



DOC18/6672126
SSD 7480

Mr Steve O'Donoghue
Team Leader Resource Assessments
Department of Planning and Environment
Stephen.ODonoghue@planning.nsw.gov.au

Dear Steve

Vickery Extension Project - EIS Public Exhibition

I refer to an email from the Department of Planning and Environment (DPE) dated 11 September 2018 stating that the EIS for the Vickery Extension Project (SSD 7480) would commence public exhibition on 13 September 2018 and comments were being invited from the Office of Environment and Heritage (OEH).

OEH understands that the proposed development will result in the clearing of 775.8 hectares, of which 693.1 hectares comprises the mine footprint and 82.7 hectares comprises the rail spur. Of this area, 579.8 hectares of native vegetation will be cleared. No threatened flora species or threatened ecological communities occur within the proposed footprint. The biodiversity offset requirement has been calculated to be 16,401 ecosystem credits, 3,703 species credits for the regent honeyeater, 1,643 species credits for the squirrel glider, and 1,308 species credits for the koala.

The proposed development has been declared a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999*. The EPBC Act footprint covers 984.4 hectares, as part of the approved mine footprint was not previously referred for assessment.

OEH has reviewed the information provided against the Secretary's Environmental Assessment Requirements (SEARs) sent to the DPE on 11 February 2016. A summary of OEH's recommendations is provided in **Attachment A**. Detailed comments on biodiversity are provided in **Attachment B**, comments on Aboriginal cultural heritage are provided in **Attachment C**, and comments on hydrology and flooding are provided in **Attachment D**.

OEH would like to acknowledge the extensive and timely provision of additional information by the proponent and the ecological consultant, Resource Strategies, on request from OEH during the EIS exhibition period. The provision of this information has clarified numerous issues identified in the Biodiversity Assessment Report. OEH will continue to liaise with the proponent regarding the Biodiversity Offset Strategy (BOS). The quantum of biodiversity credits proposed to be generated in the offset areas requires review and it is likely to result in an amended BOS to ensure the biodiversity credit liability is met.

If you have any further questions regarding this matter please contact Renee Shepherd, Senior Conservation Planning Officer on 02 6883 5355 or renee.shepherd@environment.nsw.gov.au.

Yours sincerely

A handwritten signature in dark ink, appearing to read 'P. Christie', is positioned above the printed name.

PETER CHRISTIE
Director North West
Conservation and Regional Delivery

24 October 2018

Contact officer: RENEE SHEPHERD
02 6883 5355

Vickery Extension Project – Environmental Impact Statement

Summary of OEH Recommendations

List of acronyms used in this response:

ACH	Aboriginal Cultural Heritage
AEP	Annual Exceedance Probability
BAR	Biodiversity Assessment Report
BBCC	BioBanking Credit Calculator
BC Act	<i>Biodiversity Conservation Act 2016</i>
BOS	Biodiversity Offset Strategy
BVT	Broad Vegetation Type
DNG	Derived Native Grassland
DoEE	Department of the Environment and Energy
EIS	Environmental Impact Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FBA	Framework for Biodiversity Assessment
PCT	Plant Community Type

Recommendations

Biodiversity:

1. The species credit polygons for the koala should be increased from 44.6 hectares to 72.6 hectares at the mine site. The subsequent species credit liability for the koala should be updated and offset appropriately.
2. The species credit polygons for the koala in the Commonwealth assessment footprint should be reviewed and updated. The subsequent species credit liability for the koala should be updated and offset appropriately.
3. The proposal to develop a Koala Management Plan for the Vickery Extension Project should be captured in the project approval.
4. Further justification should be provided to explain why NA185 (poplar box woodland on alluvial clay soils) would not be used as habitat by the squirrel glider.
5. Further information should be provided detailing how the area of potential habitat was determined for each EPBC Act-listed species likely to be significantly impacted by the proposed development. This should include the area of each vegetation community considered to be habitat for each species.
6. The consolidated project approval should be updated to capture the increased area of Offset Area 5 (65 hectares compared to 52 hectares in the existing approval).
7. The Biodiversity Offset Strategy should be updated to include all of the information required in Section 12.2 of the FBA.
8. The species credits able to be generated on Offset Areas 6, 7, 8 and Mt Somner in accordance with the FBA must be reviewed. If the review results in a reduction of species credits generated by the current BOS, additional species credits must be retired to satisfy the species credit liability.

