

Echuca-Moama Bridge Crossing (NSW)

Addendum review of environmental factors

Transport for NSW | June 2020



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Prepared by GHD Pty Ltd and TfNSW

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Approval and authorisation

Title	Echuca – Moama Bridge Crossing (NSW) Addendum review of environmental factors
Accepted on behalf of Transport for NSW by:	Michael Suidgeest Senior Environment Officer
Signed:	<i>Michael Suidgeest 23.06.2020</i>
Dated:	

Executive Summary

Proposed modification

This addendum Review of Environmental Factors (REF) provides a detailed description of the potential environmental impacts associated with the modification proposed for the Echuca-Moama Bridge Crossing to achieve a more sustainable design and enable substantial cost savings. The proposed modification involves a reduction in the length of bridge structures and a consequent increase in length of the embankment adjoining the bridges. Construction activities of the modification include:

- Property acquisition - an additional area of about 1723 square metres (0.17 hectares) of land outside the approved project boundary is required
- Removing vegetation
- An additional 20,000 cubic metres of material to be used in the adjustments to the abutments.

This addendum REF is to be read in conjunction with the Echuca-Moama Bridge Crossing REF, Echuca-Moama Bridge Crossing Submissions Report (29 April 2016), the Victorian Environmental Effects Statement (15 September 2015), and the earlier addendum REF (November 2019).

Background

Transport for NSW (TfNSW, formerly Roads and Maritime) and Major Road Projects Victoria (MRPV, formerly VicRoads) are building a second Murray River bridge crossing between Moama in NSW and Echuca in Victoria (referred to as the 'Echuca-Moama bridge crossing'). Moama and Echuca are located about 640 kilometres south-west of Sydney and 190 kilometres north of Melbourne. TfNSW, in line with NSW planning legislation, prepared an REF for the NSW component of the Echuca-Moama bridge crossing. MRPV, in line with Victorian planning legislation, prepared an Environmental Effects Statement (EES) for the Victorian component of the Echuca-Moama bridge crossing. Both the REF and EES were placed on public exhibition in August 2015 and a submissions report was prepared in April 2016.

The Echuca-Moama bridge crossing was determined a 'controlled action' by the former Australian Government Department of Environment and Energy. The project was approved by the Department of Agriculture, Water and the Environment (DAWE) (formerly, Department of Environment and Energy) on 21 October 2016.

In November 2019, an addendum REF (Addendum REF 2019) was prepared to assess minor boundary adjustments for construction site facilities, stockpile and laydown areas (NGH Consulting, 2019).

Need for the proposed modification

Echuca and Moama function as a single community and are linked by the existing heritage-listed bridge across the Murray River, the only accessible river crossing in the area. The bridge does not meet current road design standards. Traffic congestion occurs on the bridge. The bridge has height, weight and width restrictions. These constraints affect freight transport, local business and tourism, with associated impacts on the region's productivity and economy. A second bridge crossing is required to provide an alternative route across the Murray River. The proposed modification is needed to better achieve the objectives of the approved project, as outlined in Section 2.3 of the REF.

Options considered

The following options were considered:

- Option 1 – Do nothing
- Option 2 – Construct the proposed modification (preferred option).

Option 2 was selected as the preferred option as it accommodates the design changes necessary to reduce the length of two bridge structures by one span each to achieve a more sustainable design, and

cost savings. This also reduces the number of piers, girders and other bridge components which require ongoing inspection and maintenance.

Statutory and planning framework

The description of the proposed modification and associated environmental impacts have been carried out in context of *Biodiversity Conservation Act 2016* (BC Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In doing so, the addendum REF helps to fulfil the requirements of Section 5.5 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) and takes into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The proposed modification would not result in a change to the findings of the approved project and would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an Environmental Impact Statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. Consent from council is not required.

The proposed modification would not cause a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the EPBC Act. A referral to the Australian Government Department of the Environment and Energy is not required.

Community and stakeholder consultation

TfNSW continues to consult with the community and stakeholders about the project. A project specific website is being maintained. Other consultation relating to the project since November 2019 includes consultation with the Murray-Darling Basin Authority (MDBA) and North Central Catchment Management Authority (North Central CMA) regarding the proposed modification and need for additional hydraulic assessment.

Environmental impacts

The addendum REF identified three environmental aspects as key risks from the proposed modification.

Hydrology and flooding impacts

Based on the updated hydraulic assessment compared to the approved project, the afflux for the modification is generally greater. This is due to the further constriction of the floodplain caused by the increased length of embankment. As a result, the change in flood levels upstream of the structure has increased by between 25 and 50 millimetres. The identified properties in Table 6-1 where afflux above the approved project is predicted to still meet the project flood criteria of an increase of less than 50 millimetres afflux (refer section 6.1.1).

Overall, flood behaviour is not significantly altered across the floodplain as a result of the proposed modification. The predicted impacts of the proposed modification meet the legislative requirements of the Flood Prone Land Policy and Murray Regional Environmental Plan No 2 – Riverine Land (REP), and have been approved by the North Central CMA. The proposed modification is expected to have minor additional flood impacts, and no impact on the beneficial uses of surface water.

Biodiversity impacts

The proposed modification would remove 0.17 hectares of native vegetation and fauna habitat, including the removal of one hollow bearing tree. The removal of 0.17 hectares of habitat is unlikely to have a significant impact on any threatened species or ecological community.

The cumulative impact from the approved project and the proposed modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of

the BC Act or *Fisheries Management Act 1994* (FM Act) and therefore a Species Impact Statement is not required

Aboriginal heritage impact

The preliminary archaeological assessment (Appendix E) determined the proposed modification is unlikely to have a significant impact on Aboriginal cultural heritage based on the following (due diligence) considerations:

- The project is unlikely to harm known Aboriginal objects or places
- The AHIMS search indicated Aboriginal objects adjacent to the study area, however they are well outside the proposed modification area and mitigation measures outlined in Section 7 would be implemented
- The study area contains landscape features that indicate the presence of Aboriginal objects, based on the *Due Diligence Code of Practice for the Protection of Aboriginal objects in NSW* and the Roads and Maritime Services' procedure, but the cultural heritage potential of the study area appears to be reduced due to past disturbance
- There is an absence of sandstone rock outcrops likely to contain Aboriginal art.

Justification and conclusion

In considering the proposed modification this assessment has examined and taken into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of that activity as addressed in this addendum REF and associated information. The impacts and risks identified are considered manageable with the effective implementation of the measures detailed in the Echuca-Moama Bridge Crossing (NSW) REF, subsequent submissions report and Addendum REF 2019. On balance, the addendum REF finds that any negative impacts are outweighed by the long-term positive impacts of the project.

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1. Introduction

1.1 Background

In 2016, a review of environmental factors (REF) was prepared by Transport for NSW (TfNSW, formerly, NSW Roads and Maritime Services) for the NSW components of the Echuca-Moama bridge crossing over the Murray River (the project). The location of the project is shown in Figure 1-1.

In accordance with Victorian planning legislation, Major Road Projects Victoria (MRPV, formerly VicRoads), prepared an Environmental Effects Statement (EES) in parallel with the REF, for the Victorian components of the project.

The REF and EES were placed on public display for community and stakeholder comment between 27 August 2015 and 9 October 2015. A submissions report was prepared to respond to issues raised in relation to the NSW components of the project. The NSW component of the project was determined by TfNSW in April 2016 (the approved project).

The Echuca-Moama bridge crossing was determined a 'controlled action' by the former Australian Government Department of Environment and Energy. The project was approved by the Department of Agriculture, Water and the Environment (DAWE) (formerly, Department of Environment and Energy) on 21 October 2016.

In November 2019, an addendum REF (Addendum REF, 2019) was prepared to assess minor boundary adjustments for construction site facilities, stockpile and laydown areas (NGH Consulting, 2019).

