to have significant impacts due to changes in inundation.

The EIS needs to:

- **Clearly identify the extent of potential impact to MNES in the downstream areas. In particular to ecological communities which may be at risk of extinction from changes to inundation.**
- **Identify how impacts to these ecological communities can be mitigated in advance of the impact occurring from changes in inundation. If the impacts cannot be offset, what else can be done to compensate for the potential loss/extinction of these ecological communities?**
- **The EMP outline in the EIS needs to include mitigation measures for threats to ecological communities or species habitats such as fire or pathogens from either reduced/increased flooding in the downstream area. A commitment should include at the least a detailed baseline monitoring program to determine if changes in inundation (including reduced inundation) is impacting the ecological communities.**

4. World Heritage Offsets

The EIS has stated that world heritage area offsets would be found by adding land with similar values to the world heritage area estate. Before offsets can be found, the assessment of impact in the EIS needs to be improved so that there is a better understanding of what values could be lost and if values can be found in adjacent lands. **The EIS would need to detail how offsets would be found and if land with similar values exists for the purpose of offsetting world heritage impacts**. Land based offsets found for biodiversity purposes may not necessarily meet the requirements for world heritage area offsets.

Following a more adequate assessment of impacts to OUV, DAWE supports the securing of additional lands with Outstanding Universal Values to be acquired and incorporated into the national estate to offset impacts to OUV including loss of protected lands (national park).

5. Environmental Management Plan

The SEARs Attachment A requirement 10 States:

For each of the relevant matters protected that are likely to be significantly impacted by the development, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including:

i. a description, and an assessment of the expected or predicted effectiveness of the mitigation measures,

ii. any statutory policy basis for the mitigation measures;

iii. the cost of the mitigation measures;

iv. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing;

v. the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.

The IUCN Guidance Note principle 8 states an "*Environmental Management Plan should be included in the Environmental Assessment Report and should detail operating, monitoring and restoration conditions relating to the World Heritage site's Outstanding Universal Value throughout the life cycle of the proposal. The EMP should ensure that the measures necessary to assess and monitor residual adverse effects are in place and that remedial action is taken when impacts are worse than predicted".*

The EMP outline in the EIS (Appendix F6) needs to include further management and mitigation measures relating to the ongoing operation of the project. This includes mitigation and management measures relating to impacts on biodiversity (such as ecological communities in the downstream area) and measures relating to protecting and reporting on OUV. Currently most mitigation measures are related to the construction phase.