9. The ecosystem credits able to be generated on Offset Areas 6, 7, 8 and Mt Somner in accordance with the FBA should be reviewed. If the review results in a reduction of ecosystem credits generated by the current BOS, additional ecosystem credits must be retired to satisfy the ecosystem credit liability.

Aboriginal Cultural Heritage:

1. That the proponent facilitates and documents on-site discussion between the RAPs and the experts about the results of the technical investigation of the scarred trees, allowing opportunities for the RAPs to discern the technical findings of the expert assessments, and to also be given opportunity to discuss the findings.
2. That the proponent submits the expert reports to the OEH AHIMS Registrar notifying the AHIMS Registrar of the expert findings and include outcomes of any on-site discussions with the RAPs.
3. Undertake adequate investigations of potentially sensitive areas associated with the Namoi River with reference to best practice procedures.
4. The proposed cultural heritage management plan includes additional analysis of axe grinding groove site AHIMS 24-4-0009.

Flooding and Hydrology:

1. OEH requests the opportunity to review the detailed design to ensure design objectives have been met.
2. The impact of the rail line on flow distribution should be assessed for the 1% AEP (annual exceedance probability).
3. Further information regarding the cumulative impact assessment should be provided. Additional modelling may be required to assess cumulative impacts against pre-developed conditions.
4. An assessment of the impact of potential erosion should be considered for the areas where there is a measurable increase in flow velocity.

Detailed Comments on Biodiversity

Potential habitat excluded from species credit polygons for the koala on the mine site should be reinstated

Recommendation:

1. The species credit polygons for the koala should be increased from 44.6 hectares to 72.6 hectares at the mine site. The subsequent species credit liability for the koala should be updated and offset appropriately.
2. The species credit polygons for the koala in the Commonwealth assessment footprint should be reviewed and updated. The subsequent species credit liability for the koala should be updated and offset appropriately.
3. The proposal to develop a Koala Management Plan for the Vickery Extension Project should be captured in the project approval.

Section 3.9 of *Attachment C Vickery Extension Baseline Flora Report* of the BAR states that all the woodland vegetation communities present at the mine site provide potential habitat for the koala, except for three patches of vegetation.

The following patches of native woodland vegetation should be reinstated as habitat within the species credit polygons:

- The patch comprising NA349 encompassing quadrats 21 and 22
- The patch comprising NA311 encompassing quadrat 39
- Two patches comprising NA324 to the south of the mine site near quadrat 10

Whilst these patches may not contain primary or secondary feed trees as listed within SEPP 44 or the NSW Recovery Plan for the Koala or comprise at least 15% of the total number of trees in the upper or lower strata of the tree component (as per SEPP 44), the presence of these species in a lower density does not preclude their use by koalas. In the case that listed species are not present at all, there are other species that are present in these patches that koalas have been documented as using in the Gunnedah region. A review of the flora field data sheets shows the presence of silver-leaved ironbark and white cypress pine (quadrats 21 and 22 for NA349), narrow-leaved ironbark (quadrat 39 for NA311) and yellow box (quadrat 10); all species that are known to be used by koalas in the region (see Kavanagh *et al.* 2007; Crowther *et al.* 2014).

The proposed development occurs within a highly fragmented landscape. It is increasingly accepted that koalas shelter in a range of tree species in north-west NSW, like white cypress pine and ironbarks. Any remaining patches of woodland, even scattered paddock trees, provide important habitat, shelter and stepping stones across the landscape, allowing koalas to move between larger patches of woodland vegetation. As a result, it is recommended that the 0.5 hectares of scattered paddock trees that have been recognised as habitat for the regent honeyeater and the squirrel glider are also considered as habitat for the koala. Numerous studies have shown that koalas will utilise isolated trees in the landscape as they move between larger patches of woodland vegetation (Prevett 1991; Lunney *et al.* 2012; White 1999)

Reinstating these patches of woodland vegetation and scattered paddock trees would increase the total koala habitat at the mine site from 44.6 hectares to 72.6 hectares. All woodland within the rail spur footprint has already been assumed to be koala habitat. As a result, the BioBanking Credit Calculator (BBCC) should be updated to reflect this increase in habitat and the subsequent increase in the species credit liability for the koala should be updated and the credits appropriately retired.