1.2 Proposed modification overview

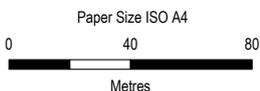
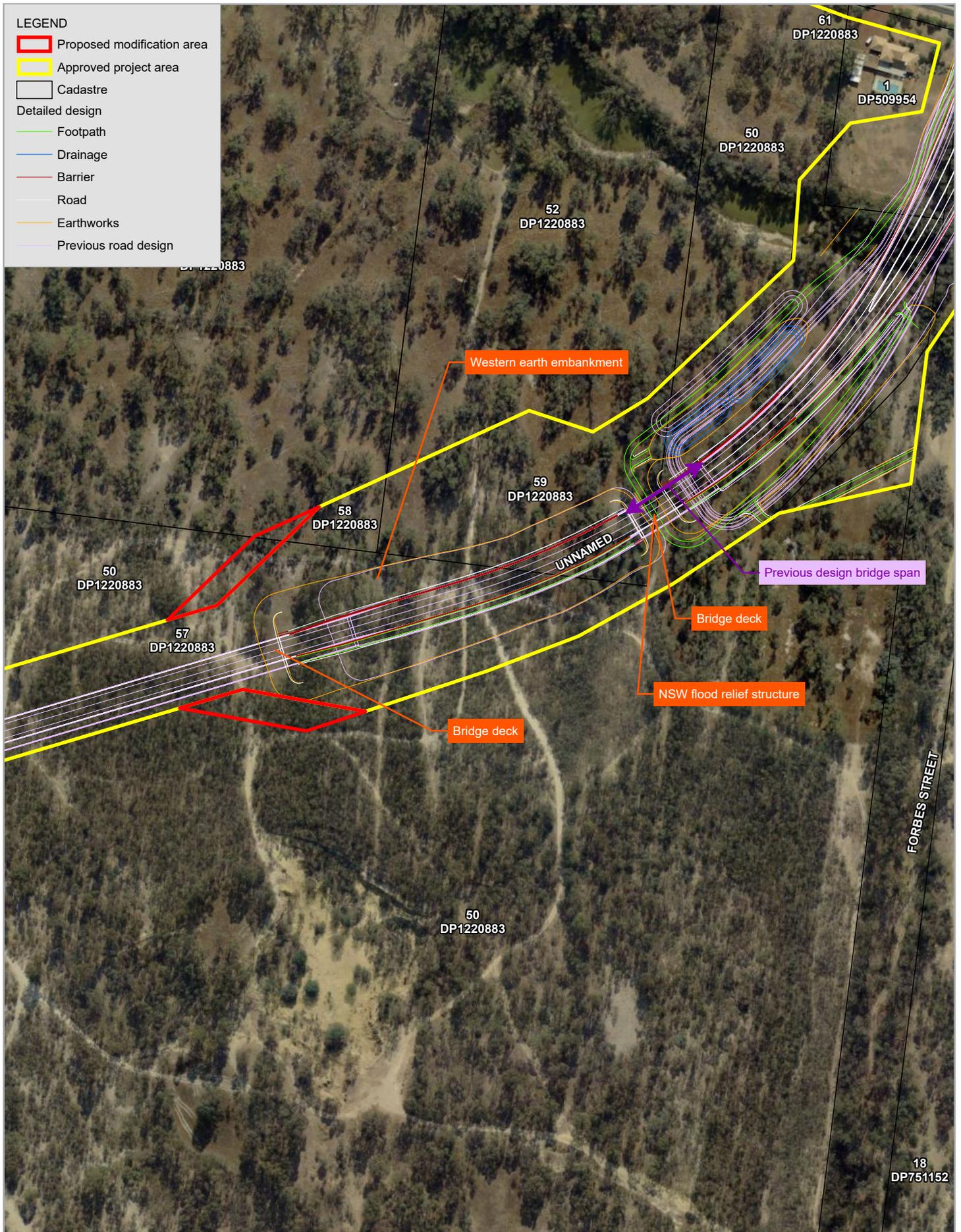
TfNSW proposes to modify the approved project to achieve a more sustainable design and enable substantial cost savings.

The proposed modification involves a reduction in the length of bridge structures and a consequent increase in length of the embankment adjoining the bridges. An increase of about 1723 square metres of the land is also required to accommodate the proposed modification.

The proposed modification is shown in Figure 1-2. Chapter 3 describes the proposed modification in more detail.

This addendum REF has been prepared to assess the potential change in environmental impacts as a result of the proposed modification.

The proposed modification has been assessed in this addendum REF in accordance with Division 5.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The proposed modification is permissible without consent in accordance with Clause 94 of *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP). TfNSW is the proponent and determining authority for the proposed modification in accordance with Section 5.3 of the EP&A Act. Further explanation of the statutory and planning framework relevant to the proposed modification is provided in Chapter 4.



Transport for NSW
Echuca Moama Bridge
Addendum REF

Project No. 12519170
Revision No. -
Date 16 Jun 2020

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

Overview of the proposed modification

FIGURE 1-2

N:\AU\Melbourne\Projects\3112519170\GIS\Maps\Deliverables\12519170_AddendumREF\12519170_AddendumREF.aprx Data source: General topo - NSW LPI 2020/2015, Victoria State Government; Project boundaries - MRPV, TNSW; Aerial imagery - Sixmaps 2020 public_NSW_Imagery; © Department of Customer Service 2020. Created by: jprice
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1.3 Purpose of the report

This addendum REF has been prepared by GHD Pty Ltd (GHD) on behalf of TfNSW.

The purpose of this addendum REF is to describe the proposed modification, to document and assess the likely impacts of the proposed modification on the environment, and to detail mitigation and management measures to be implemented, as necessary.

This addendum REF is to be read in conjunction with the Echuca-Moama Bridge (NSW) addendum REF (November 2019), Echuca-Moama Bridge Crossing REF (April 2016), Echuca-Moama Bridge Crossing Submissions Report (April 2016), and the Victorian Environmental Effects Statement (September 2015).

The description of the proposed modification and assessment of the potential environmental impacts has been undertaken in the context of:

- clause 228 of the Environmental Planning and Assessment Regulation 2000
- the *Biodiversity Conservation Act 2016* (BC Act)
- the *Fisheries Management Act 1994* (FM Act)
- the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In doing so, the addendum REF helps to fulfil the requirements of Section 5.5 of the EP&A Act that, TfNSW examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the addendum REF would be considered when assessing:

- Whether the proposed modification is likely to result in a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act.
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in Section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report.
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured.
- The potential for the proposed modification to significantly impact any other matters of national environmental significance or Commonwealth land and therefore the need to make a referral to the Australian Government Department of the Agriculture, Water and Environment for a decision by the Australian Government Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2. Need and options considered

2.1 Strategic need for the proposed modification

As outlined in Chapter 2 of the REF for the approved project the Echuca-Moama bridge crossing is required to alleviate congestion on the existing bridge, improve security of access for the local community and provide access across the Murray River for higher mass limit and oversized vehicles. The proposed modification described and assessed in this addendum REF is consistent with the strategic need for the project.

2.2 Objectives and development criteria

Section 2.3 of the REF for the approved project outlines the objectives and development criteria that are relevant to the project. The objectives are as follows:

- Improve accessibility and connectivity for the community of Echuca-Moama and the wider region
- Provide improved access during flood events, with a second flood-free crossing between Echuca and Moama
- Enable cross-border access for high productivity freight vehicles (longer trucks carrying heavier loads) and oversized vehicles
- Improve emergency services access between Echuca and Moama during emergency situations and major tourist and flood events
- Provide road infrastructure that supports:
 - The NSW, Victorian and national economies through improved connectivity of goods and services
 - The local and regional economy of Echuca- Moama
- Minimise impacts on the natural environment, including:
 - The native vegetation and habitat on the Murray River floodplain
 - The water quality and aquatic habitats of the Murray River and floodplain wetlands
- Minimise impacts on the local community.

The proposed modification described and assessed in this addendum REF is consistent with these objectives.

2.3 Alternatives and options considered

The following options were considered:

Option 1 – Do nothing

This option would facilitate the design and construction work to be undertaken as described and assessed in the REF for the approved project. However this option was based on a concept design and would consume more construction materials (eg steel and concrete) and at greater financial cost. This option was therefore not considered further.

Option 2 – Proposed modification

During development of the detailed design, TfNSW identified that a more sustainable design outcome could be achieved along with a cost saving and with minimal change in environmental or social impacts.

The proposed modification involves a reduction in the length of bridge structure and a consequent increase in the length of the embankment adjoining the bridge. An increase of about 1723 square metres of the construction footprint at the northern abutment is required.

The proposed modification has been developed with consideration to minimising the social and environmental impacts, including the safety of the workers and motorists during all stages of the project.

2.4 Preferred option

Option 2 was selected as the preferred option as it accommodates the design changes necessary to reduce the length of two bridge structures by one span each to achieve a more sustainable design, and cost savings. This also reduces the number of piers, girders and other bridge components which require ongoing inspection and maintenance.

3. Description of the proposed modification

3.1 The proposed modification

TfNSW proposes to modify the approved project to accommodate a design change. The key features of the proposed modification include:

- Reduction in the length of the Murray River bridge structure by one bridge span and one pier (about 35 metres)
- Increase in the length of the western (earth) embankment of the Murray River bridge structure by 35 metres
- Reduction in the length of the NSW flood mitigation bridge (by about 22.5 metres)
- Adjustment of the northern abutment of the NSW flood mitigation bridge and increase the embankment length by about 22.5 metres
- An increase in the land required by about 1723 square metres to accommodate the proposed modification.

The proposed modification is shown in Figure 1-1 and Figure 1-2. Details of each of the key features are provided below. Detailed engineering drawings of the proposed modification are provided in Appendix A.

3.2 Design

A summary of the design criteria and engineering constraints that characterise the proposed modification are provided in the following sections.

3.2.1 Design criteria

The design of the proposed modification was prepared in accordance with the standards provided in Section 3.1.2 of the REF for the approved project and the contract documents and technical criteria specified for the design and construction of the Echuca-Moama Bridge Crossing.

3.2.2 Engineering constraints

Section 3.2.2 of the REF for the approved project identifies the engineering constraints that apply to the project. No additional engineering constraints have been identified to apply to the proposed modification.

3.2.3 Design features

The key features of the proposed modification are consistent with the description in Section 3.2.3 of the REF for the approved project and Section 1.3 of the Addendum REF 2019, with the following exceptions:

Murray River Bridge floodplain section

The length of the Murray River bridge structure would be reduced by one segment; approximately 35 metres. By reducing the length of the bridge structure, one less pier in the floodplain is required.

Floodplain section

The western (earth) abutment for the Murray River bridge structure would be adjusted to allow for a reduction in the length of the bridge by one span.

Flood mitigation bridge

The flood mitigation bridge would be reduced by one span, resulting in an adjustment of the northern abutment of the bridge. The overall length of the flood mitigation bridge would be reduced from about 45 metres to 22.5 metres.

3.3 Construction activities

The likely construction methodology, staging, work hours, and plant and equipment would be as described in the REF for the approved project. As stated in Section 3.3.1 of the REF for the approved project, the detailed construction staging plans and methods would be determined by the construction contractor(s).

The final construction plan and methods chosen by the contractor are to be consistent with environment safeguards outlined in Chapter 7 of this addendum REF.

3.3.1 Work methodology

Section 3.3.1 of the REF for the approved project identifies the work methodology that also applies to the proposed modification.

3.3.2 Construction hours and duration

Construction timing would be as outlined in Section 3.3 of the REF for the approved project.