This increase in koala habitat in the BAR footprint will also result in an increase in the koala habitat in the Commonwealth assessment footprint. The areas identified above within the mine site should be added to the area of potential koala habitat, and the additional areas covered by the Commonwealth assessment footprint compared to the mine site footprint should also be assessed for potential koala habitat that should be added to the species credit polygon.

Finally, Section 5.4 of the BAR states that the proponent will prepare a Koala Management Plan that will detail the management measures proposed to minimise the impact on koalas. This proposal should be captured in the project approval.

Further justification is required for excluding the vegetation community NA185 from the potential habitat for the squirrel glider

Recommendation:

4. Further justification should be provided to explain why NA185 (poplar box woodland on alluvial clay soils) would not be used as habitat by the squirrel glider.

Section 3.9 and 3.10 of *Attachment C Vickery Extension Baseline Flora Report* of the BAR detail the vegetation communities that are considered to be habitat for the koala and regent honeyeater respectively. No such justification has been provided for the squirrel glider. Section 2.3.4 and Table 10, and Section 3.3.4 and Table 20 of the BAR outline the potential habitat for the squirrel glider at the mine site and rail spur respectively. It is stated that NA185 (poplar box woodland on alluvial clay soils) is not considered potential habitat for the squirrel glider in the *Archived Biometric and Threatened Species Profiles Datasets*. No further explanation has been provided detailing why the squirrel glider would not use this vegetation community. Figure 15 details the location of squirrel glider records at the development site, and Figure 6 illustrates the vegetation communities at the development site. The records occur close to NA185. It is recommended that further justification is provided to detail why the squirrel glider would not use this vegetation community as habitat.

The area of habitat for EPBC Act-listed species that are likely to be significantly impacted should be justified

Recommendation:

5. Further information should be provided detailing how the area of potential habitat was determined for each EPBC Act-listed species likely to be significantly impacted by the proposed development. This should include the area of each vegetation community considered to be habitat for each species.

The Department of the Environment and Energy (DoEE) has declared that the proposed development is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It has been determined that there is likely to be a significant impact on the regent honeyeater (critically endangered), swift parrot (endangered) and koala (vulnerable). Three additional species may be significantly impacted, including the Corben's long-eared bat, large-eared pied bat and Murray cod, all which are listed as vulnerable.

An assessment of the entities listed under the EPBC Act (except for the Murray cod) is included in *Attachment B Matters of National Environmental Significance* of the BAR. Potential impacts to the Murray cod are assessed in Appendix B of *Appendix N Aquatic Ecology Assessment* in the EIS.

Section B3 of Attachment B of the BAR includes an assessment of the likelihood of a significant adverse impact on the species listed above. The potential habitat for each species is stated in the

assessment; however, no explanation has been provided regarding how this habitat was determined. It is requested that this information be provided, including the area of each vegetation community that is considered to be habitat for each particular species.

The proposed amendment to Offset Area 5 is supported

Recommendation:

6. The consolidated project approval should be updated to capture the increased area of Offset Area 5 (65 hectares compared to 52 hectares in the existing approval).

Section 6.2.2.6 of the BAR states that the rail spur will traverse the northern portion of Offset Area 5; a 52-hectare area that forms part of the Biodiversity Offset Strategy for the Vickery Coal Project approval (Schedule 3 Condition 32). The rail spur will impact on 1 hectare of the offset area. It is proposed that an additional 13 hectares is added to the offset area immediately to the south of the current boundary. Table 47 of the BAR provides a comparison between the approved offset area and the proposed offset area with regards to the vegetation communities and their areas. OEH supports this proposed amendment and recommends that this amendment is captured in the consolidated approval conditions.