Work would be carried out during standard construction working hours in accordance with the *Interim Construction Noise Guideline* (DECC, 2009):

- Monday to Friday: 7 am to 6 pm
- Saturday: 8 am to 1 pm
- Sundays and public holidays: no work.

Site compound establishment and demobilisation would be carried out during standard working hours only. The use of site compounds would periodically include out of hours works, in particular, when receiving deliveries.

Any out of hours works would be undertaken in accordance with the *Construction Noise and Vibration Guidelines* (Roads and Maritime 2016), the *Interim Construction Noise Guideline* (DECC 2009) (ICNG).

3.3.3 Plant and equipment

Section 3.3.3 of the REF for the approved project identifies the construction plant and equipment that would be used to construct the proposed modification.

3.3.4 Earthworks

The proposed modification would require an additional 20,000 cubic metres of material, to be used in the adjustments to the abutments.

3.3.5 Source and quantity of materials

Section 3.3.5 of the REF for the approved project identifies the source and quantity of materials required for construction of the project.

The source of materials for the proposed modification would be in accordance with the REF for the approved project.

3.3.6 Traffic management and access

Section 3.3.6 of the REF for the approved project identifies the traffic management and access required for construction of the project. The proposed modification would be in accordance with the REF for the approved project.

3.4 Ancillary facilities

Section 3.3.6 of the REF for the approved project identifies the ancillary facilities required for construction of the project. The proposed modification would be in accordance with the REF for the approved project.

3.5 Public utility adjustment

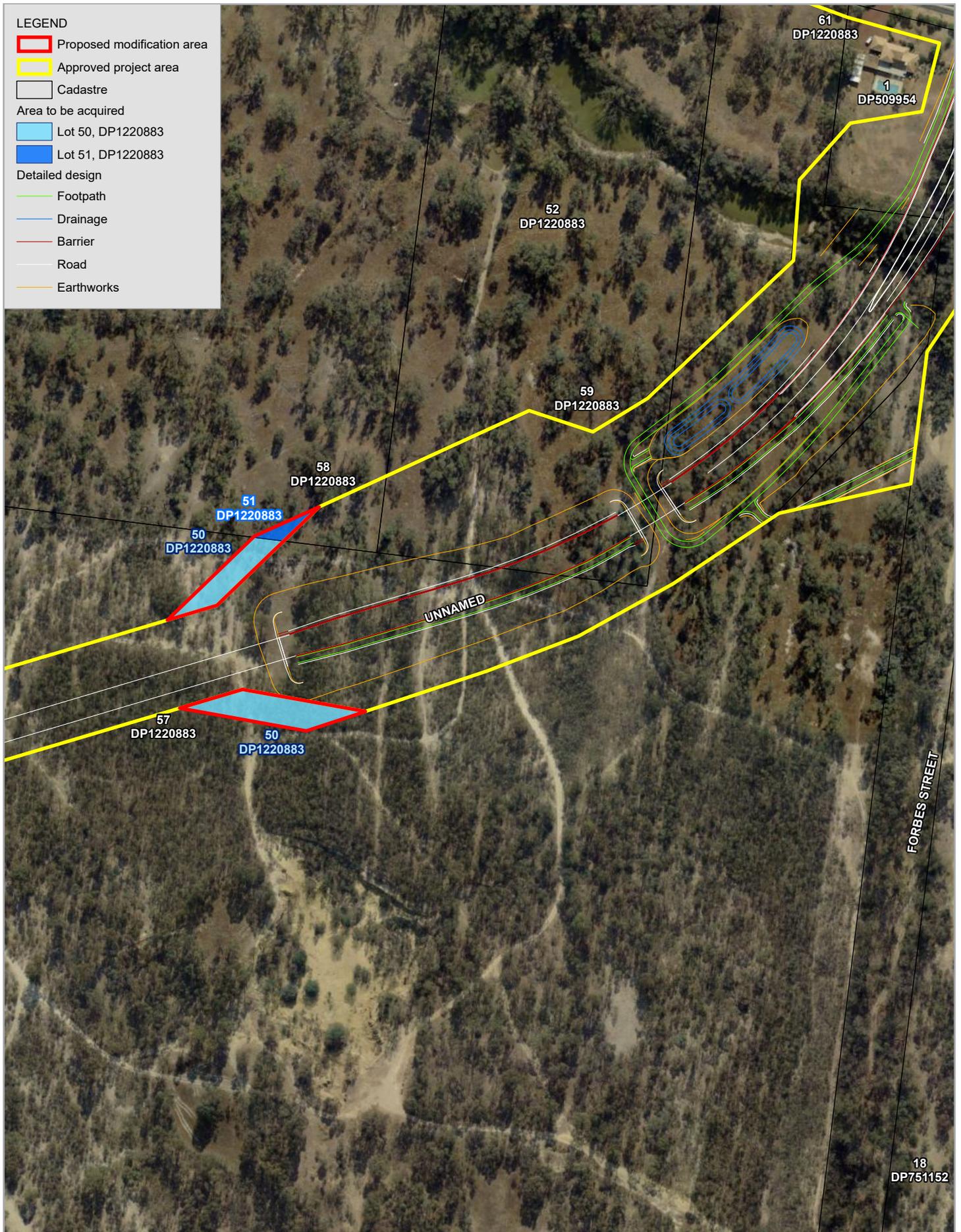
No additional public utility adjustment would be required for the proposed modification.

3.6 Property acquisition

To support the proposed modification, an additional area of about 1723 square metres (0.17 hectares) of land outside the approved project boundary is required (refer Figure 3-1). Table 3-1 outlines the details of the property acquisition required for the proposed modification.

Table 3-1 Proposed property acquisition

Lot and DP	Description	Total area (m ²)	Acquisition type	Current owner	Land use zone (LEP)
Lot 51 DP1220883	Area required for expansion of the western embankment	151.5	Partial	Private	E3
Lot 50 DP1220883	Area required for expansion of the western embankment	1571.1	Partial	Private	E3
Total area to be acquired		1722.6 m ² (0.17 ha)			



LEGEND

- ▭ Proposed modification area
- ▭ Approved project area
- Cadastre
- Area to be acquired
 - ▭ Lot 50, DP1220883
 - ▭ Lot 51, DP1220883
- Detailed design
 - Footpath
 - Drainage
 - Barrier
 - Road
 - Earthworks

Paper Size ISO A4

0 40 80

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Transport for NSW
Echuca Moama Bridge
Addendum REF

Project No. **12519170**
Revision No. **-**
Date **16 Jun 2020**

Proposed area of acquisition

FIGURE 3-1

N:\AU\Melbourne\Projects\3112519170\GIS\Maps\Deliverables\12519170_AddendumREF\12519170_AddendumREF.aprx Data source: General topo - NSW LPI 2020/2015, Victoria State Government; Project boundaries - MRPV, TNSW; Aerial imagery - Sixmaps 2020 public; NSW Imagery; © Department of Customer Service 2020. Created by: jprjpc © 2020. Whilst every care has been taken to prepare this map, GHD (and Sixmaps 2020, NSW Department of Lands, Victoria State Government, TNSW, MRPV) make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

4. Statutory and planning framework

4.1 State Environmental Planning Policies

4.1.1 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 94 of ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposed modification is for road infrastructure facilities and is to be carried out by TfNSW, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposed modification is not located on land reserved under the *National Parks and Wildlife Act 1974* (NPW Act), State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (Major Development) 2005.

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by ISEPP (where applicable), is discussed in Section 5 of this addendum REF.

4.1.2 Murray Regional Environmental Plan No 2—Riverine Land

As of 1 July 2009, the Murray Regional Environmental Plan No 2 – Riverine Land (Murray REP) is deemed a State Environmental Planning Policy.

The aims of the Murray REP are to conserve and enhance the riverine environment of the Murray River for the benefit of all users. It covers the riverine land of the Murray River Council as one of 11 local government areas to which the Murray REP applies.

Part 2 sets out planning principles that apply to development that does not require consent. Clause 9 lists the following general principles that must be taken into account:

(a) *the aims, objectives and planning principles of this plan,*

Response: The proposed modification is generally consistent with the aim and objectives of the Murray REP which include:

- a. *to ensure that appropriate consideration is given to development with the potential to adversely affect the riverine environment of the River Murray, and*
- b. *to establish a consistent and co-ordinated approach to environmental planning and assessment along the River Murray, and*
- c. *to conserve and promote the better management of the natural and cultural heritage values of the riverine environment of the River Murray.*

(b) *any relevant River Management Plan,*

Response: There is no river management plan for the Murray. The Murray-Darling Basin Plan has been in place since 2014. The proposed modification is broadly consistent with the high level objectives of the Basin Plan.

(c) any likely effect of the proposed plan or development on adjacent and downstream local government areas,

Response: The impacts of the proposed modification are considered in detail in Section 6.

(d) the cumulative impact of the proposed development on the River Murray.

Response: Potential cumulative impacts are specifically addressed in Section 6.5.

Consultation requirements set out in Part 3 of the Murray REP that are applicable to the proposed modification are addressed in Section 5.

Murray Local Environmental Plan 2011

The proposed modification is located within the E3 Environmental Management zone under the Murray Local Environmental Plan 2011 (Murray LEP).

Clause 1.9 of the Murray LEP states that *the Plan is subject to the provisions of any State environmental planning policy that prevails over this Plan as provided by section 3.28 of the Act.*

In accordance with the above, the consent provisions of the LEP do not apply.

4.2 Other relevant NSW legislation

4.2.1 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) was passed by the NSW Parliament in November 2016 and came into effect on 25 August 2017. The *Threatened Species Conservation Act 1995* (TSC Act), *Native Vegetation Act 2003* (NV Act) and some parts of the *National Parks and Wildlife Act 1974* (NPW Act) were repealed on 25 August 2017. As a result, the matters relating to the listing of threatened species, biodiversity impact assessment, offsetting and related offences are now contained within the BC Act.

The REF for the approved project was approved under the TSC Act, however the BC Act applies to this modification as the provisions of the TSC Act no longer apply and all provisions have been transferred to the BC Act.

The BC Act, together with the Biodiversity Conservation Regulation 2017, provide a mechanism to address impacts on biodiversity from land clearing associated with development. Under this legislation, there are provisions for a Biodiversity Offsets Scheme (BOS), which includes a framework to avoid, minimise and offset impacts of development on biodiversity.

The potential impacts of the proposed modification on threatened species are discussed in the biodiversity assessment (Section 6.1).

4.2.2 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides the basis for legal protection and management of National Parks estate and Aboriginal sites and objects in NSW.

Section 86 lists offences relating to harming or desecrating Aboriginal objects. An Aboriginal heritage impact permit (AHIP) is required in accordance with Section 90 of the Act to harm an Aboriginal heritage object.

Assessments undertaken as part of the Echuca-Moama Bridge (NSW) addendum REF (November 2019) by Heritage Insight (2019) as well as subsequent statutory consultation and a cultural heritage assessment report completed by Kelleher Nightingale Consulting (2019) assessed the area required for the proposed modification (refer to Section 3.6 of the Echuca-Moama Bridge (NSW) addendum REF (November 2019)).

A preliminary archaeological assessment has been undertaken for the proposed modification in Section 6.3 of this addendum REF. The proposed modification would not result in additional impacts to those identified in the REF for the approved project or the addendum REF (November 2019) and an AHIP is not required (refer to Appendix E).

Further information is provided in Appendix J and Appendix K of the REF for the approved project.

4.2.3 Biosecurity Act 2015

The *Biosecurity Act 2015* (Biosecurity Act) repealed the *Noxious Weeds Act 1993* on 1 July 2017. The Biosecurity Act specifies the duties of public and private landholders as to the control of priority weeds. Under the Act, priority weeds have been identified for Local Government Areas and assigned duties of control. Under Part 3 of the Biosecurity Act, any person who deals with biosecurity matters (i.e listed weed species) and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by biosecurity matters has the duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated and minimised.

The proposed modification area was previously assessed for priority weeds in the REF for the approved project, (refer to Section 6.1). Potential for priority weeds to occur within the proposed modification area is discussed in Section 6.1 of this Addendum REF.

4.2.4 Crown Lands Management Act 2016

The *Crown Lands Management Act 2016* (Crown Lands Management Act) repealed the *Crown Lands Act 1989* on 1 July 2018.

The proposed modification is located wholly on private land, and would be acquired by TfNSW for the project.

In accordance with the *Crown Lands Management Act 2016*, TfNSW does not require a permit or licence from the Department of Industry (Crown Lands Division) as no works would be undertaken on Crown Land.

4.2.5 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) aims to conserve, develop and share the fishery resources for the benefit of present and future generations.

No additional approvals are required for the proposed modifications of the addendum REF.

Further information is provided in Section 4.4.3 of the REF for the approved project.

4.2.6 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) focuses on protecting, restoring and enhancing the environment within NSW, and through the use of various mechanisms, reduce potential risks to human health and the environment. It aims to provide opportunity for increased public involvement and access to information regarding environmental protection.

No additional approvals are required for the proposed modifications of the addendum REF.

Further information is provided in Section 4.4.7 of the REF for the approved project.

4.2.7 Heritage Act 1977

The *Heritage Act 1977* is concerned with all aspects of conservation ranging from the most basic protection against indiscriminate damage and demolition of buildings and sites, through to restoration and enhancement.

Approval under Section 57(1) is required for works to a place, building, work, relic, moveable object, precinct, or land listed on the State Heritage Register. An excavation permit is required under Section 139 to disturb or excavate any land containing or likely to contain a relic.

The proposed modification would not result in any changes in impacts to heritage items to those assessed in the REF for the approved project.

Further information is provided in Section 6.4 of this addendum REF and Section 6.8 of the REF for the approved project.

4.2.8 Water Management Act 2000

The proposed modification is within an area covered by the Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2004 and therefore the *Water Management Act 2000* (WM Act) applies to the proposed modification. Under clause 29 of the Water Sharing Plan, access licences may be granted in the water sources covered by the Plan.

The WM Act aims to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. A controlled activity approval is required from the NSW Office of Water for certain types of developments and activities that are carried out in or near a river, lake or estuary.

TfNSW is exempt from the requirements to obtain a controlled activity approval under Clause 38 of the Water Management (General) Regulation 2004.

Under clause 61 of the WM Act, a person may apply to the Minister for Water for an access licence (section 56) if the application is for a specific purpose access licence and a management plan provides that an application for the licence may be made. If extraction of water from the Murray River is required for the proposed modification, the contractor would need to apply for a specific purpose access licence.

A licence is required under section 91F of the WM Act for any aquifer interference activity (the penetration, interference, obstruction or taking of water from an aquifer). Due to the shallow depth to groundwater on the Murray River floodplain, it is likely that construction of bridge piers would penetrate the groundwater aquifer and may require dewatering of excavations and therefore an aquifer interference licence would be required.

The proposed modification includes minor changes to the design assessed in the REF for the approved project and amendments to any licence required for the project under the WM Act may be required.

4.2.9 Water Act 1912

As identified in the REF for the approved project, under section 165A of the *Water Act 1912*, the project may be classified as a controlled work for the following reasons:

- It involves earthworks and construction of the road embankment on the Murray River floodplain

- It involves other work on the Murray River floodplain
- It involves earthworks and construction of the road embankment, which are reasonably likely to affect the flow of water to or from the Murray River
- It involves other work which may affect the flow of water to or from the Murray River.

TfNSW is required to consult with the WaterNSW to determine approval requirements for the proposed modification under the Water Act.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance (MNES), the environment of Commonwealth land or are undertaken by a Commonwealth Government agency.

On 11 July 2013, the Department of the Environment determined the Echuca-Moama Bridge Crossing to be a 'controlled action' under controlling provisions s18 and s18A (threatened species and ecological communities), and therefore approval from the Australian Government is required. The Commonwealth determined the assessment approach under the EPBC Act would be through preliminary documentation.

The project was approved by the Department of Agriculture, Water and the Environment (DAWE) (formerly, Department of Environment and Energy) on 21 October 2016.

An assessment of impacts to MNES as a result of the proposed modification has been undertaken in Section 6 of this addendum REF and concluded that the proposed modification is unlikely to cause a significant impact on MNES, and therefore referral to DAWE is not required.

4.3.2 Water Act 2007

The *Water Act 2007* establishes an independent Murray-Darling Basin Authority (MDBA) with the functions and powers needed to ensure that Basin water resources are managed in an integrated and sustainable way. The MDBA oversees water planning, considering the Basin as a whole.

Clause 49 of the Water Act 2007 requires that whenever a Contracting Government or a public authority is considering any proposal which may significantly affect the flow, use, control or quality of any water in the upper River Murray and in the River Murray in South Australia, that Contracting Government must, or must ensure that the public authority shall:

- inform the Authority of the proposal; and
- provide the Authority with all necessary information and data to permit it to assess the anticipated effect of the proposal on the flow, use, control or quality of the water.

The proposed modification is unlikely to significantly impact the flow, use, control or quality of any water in the upper River Murray (see section 6.1). Therefore it is considered that there is no formal requirement to inform the MDBA of the Echuca-Moama bridge crossing. Nevertheless, TfNSW has consulted with the MDBA as outlined in section 5.1.

4.4 Confirmation of statutory position

The proposed modification is categorised as development for the purpose of road infrastructure facilities and is being carried out by or on behalf of a public authority. Under clause 94 of the ISEPP, the proposed modification is permissible without consent. The proposed modification is not State Significant Infrastructure or State Significant Development. The proposed modification can be assessed under Division 5.1 of the EP&A Act. Consent from Council is not required.

5. Consultation

Consultation with potentially affected property owners, relevant government agencies and other stakeholders has been carried out by TfNSW during the development and concept design phase of the approved project.

Consultation undertaken for the proposed modification is outlined below.

5.1 Preliminary agency consultation

The North Central Catchment Management Authority were consulted regarding the proposed modification. A letter with information about the proposed modification was also sent to the MDBA.

5.2 Infrastructure SEPP consultation

Clauses 13, 14, 15 and 16 of the ISEPP require that public authorities undertake consultation with councils and other public authorities, when proposing to carry out development without consent where impacts are likely to their infrastructure. Consideration of the consultation requirements in Clause 13 – 16 is presented in Appendix C.

No ISEPP consultation is required for the proposed modification.

5.3 Ongoing or future consultation

TfNSW will continue to consult with the community and relevant stakeholders during the construction of the project. Details of the proposed consultation activities are outlined in Section 5.7 of the REF for the approved project.

6. Environmental assessment

This section of the addendum REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposed modification. All aspects of the environment potentially affected by the proposed modification are considered. The factors specified in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* are considered in Appendix B.

Site-specific safeguards and management measures are provided to ameliorate the identified impacts, where necessary

6.1 Hydrology and flooding

6.1.1 Methodology

A hydrology assessment for the Echuca-Moama Bridge Crossing project was completed by Cardno (*Echuca-Moama Bridge EES specialist hydrology report* (Cardno, 2015)) which documents the hydrological impacts of the project and proposed mitigation. This modelling study formed the basis of the assessment of flooding contained in the REF (NSW) and EES (VIC) planning approvals documents. Further details are contained in Section 6.4 of the REF for the approved project and the technical report in Appendix G.