Retirement of the remaining ecosystem credits on the Whitehaven Biobank site is supported

Section 6.2.2 of the BAR states that 869 ecosystem credits remain available for NA228 (white cypress pine – narrow-leaved ironbark shrub/grass open forest of the western Nandewar Bioregion). As shown in Table 46, these credits could be used to partially offset the credit liability for NA311. OEH supports this offset proposal.

The required information on the proposed ecological rehabilitation works has not been included in the BOS

Recommendation:

7. The Biodiversity Offset Strategy should be updated to include all of the information required in Section 12.2 of the FBA.

Section 6.2.2.1 of the BAR proposes that ecosystem credits will be generated from the ecological rehabilitation of 1,005 hectares of previously mined land. This includes 482 hectares from the current project proposal and 523 hectares from the existing Vickery Coal Project approval that was intended to be rehabilitated to agricultural land.

Section 12.2.1.5 of the FBA requires that the BOS sets out the completion/relinquishment criteria for each plant community type (PCT) that is the target of the proposed ecological rehabilitation works. In addition, Section 12.2.1.6 sets out additional information to be included in the BOS including rehabilitation objectives, target PCTs, and the area of land that will be rehabilitated to each PCT. The BOS does not contain any of these items. The BOS should be updated to include all the items required in Section 12.2 of the FBA.

Generation of species credits for the koala, squirrel glider and regent honeyeater does not conform to the FBA

Recommendation:

8. The species credits able to be generated on Offset Areas 6, 7, 8 and Mt Somner in accordance with the FBA must be reviewed. If the review results in a reduction of species credits generated by the current BOS, additional species credits must be retired to satisfy the species credit liability.

Section 4.5 of *Attachment I Offset Areas 6, 7 and 8 BioBanking Assessment Report* in the BAR outlines the survey methods used to detect threatened fauna on the offset sites. However, no actual survey methodology is provided, there is no discussion on whether targeted surveys were undertaken, and other than survey dates there is no description of the survey effort that was undertaken for each target species. In addition, no justification has been provided for the area of habitat attributed to each species to generate the species credits. Section 2.3.4 and Section 3.3.4 of the BAR provided descriptions of the habitat present on the development site for species credit species; at a minimum the same explanation should have been included for the offset areas.

Despite this, as stated in Section 6.5 of the FBA, species credits can only be generated on offset sites if the species credit species has been recorded during a threatened species survey, or an expert report has determined that the species is likely to be present on the site. Species credits have been generated on Offset Areas 6,7,8 and Mt Somner without conforming to these requirements. No expert report was provided for any of the species credit species on any of the proposed offset sites.

Specific issues relating to the credits that have been generated are:

- The regent honeyeater was not recorded on Offset Areas 6, 7, 8 or Mt Somner.
- The squirrel glider was not recorded on Offset Area 7, 8 or Mt Somner. Figure 35 in the BAR indicates that the squirrel glider was recorded in Offset Area 6 in 2018. However, no details regarding this record have been provided.
- The koala was not recorded on Offset Areas 6, 7 or 8. The koala was recorded on Mt Somner in 2012. No details of this survey have been provided. Given that this survey occurred more than 5 years ago, its results can inform the credit generation process, but it cannot be used in place of a targeted threatened species survey. No koalas were recorded during the surveys undertaken for this project.

Therefore, the proposed generation of species credits in Tables 44 and 46 of the BAR is incorrect and the proposed BOS does not generate the species credits required to meet the credit liability from the proposed development. An alternative proposal to retire the required species credits must be developed.

Further review of the ecosystem credits proposed to be generated on Offset Areas 6,7,8 and Mount Somner is required

Recommendation:

9. The ecosystem credits able to be generated on Offset Areas 6, 7, 8 and Mt Somner in accordance with the FBA should be reviewed. If the review results in a reduction of ecosystem credits generated by the current BOS, additional ecosystem credits must be retired to satisfy the ecosystem credit liability.