This study was further developed as part of the detailed design of the project, including the proposed modification. The findings of the assessment undertaken during detailed design are summarised in the following sections.

The computer software hydraulic modelling software TUFLOW was used to model the hydraulics within the study area. The modelling has used information including river cross sections, bridges, culverts and surface elevations to develop the hydraulic model, which was then used to simulate the hydrology.

The existing ground surface elevations were generated from:

- One metre DEM LiDAR dating from 2012 (DELWP)
- Two metre DEM LiDAR dating from 2017 (NSW Spatial Services)
- 1980 State Rivers Cross Section Data (GMWATER)
- 2006 Murray River Cross Section Data (GMWATER)
- Campaspe River Survey Data (Campaspe Shire)
- Corridor Feature Survey and Bathymetry Survey (MRPV)
- Echuca Levee data (Campaspe Shire)
- Moama Levee data (Campaspe Shire).

In relation to the detailed design of the project, the design criteria specify the following in relation to flood impacts:

- *The waterway at bridge and culvert structures shall be sufficient to prevent scour and limit afflux to not exceed the afflux conditions for the 100 year ARI flood event as detailed in the Echuca-Moama Bridge EES specialist hydrology report (Cardno, 2015)*
- *Where the Contractor proposes to adopt alternative hydraulic characteristics to those detailed in the above report, including the length or waterway area of any structure, the Contractor shall engage a specialist hydrologist to assess and confirm the Contractor's design. In particular, the Contractor shall*

demonstrate that its alternative design does not result in afflux greater than 50 mm, and that flow velocities, scour potential or other hydraulic characteristics are in keeping with those previously determined for any of the modelled flood events (20, 50 and 100 year ARI) as detailed in the EES.

- *The Contractor shall be responsible for gaining approval of its alternative design from the North Central Catchment Management Authority.*

Flood criteria in relation to afflux were developed in the *Detailed hydrology study for the Echuca - Moama Bridge planning study* (Cardno, 2009), and were reviewed and agreed on by the following agencies:

- North Central CMA
- MDBA
- NSW Department of Environment and Climate change
- NSW Department of Water and Energy.

6.1.2 Existing environment

The existing hydrological environment of the Murray River floodplain in the study area is consistent with the description provided in Section 6.4 of the REF for the approved project. For the purposes of this flooding study, the existing environment comprises the hydraulic conditions resulting from implementation of the approved project. Any flood changes resulting from the proposed modification has been assessed relative to these conditions and deemed to be an impact of the proposed modification (positive or negative).

6.1.3 Potential impacts

Construction

The construction impacts of the proposed modification are as described in Section 6.4.3 of the REF for the approved project. No additional construction impacts are expected to occur.

Operation

A detailed hydraulic modelling report has been completed as part of detailed design and the results summarised in this section.

Figure 6-2, Figure 6-3 and Figure 6-4 show the extent of changes in maximum flood level (or afflux) for 100, 50 and 20 year Average Recurrence Interval (ARI) events respectively. The figures show that the Murray River floodplain has the highest magnitude of afflux in the 100 year ARI event (Figure 6-2) and that the extent of afflux upstream of the flood relief structure decreases from the 100 year to the 20 year ARI event.

Figure 6-2 also shows that, compared to the approved project, the afflux is generally greater. This is due to the further constriction of the floodplain caused by the increased length of embankment. As shown in Figure 6-2, and as a result, the change in flood levels upstream of the structure has increased by between 25 and 50 millimetres. Properties impacted by flooding of between 25 and 50 millimetres are identified in Table 6-1. The predicted level of afflux is shown at key locations on the figures.

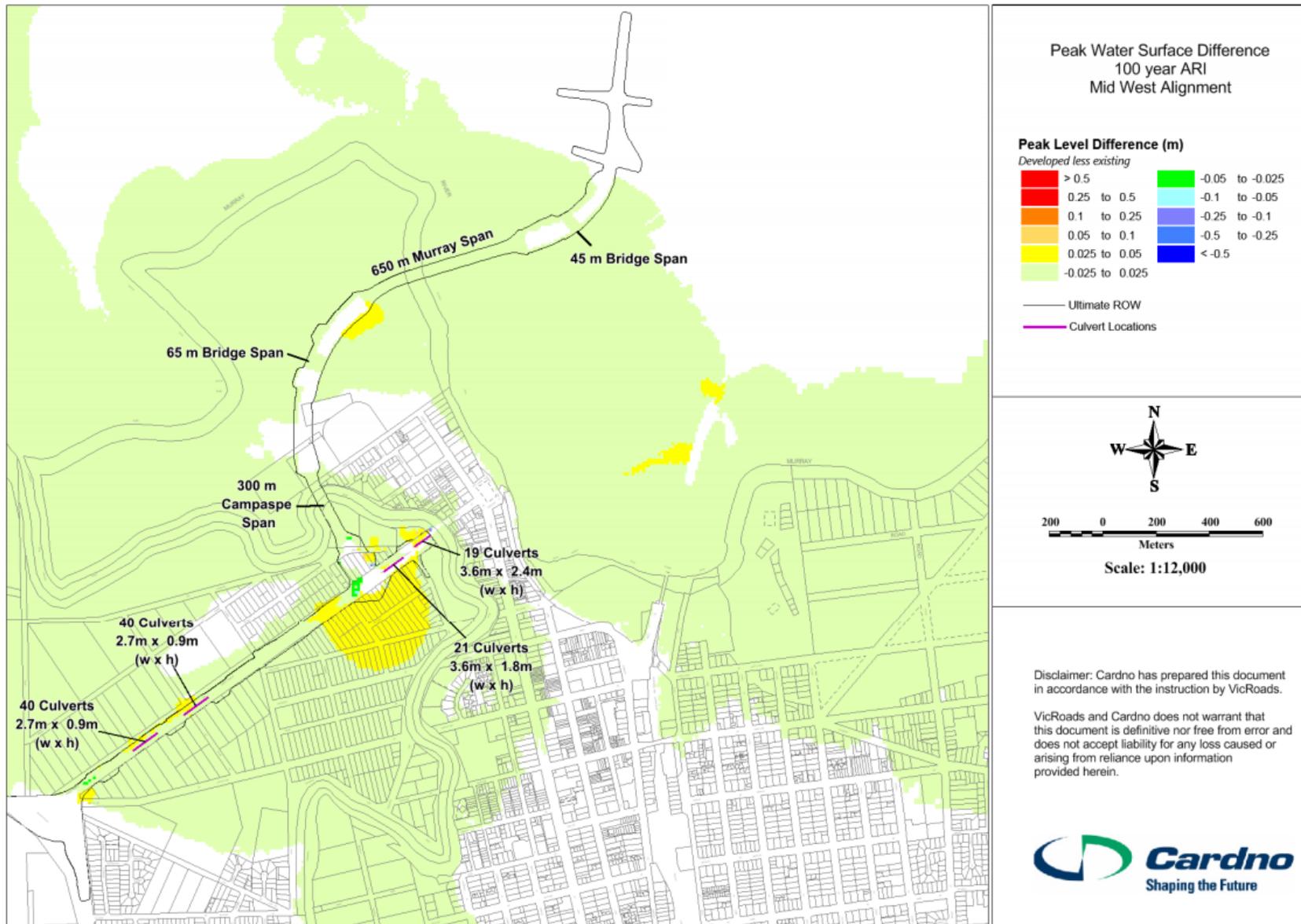
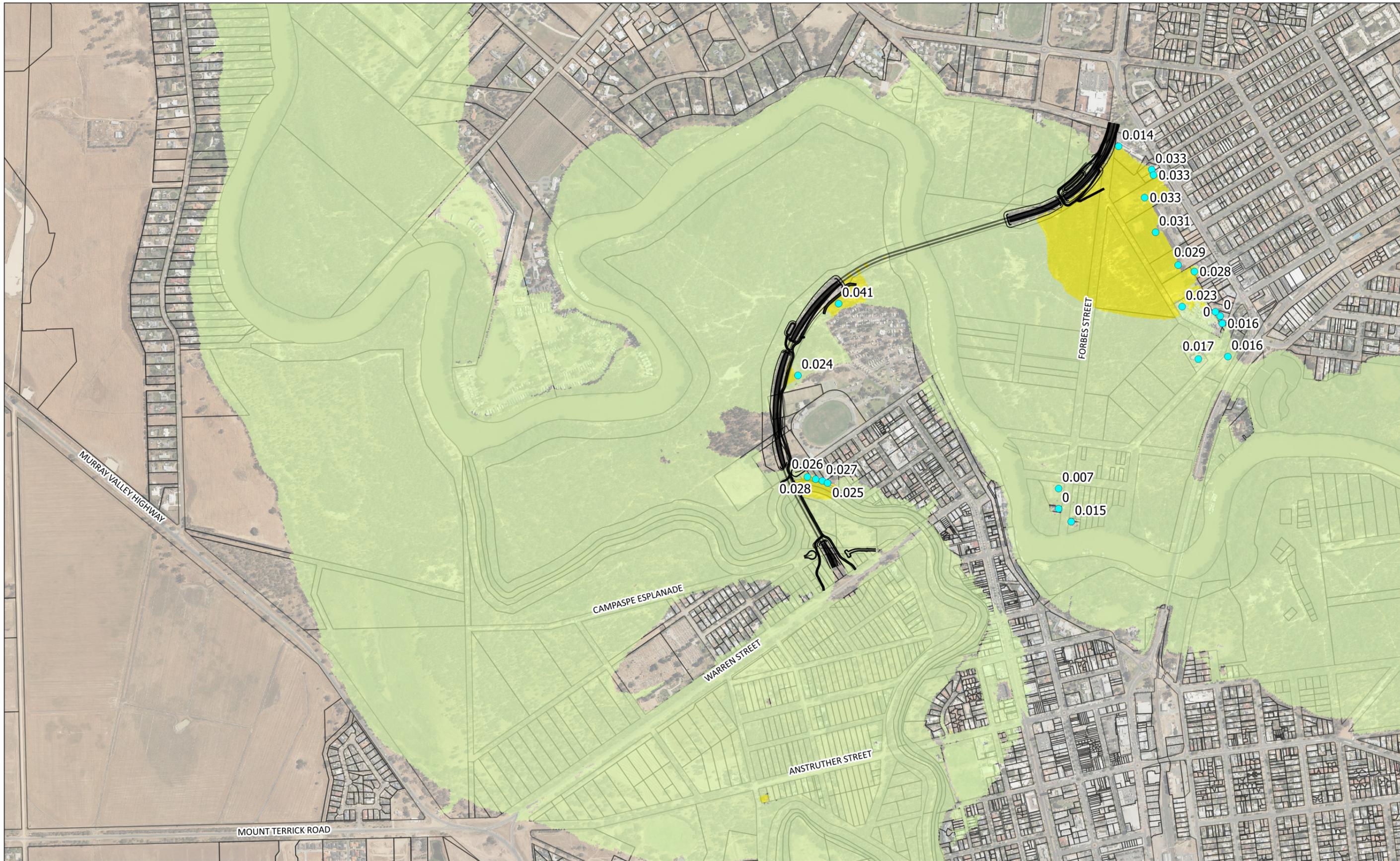


Figure 6-1 Flood afflux during 100 year ARI event (approved project)

[Source: Fig 6.27 Cardno 2015 from REF for approved project]



1:11,999.999988

0 100 200 300 m

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55



LEGEND

Peak Level Difference (m)

- | | | | |
|---|--|--|--|
| ■ <-0.5 | ■ -0.1 - -0.05 | ■ 0.025 - 0.05 | ■ 0.25 - 0.5 |
| ■ -0.5 - -0.25 | ■ -0.05 - -0.025 | ■ 0.05 - 0.1 | ■ >0.5 |
| ■ -0.25 - -0.1 | ■ -0.025 - 0.025 | ■ 0.1 - 0.25 | VM_Parcel_MGA55 |

— Proposed Alignment

● Key Locations



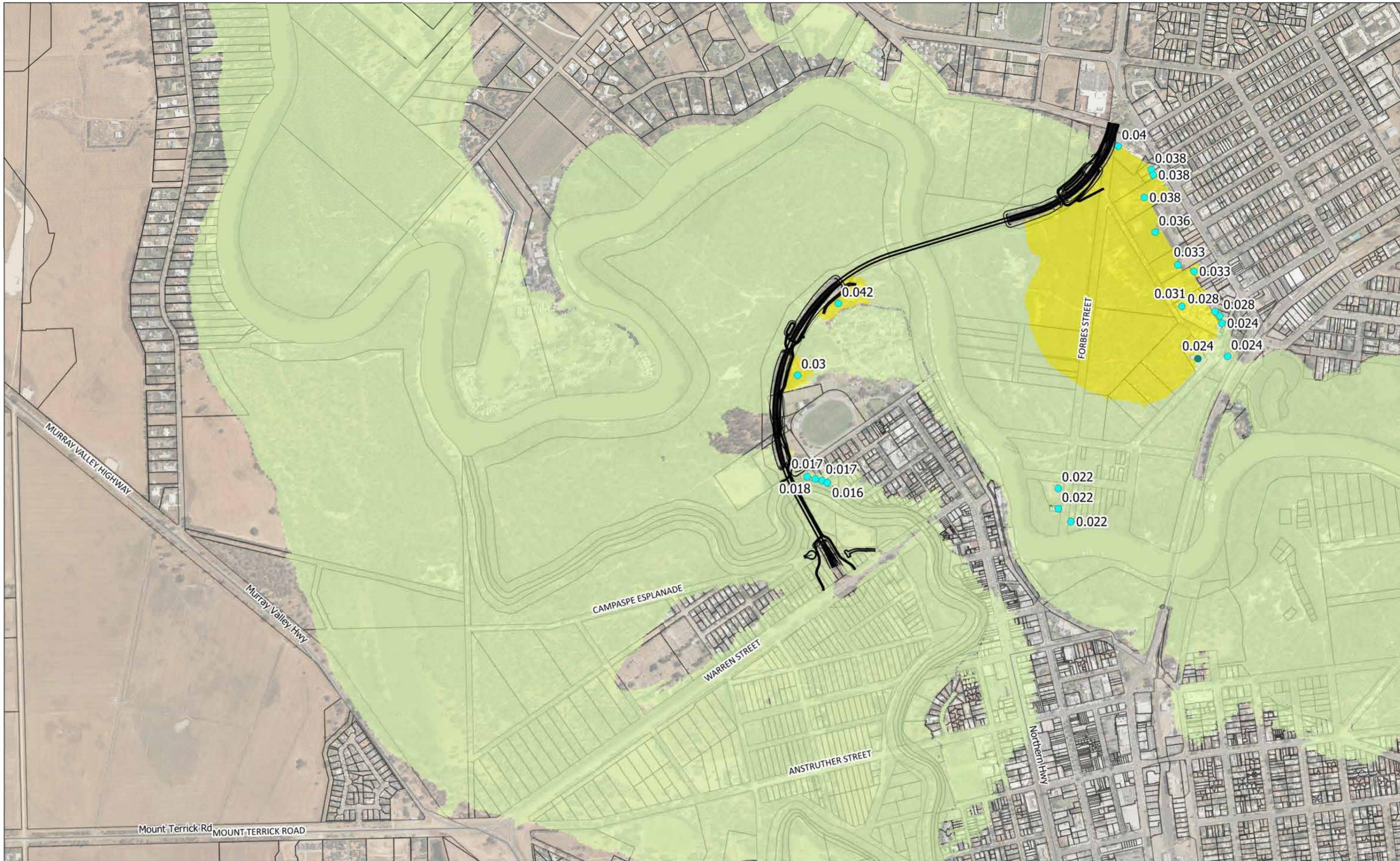
Major Road Projects Victoria
Echuca Moama Bridge Project

**Afflux (Difference in peak water level)
20 year ARI - COPP**

Job Number 12519170
Revision 0
Date 11/05/2020

FIGURE 6-2

G:\31112519170\TechSurface_waterEM_JM_v2.qgz
(c) 2016. Whilst every care has been taken to prepare this map, GHD (and DATA CUSTODIAN) make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data Custodian, Data Set Name/Title, Version/Date. Created by: TuFlowMelUser



1:11,999,999,988
 0 100 200 300 m
 Metres
 Map Projection: Universal Transverse Mercator
 Horizontal Datum: Geocentric Datum of Australia 1994
 Grid: Map Grid Of Australia, Zone 55



LEGEND
 Peak Level Difference (m)

■ <-0.5	■ -0.1 - -0.05	■ 0.025 - 0.05	■ 0.25 - 0.5	— Proposed Alignment
■ -0.5 - -0.25	■ -0.05 - -0.025	■ 0.05 - 0.1	■ >0.5	● Key Locations
■ -0.25 - -0.1	■ -0.025 - 0.025	■ 0.1 - 0.25	□ VM_Parcel_MGA55	