Attachment I and Attachment J to the BAR contain the BioBanking assessment reports for Offset Areas 6, 7 and 8; and Mt Somner respectively. These reports contain minimal information on the proposed offset areas compared to the information contained in the BAR for the proposed mine site

and rail spur. Specifically, detail is lacking with regards to threatened species targeted survey methodology and survey effort; descriptions of previous flora and fauna surveys undertaken on the sites; justification of vegetation community selection; vegetation community descriptions; discussion of the threatened flora species recorded, the habitat they were recorded in and their abundance; and BioBanking plot data has not been appended.

OEH proposes to continue to liaise with the proponent and review all of the information to ensure that the ecosystem credits proposed to be generated on the offset areas conform to the FBA.

Issues that have been clarified directly with the proponent

Numerous points of clarification have been addressed through direct liaison with the proponent. A summary of these issues is outlined below:

1. Minor inconsistencies exist between the BBCC and Table B1 of Attachment C with regards to overstorey regeneration values for quadrats 7, 13, 32, 33, 48. These inconsistencies are due to typographical errors or later revisions in the BBCC.
2. Seventeen of the flora plots were located in the broader development site, but not in the final site footprint. The final site footprint has been amended over time as outlined in Section 4.11.3 of the EIS. It was appropriate to include the information from these plots in the BBCC due to one or more of the following:
 - the patch of vegetation the plot occurs in enters the site footprint
 - the plot occurs in the same vegetation zone and same paddock as other plots used, meaning the plot in question was subject to the same disturbance history as plots located within the footprint
 - site attribute scores were not substantially different from the plots within the footprint

Furthermore, three plots collected near the rail spur and used in the rail spur assessment were also used within the mine site assessment. Two plots collected at the mine site and used for the mine site assessment were also used for the rail spur assessment. The use of the plot information in this manner is acceptable as the minimum number of plots were achieved for the aggregate area for the vegetation zones in question.

3. Little explanation was provided in the BAR detailing why no flora plots had been completed in the areas mapped as “disturbed land”, and why an offset is not required to be determined for these areas (Section 9.4 of the FBA) or why this land does not require assessment under Chapter 4 or 5 of the FBA (as per Section 9.5 of the FBA).

Additional information provided by the proponent shows photos and recent monitoring information from the Canyon Coal Mine (located in the north of the proposed mine site). The landscape is either disturbed or contains vegetation that is predominantly exotic. The remainder of the land mapped as disturbed has been cropped in recent years.

References

Crowther, M.S., Lunney, D., Lemon, J., Stalenberg, E., Wheeler, R., Madani, G., Ross, K.A. and Ellis, M. (2014) Climate-mediated habitat selection in an arboreal folivore. *Ecography*, 37, 336-343.

Kavanagh, R.P., Stanton, M.A. and Brassil, T.E. (2007) Koalas continue to occupy their previous home-ranges after selective logging in *Callitris-Eucalyptus* forest. *Wildlife Research*, 34, 94-107.

Lunney, D., Crowther, M.S., Wallis, I., Foley, W.J., Lemon, J., Wheeler, R., Madani, G., Orscheg, C., Griffith, J.E., Krockenberger, M., Retamales, M. and Stalenberg, E. (2012) Koalas and climate

change: a case study on the Liverpool Plains, north-west New South Wales. Pp. 150-168 in *Wildlife and climate change: Towards robust conservation strategies for Australian fauna* ed by D Lunney and P Hutchings, Royal Zoological Society of NSW, Mosman.

Prevett, P. T. (1991) Movement paths of koalas in the urban-rural fringes of Ballarat, Victoria: Implications for Management. Pp. 259-72 in *Nature Conservation 2: The Role of Corridors* ed by D. A. Saunders and R. Hobbs. Surrey Beatty & Sons, Chipping Norton.

White, N.A. (1999) Ecology of the koala (*Phascolarctos cinereus*) in rural south-east Queensland, Australia. *Wildlife Research*, 26, 731-744.

Detailed Comments on Aboriginal Cultural Heritage

OEH notes the preliminary ACH assessment for the proposed Vickery extension project

OEH accept the method and preliminary findings of the assessment report for the Vickery Extension which includes the northern bore fields, mine extension, haul road and rail corridor. OEH raise comments about the scarred tree assessment, proposed additional surveys for unassessed areas and make recommendations for research.