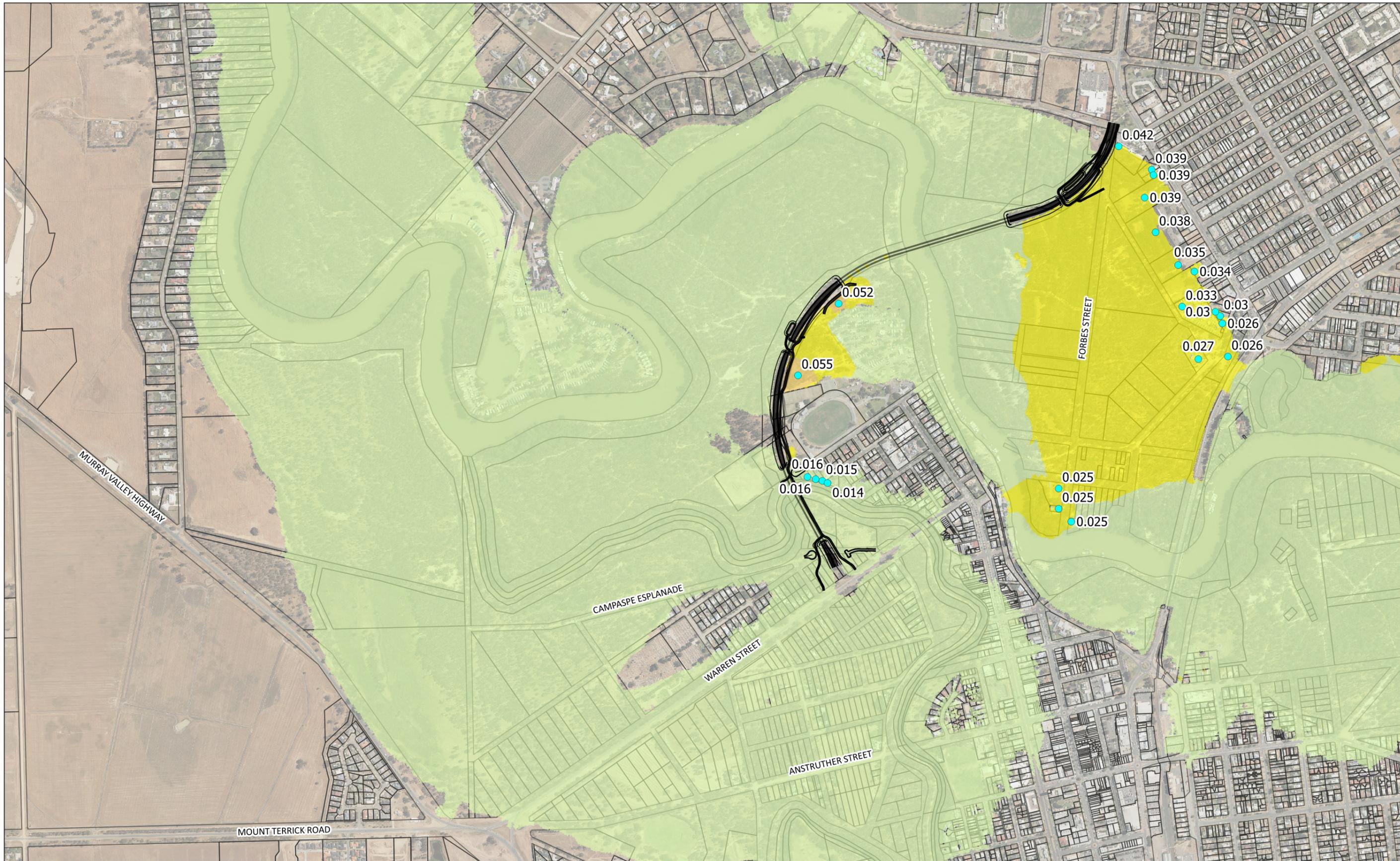


Major Road Projects Victoria
 Echuca Moama Bridge Project

**Afflux (Difference in peak water level)
 50 year ARI - COPP**

Job Number 12519170
 Revision 0
 Date 11/05/2020

FIGURE 6-3



1:11,999.999988

0 100 200 300 m

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55



LEGEND

Peak Level Difference (m)

- | | | | | |
|---|--|--|---|--|
| <-0.5 | -0.1 - -0.05 | 0.025 - 0.05 | 0.25 - 0.5 | Proposed Alignment |
| -0.5 - -0.25 | -0.05 - -0.025 | 0.05 - 0.1 | >0.5 | Key Locations |
| -0.25 - -0.1 | -0.025 - 0.025 | 0.1 - 0.25 | VM_Parcel_MGA55 | |



Major Road Projects Victoria
Echuca Moama Bridge Project

**Afflux (Difference in peak water level)
100 year ARI - COPP**

Job Number | 12519170
Revision | 0
Date | 11/05/2020

FIGURE 6-4

Table 6-1 NSW properties impacted by afflux greater than 25 mm for the 100 year ARI event

Map ID	Address	Design flood level pre-development (m AHD)	Predicted afflux (mm)
1	Madison Spa Motel Resort	95.39	42
2	72-74 Meninya Street Moama	95.39	39
3	72 Meninya Street Moama	95.39	39
4	Parcel south of 72 Meninya Street	95.39	39
5	54 Meninya Street Moama	95.39	38
6	38 Meninya Street Moama	95.4	34
7	Murray River Holiday Park	95.4	33
8	4 Blair Street Moama	95.42	28
9	6 Blair Street Moama	95.41	30
10	8 Blair Street Moama	95.41	30
11	Moama Skate Park	95.42	27
12	2 Forbes Street Moama	95.41	25
13	1-4 Forbes Street Moama	95.41	25
14	Parcel at the end of Forbes Street	95.41	25
21	42 Meninya Street Moama	95.40	40
22	4 Blair Street Moama	95.43	30

In accordance with the methods used by Cardno (2015) in the hydrological impact assessment for the REF for the approved project, floor levels at the above mentioned properties have been estimated from Google Street View to estimate flood impacts at individual properties.

As an example, the property at 74 Meninya Street, Moama, has an approximate site level of 96.25 mAHD and this building has an elevated floor level (estimated from Google Street View) of approximately 150 mm above this level. This sets the floor level at approximately 96.4 mAHD. This level is above the current flood level for the 100 year ARI event at this location of 95.39 mAHD under existing conditions (ie. No Project scenario) with a freeboard of 1.01 metres. As such, a predicted afflux of 39 mm at this property is unlikely to result in any flood impacts at this location.

No floor level survey of buildings within the floodplain have been undertaken, and as such, it is not possible to determine with a high level of certainty, the current level of protection each property in the floodplain has from the predicted flood levels in Table 6-1.

Based on the updated hydraulic assessment, and the properties identified in Table 6-1 where afflux above the approved project is predicted, the modification satisfies the project flood criteria with a predicted increase of less than 50 millimetres afflux. These results are consistent with the results of the EES for the Victorian component of the Echuca-Moama bridge crossing which show no change in flood extent and afflux to be less than 50 millimetres.

In relation to the flood planning principles of the Murray REP, it is considered unlikely that the proposed modification would significantly compromise the principles of the Murray REP. Furthermore, in accordance with relevant Victorian legislation, the project design has been approved by the North Central CMA.

Summary of impacts

Overall, flood behaviour is not significantly altered across the floodplain as a result of the proposed modification. The predicted impacts of the proposed modification meet the legislative requirements of the Flood Prone Land Policy and Murray REP, are consistent with the results of the EES for the Victorian component of the Echuca-Moama bridge crossing and have been approved by the North Central CMA. The proposed modification is expected to have minor additional flood impacts, and no impact on the beneficial uses of surface water.

6.1.4 Safeguards and mitigation measures

The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.

6.2 Biodiversity

6.2.1 Methodology

An ecological assessment was conducted as part of the REF for the approved project (Section 6.1) which included the area subject to assessment in this addendum REF. An additional desktop review was conducted to determine the impact on biodiversity from the proposed modification.

The desktop assessment included a review of information from the following databases:

- Bionet Atlas of NSW Wildlife database– licensed data for Murray River local government area (LGA). Search of all terrestrial threatened flora and fauna species (within a 10 kilometre radius of the proposed modification) (accessed 20 April 2020) (BCD 2020a)
- BCD (2020b) NSW threatened species, online profiles
- DAWE (2020a) EPBC Act PMST – for a 10 kilometre radius around the proposed modification (accessed 6 April 2020)
- DAWE (2020b) Species profile and threats database, online profiles
- DPI – priority weed declarations –Murray River Council (DPI 2020) (accessed 6 April 2020).

The Bionet Atlas and PMST search results are provided in Appendix D.

6.2.2 Existing environment

Vegetation

The REF for the approved project identified the following plant community types (PCTs) within the area of the proposed modification:

- River Red Gum (*Eucalyptus camaldulensis*) – Black Box (*Eucalyptus largiflorens*) woodland of the semi-arid (warm) climatic zone (PCTID 10)
- River Red Gum - herbaceous tall open forest of the Riverina and Murray Darling Depression Bioregions (PCTID 5).

PCTs within the area of the proposed modification are mapped in Figure 6.10 of the REF for the approved project.

Neither of these PCTs is listed as a threatened ecological community. However the REF for the approved project identifies both vegetation types as groundwater dependent ecosystems.

The ecological assessment of the REF for the approved project mapped patches of remnant native vegetation within the REF study area into 'Habitat Zones', based on the species composition and quality of vegetation within each area. Habitat Zones within the area of the proposed modification are summarised in Table 6-2 below.

Table 6-2 Description of habitat zones within the area of the proposed modification

Habitat zone (as described in the REF for the approved project)	PCT	Vegetation condition	Description
25	River Red Gum – Black Box woodland of the semi-arid (warm) climatic zone	Low	Sparse River Red Gum dominated patch of woodland with some Black Box present. Canopy sparse with moderate cover of eucalypt regrowth. Understorey disturbed to form series of tracks. Ground layer very sparse, mostly bare ground.
26	River Red Gum – Black Box woodland of the semi-arid (warm) climatic zone	Low	River Red Gum dominated patch of woodland with some Black Box present. Canopy mostly absent, rather patch distinguished by high cover of regrowth of various age cohorts. Native shrubs including Pale-fruit Ballart and Silver Wattle present. Ground layer very sparse, supporting mostly leaf litter and bare ground.
27	River Red Gum herbaceous tall open forest of the Riverina and Murray Darling Depression Bioregions	Moderate	River Red Gum dominated shallow forested wetland. Old growth River Red Gums scattered throughout. Predominantly native understorey dominated by Common Spike-sedge (<i>Eleocharis acuta</i>) with scattered rushes.
30	River Red Gum herbaceous tall open forest of the Riverina and Murray Darling Depression Bioregions	High	River Red Gum dominated shallow forested wetland. Old growth River Red Gums scattered throughout. Native understorey dominated by Common Spike-sedge and rushes, with various native wetland species including Common Nardoo (<i>Marsilea drummondii</i>), Water Ribbons (<i>Triglochin procera</i> s.l.), Ridged Water-milfoil (<i>Myriophyllum porcatum</i>) and Common Swamp Wallaby-grass (<i>Amphibromus nervosus</i>). Low weed cover and moderate eucalypt recruitment.
Total area of vegetation (ha)			0.17

[^] As per criteria in Section 6.2.2 of ecological assessment in Appendix D of the REF for the approved project.

Priority weeds

Three flora species declared as noxious under the *Noxious Weeds Act 1993* were recorded during surveys for REF for the approved project; African Boxthorn *Lycium ferocissimum*, Bridal Creeper *Asparagus asparagoides*, and Prickly Pear *Opuntia sp.*.

The *Noxious Weeds Act 1993* was replaced by the *Biosecurity Act 2015*. The three species recorded during surveys are declared priority weeds under the *Biosecurity Act 2015*. Biosecurity duties for each species in the Murray region are presented in Table 6-3 below.