Proponent has complied with the prescribed Aboriginal consultation requirements

OEH acknowledge that the Aboriginal consultation undertaken by the proponent is consistent with the procedures set down in the project SEARS, with reference to the OEH Aboriginal consultation requirements (2010).

OEH note that Registered Aboriginal Parties were identified for the Vickery extension easement in 2011 by the former coal mine proponent and included field surveys (Hudson 2012). Additional surveys and consultation were overseen in 2015 by the current proponent, Whitehaven. The consultation included an extended invitation for additional registered Aboriginal parties and involved notification of scheduled meetings to discuss the project and the ACH assessment results (Whincop 2015).

OEH have noted that there have been no major issues raised by the RAPs during the consultation phases. OEH understands that the proponent will continue to engage and consult with the RAPs when developing the appropriate measures necessary for avoiding and mitigating harm to Aboriginal objects, as part of the procedures to be identified in the proposed cultural heritage management plan.

Aboriginal scarred trees assessed as scars caused by natural or pastoral events

An ACH assessment undertaken by Hudson and RAPs during three field surveys between 2011 and 2012 recorded 27 Aboriginal scarred trees across the proposed project area and have interpreted the trees to show evidence of traditional Aboriginal food extraction, canoe making and hut construction (Hudson 2012).

OEH understand that the ACH investigations facilitated by Whitehaven in 2015/16 questioned the scarred tree records prepared by Hudson (2012) and subsequently, commissioned experts to validate the claims of each tree. The experts include an arborist (Burns 2016) and two archaeologists (Kamminga and Symes 2016) in addition to a third archaeologist overseeing the ACH assessment (Whincop 2016).

OEH do accept that in cases where scarred trees prove difficult to determine or when claims are questioned then it is best practice to seek expert assistance, for example, an arborist or archaeologist with skills in scarred tree recording, to conclude the identification. This is consistent with the procedures set down in the Code (DECCW 2010:32).

OEH have examined the findings of the two independent expert reports and accept the methods they used to make critical assessment of each tree. OEH has also examined the images of the scarred trees shown in the ACH assessment report and note that they support the expert assessment findings.

OEH note that each expert report concurs with each other's findings which are consistent with the identification framework for Aboriginal scarred trees recommended by Long (in DEC 2005)¹. For example, the experts have examined the history of morphological changes to each tree that have occurred over time and compared each with same species with known ages. As a result, the experts have been able to establish other likely causes that have scarred each tree. It is further noted that the findings of the ACH assessment of the project area support the findings of expert reports (Whincop 2016).

The method used by Hudson and the RAPs to identify the Aboriginal scarred trees during the 2011 and 2012 field surveys is not described in the ACH report (Hudson 2012) and therefore the reasoning behind the identification process used by Hudson and the RAPs is unknown to OEH, when making comparisons with the methods used by Kamminga and Symes (2016), Burns (2016) and Whincop (2016).

Consultation on the scarred trees is concluded prior to project approval

Recommendation:

1. That the proponent facilitates and documents on-site discussion between the RAPs and the experts about the results of the technical investigation of the scarred trees, allowing opportunities for the RAPs to discern the technical findings of the expert assessments, and to also be given opportunity to discuss the findings.
2. That the proponent submits the expert reports to the OEH AHIMS Registrar notifying the AHIMS Registrar of the expert findings and include outcomes of any on-site discussions with the RAPs.

The opinions of the RAPs who recorded the trees in the first instance (2011/12) differs to the experts' views. OEH is unaware whether this matter was adequately discussed during the consultations phases undertaken by the proponent for the Vickery extension. OEH believe consultation of the expert results must be discussed with the RAPs (unless already concluded) prior to project determination to conclude the assessment phase of the project and thereby, allowing the consultation for the upcoming heritage management plan to be focused solely on developing managing strategies for Aboriginal heritage.

Investigations of archaeologically sensitive features post project approval

Recommendation:

3. Undertake adequate investigations of potentially sensitive areas associated with the Namoi River with reference to best practice procedures.

OEH is concerned about lands intersected by the development footprint for the proposed rail line and rail loop in areas close to the creeks and billabongs of the Namoi River. The field surveys are incomplete for some of these areas due to access issues (west of the Namoi River). It is understood that surveys will be conducted as part of the actions proposed when developing the heritage management plan, in consultation with the RAPs. It is also understood through discussions between OEH and the proponent that a defined creek with chain of ponds close to the Namoi River (east) which OEH believe has high subsurface potential for Aboriginal objects and research potential will not be impacted by the proposed rail line and rail loop.

¹ Department of Environment and Conservation, 2005, Aboriginal Scarred Trees in New South Wales – A Field Manual – Andrew Long

In areas where the rail line intersects with similar features on the western side of the Namoi, OEH insist upon best practice when undertaking assessments of these locations including appropriate analysis of finds relevant to the significance of the finds. To ensure best practice whether it be for test excavation, salvage excavation or artefact analysis (including management of artefacts salvaged from the footprint) OEH refer the proponent to the procedures set down in the code of archaeological practice (DECCW 2010) in the first instance.

Axe grinding groove site AHIMS 24-4-0009 and associated artefact scatter

Recommendation:

4. The proposed cultural heritage management plan includes additional analysis of axe grinding groove site AHIMS 24-4-0009.

The assessment report concludes that there is a chance that there may be indirect impacts to the axe grinding grooves located on the edge of the Namoi River (AHIMS site 24-4-0009). OEH expect therefore that adequate and detailed records of the grooves is undertaken in case they are damaged from vibrations caused by blasting and to update the earlier records of the site (Haglund 1981). AHIMS records show that there are many stone artefacts located on lands associated with the axe groove site. Whilst harm from vibration to the artefacts is unlikely, OEH prefer the artefacts on lands associated with the grinding grooves to be subject to examination and analysis as part of the activities for the proposed cultural heritage management plan. OEH believe the additional analysis will contribute to interpretation of the analyses to be undertaken of those artefacts that will be harmed by the proposed project. OEH note that 1981 AHIMS records refer to the artefacts as having good research potential.

Detailed Comments on Flooding and Hydrology

A review of the final detailed design is requested

Recommendation:

1. OEH requests the opportunity to review the detailed design to ensure design objectives have been met.

A number of modelling parameters and base information used in the assessment are not noted in the report, it is assumed therefore that the consultants have used the appropriate data. It is also noted that further work to optimise the locations of openings and bunds will be undertaken during detailed design to confirm the design objectives will be met. OEH requests the opportunity to review the final detailed design.

The impact of the rail line on flow distribution for the 1% AEP should be assessed

Recommendation:

2. The impact of the rail line on flow distribution should be assessed for the 1% AEP (annual exceedance probability).

Table 6.1 identifies the flow distribution for the 5% AEP flood event. A similar table should be provided for the 1% AEP. Even though the floodplain management plans do not explicitly ask for this information for the 1% AEP, this information should be provided if this event has been modelled.

Cumulative impacts may not have been fully assessed

Recommendation:

3. Further information regarding the cumulative impact assessment should be provided. Additional modelling may be required to assess cumulative impacts against pre-developed conditions.

A pre-developed or greenfield scenario is normally used when assessing the cumulative impacts of a proposed development. If the flood impacts include existing floodplain infrastructure, then the cumulative impacts will not have been fully assessed. Further information needs to be provided regarding the cumulative impact assessment that was undertaken and the assumptions that were used.

Potential erosion impacts should be assessed where increased flow velocities are likely

Recommendation:

4. An assessment of the impact of potential erosion should be considered for the areas where there is a measurable increase in flow velocity.

Figure 6.10 shows localised increases in velocity of between 0.2 m/s and 0.5m/s. Given the nature of the soils in this area, this increase may result in the threshold for erosion being exceeded. It should be noted that given both the scale and colours used in the legend it is difficult to interpret the results in this area. An assessment of potential erosion for areas where there is a measurable increase in velocities should be undertaken.