Table 6-3 Description of biosecurity duties for priority weeds

Weed	Duty
African Boxthorn <i>Lycium ferocissimum</i>	Prohibition on dealings <i>Must not be imported into the State or sold</i>
Bridal Creeper <i>Asparagus asparagoides</i>	Prohibition on dealings <i>Must not be imported into the State or sold</i> *this requirement also applies to the Western Cape form of bridal creeper
Prickly Pear <i>Opuntia sp.</i>	Prohibition on dealings <i>Must not be imported into the State or sold</i> Except for <i>Opuntia ficus-indica</i> (Indian fig)

Priority weeds were recorded at a low density during surveys, however they have the potential to occur within the area of the proposed modification.

Fauna habitat

The fauna habitat within the area of the proposed modification is consistent with those present within the REF study area.

One hollow bearing tree occurs within the area of the proposed modification. Details of the hollow bearing tree within the area of the proposed modification are summarised in Table 6-4.

Table 6-4 Details of the hollow bearing tree within the area of the proposed modification.

Tree no.	Tree species	Tree hollow details
1	River Red Gum <i>Eucalyptus camaldulensis</i>	5 potential small spouts.

Refer to Figure 8.11 and Section 6.1.2 of the REF for the approved project for more detail.

Threatened species

Flora

The Bionet Atlas search identified five flora species listed as threatened and previously recorded within 10 kilometres of the area of the proposed modification. The PMST search identified an additional five species considered likely to occur within the study area due to the potential for suitable habitat to be present (refer Appendix D).

The PMST search identified one additional threatened flora species to those considered in the ecological assessment undertaken in the REF for the approved project; Mueller Daisy *Brachyscome muelleroides*. A likelihood of occurrence assessment for Mueller Daisy within the area of the proposed modification is presented in Table 6-5 below.

Table 6-5 Likelihood of occurrence for threatened flora species within the area of the proposed modification additional to those assessed in the REF for the approved project

Common name	Scientific name	Habitat description	EPBC Act listing	BC Act listing	Likelihood of occurrence within the area of the proposed modification
Mueller Daisy	<i>Brachyscome muelleroides</i>	Grows in damp areas on the margins of claypans in moist grassland with <i>Pycnosorus globosus</i> , <i>Agrostis avenacea</i> and <i>Austrodanthonia duttoniana</i> . Also recorded from the margins of lagoons in mud or water, and in association with <i>Calotis anthemoides</i> .	Vulnerable	Vulnerable	Unlikely: Species has not been previously recorded within a 10 km radius of the proposed modification area. Associated flora species are not present within vegetation types of the proposed modification area.

Targeted flora surveys for the threatened species Slender Darling-pea, Small Scurf-pea, River Swamp Wallaby-grass and Western Water-starwort were undertaken in the REF for the approved project, and did not detect any of these species.

Based on the results of the ecological assessment undertaken for the approved project and the additional desktop assessment undertaken for this addendum REF, it is considered unlikely that any threatened flora species would occur within the area of the proposed modification.

Fauna

The Bionet Atlas search identified 27 BC and/or EPBC listed fauna species previously recorded within 10 kilometres of the area of the proposed modification (refer Appendix D). The PMST search identified an additional 12 species considered likely to occur within the area of the proposed modification due to the potential for suitable habitat to be present (refer Appendix D).

Of these, a total of 16 additional threatened or migratory fauna species to those considered in the REF for the approved project have been previously recorded or are predicted to occur within the study area. A likelihood of occurrence assessment for each additional fauna species previously recorded or predicted to occur within 10 kilometres of the area of the proposed modification is presented in Table 6-7.

One threatened bat species (BC Act – vulnerable); Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*) and one mammal species Squirrel Glider (*Petaurus norfolcensis*) (BC Act – vulnerable) were recorded within the wider study area of the proposed modification during surveys for the REF for the approved project. Potential habitat for this species within the area of the proposed modification is as described for the study area in the REF for the approved project.

Refer to Section 6.1.2 of the REF for more detail.

6.2.3 Potential impacts

Construction

Native vegetation removal

Construction of the proposed modification would include the permanent removal of 0.17 ha of native vegetation including one hollow bearing tree.

For the purposes of this addendum REF, it has been assumed that all existing vegetation within the area of the proposed modification would be removed.

Table 6-6 Proposed native vegetation

Vegetation type	Vegetation condition	Area to be removed (ha)
River Red Gum - Black Box woodland	Low	0.0936
River Red Gum - herbaceous tall open forest	Moderate	0.0188
River Red Gum - herbaceous tall open forest	High	0.0576
	Total Area	0.17 ha

The PCTs to be cleared are part of a groundwater dependent ecosystem, as identified in Section 6.1.2. The impact of vegetation removal associated with the proposed modification is unlikely to be significant, given the extent of the ecosystem in the study area and locality and minimal increase in impacts as a result of the proposed modification

No threatened or endangered ecological communities, or threatened flora species are likely to be impacted by the proposed modification.

Impacts to threatened flora

Potential impacts to threatened flora species as a result of the proposed modification are consistent with the assessment of impacts provided in section 6.1.3 of the REF for the approved project.

One additional flora species was identified by the PMST within 10 kilometres of the area of the proposed modification; Mueller Daisy. This species is unlikely to occur within the area of the proposed modification (refer to Table 6-5), and therefore, is unlikely to be impacted.

Fauna habitat removal

The proposed modification would remove up to 0.17 ha of native vegetation, including one hollow-bearing tree.

Hollow-bearing trees are critical habitat components for many tree-dwelling fauna species, including arboreal mammals, microchiropteran bats and woodland birds that rely on hollows for shelter and breeding habitat. Due to the long timeframe it takes for hollows to form in eucalypts, the loss of these hollows represents a long-term reduction in habitat resources for fauna. Details on numbers and sizes of hollows that may be removed within the area of the proposed modification are provided in Table 6-4.

Shrub layers and leaf litter would also be removed within the area of the proposed modification as a result of construction works. This would result in the loss of habitat for small woodland birds that rely on these resources for foraging and breeding. In addition, loss of leaf litter would remove habitat for small reptiles and gastropods that rely on this feature for shelter, breeding and foraging.

There would be no additional impact on wetland or aquatic habitats due to the proposed modification (refer to Figure 6.13 of the REF for the approved project).

Other potential impacts on fauna species are consistent with those described in Section 6.1.3 of the REF for the approved project.

Impacts to threatened fauna

The REF for the approved project identified that the project would be likely to affect 11 bird species and three mammal species listed as vulnerable or endangered under the BC Act (formerly listed under the TSC Act), and seven bird species and one mammal species listed as endangered, vulnerable or migratory under the EPBC Act.

Impacts to threatened species listed under the BC and EPBC Act as a result of the proposed modification are consistent with those described in Section 6.1.3 of the REF for the approved project. The small increase in the removal of potential habitat for these species is considered unlikely to change the assessment of significance of impact on these species given the following:

- A number of the species were considered unlikely to make significant use of the habitat in the study area in NSW
- The mobility of the species assessed
- Implementation of recommended mitigation measures including replacement of woody debris, reuse of hollow-bearing trees at strategic locations, strategic placement of rope bridges at two locations, placement of nest boxes and strategic revegetation
- The proposed modification being unlikely to significantly fragment habitat for these species.

An additional 16 fauna species threatened or migratory fauna species listed under the EPBC Act and/or the BC Act have been previously recorded or have potential to occur within 10 kilometres of the proposed modification area based on the updated desktop assessment (refer Section 6.2.2). Potential impacts on these species as a result of the proposed modification have been assessed in Table 6-7 below.

Table 6-7 Likelihood of occurrence and impact for listed fauna species to occur within the area of the proposed modification additional to those considered in the REF for the approved project

Common name	Scientific name	Habitat description	EPBC Act listing	BC Act listing	Likelihood of occurrence within the area of the proposed modification / Impact
Common Sandpiper	<i>Actitis hypoleucos</i>	Found along the Australian coastline, and areas inland. When in Australia, the species is concentrated in Northern and Western Australia (Bakers et al, 1984). Habitat includes coastal and inland wetlands, with varying levels of salinity. Mostly found on muddy margins or rocky shores of mudflats. These margins are often narrow and steep.	Mi		<p>Moderate: The proposed modification area represents marginal habitat for wetland birds. This species may occur as an occasional visitor to the proposed modification area, and wider study area. It may utilise resources in the riparian zone within the proposed modification area and study area</p> <p>Unlikely: The species is unlikely to be dependent on habitat to be impacted by the proposed modification. As the impact area is small, this species is considered sufficiently mobile to traverse the study area to other areas of suitable habitat.</p>
Little Eagle	<i>Hieraaetus morphnoides</i>	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.		V	<p>Moderate: This species is known to occupy riparian woodlands, and is likely to occur in the study area and occasionally within the proposed modification area</p> <p>Unlikely: Vegetation impacts caused by the proposed modification are unlikely to impact this species as it is considered sufficiently mobile, and able to traverse the study area to undisturbed areas.</p>
Brolga	<i>Grus rubicunda</i>	The Brolga was formerly found across Australia, except for the south-east corner, Tasmania and the south-western third of the country. It is still abundant in the northern tropics, but very sparse across the southern part of its range. Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow		V	<p>Likely: This species has been previously recorded within the study area. Suitable habitat is present within and the species may occasionally occur within the proposed modification area.</p>

Common name	Scientific name	Habitat description	EPBC Act listing	BC Act listing	Likelihood of occurrence within the area of the proposed modification / Impact
		swamps. They feed primarily on sedge roots and tuber but will also take large insects, crustaceans, molluscs and frogs. The nest comprises a platform of grasses and sticks, augmented with mud, on an island or in the water. Two eggs are laid from winter to autumn.			Unlikely: The species is unlikely to be dependent on habitat to be impacted by the proposed modification. As the impact area is small, this species is considered sufficiently mobile to traverse the study area to other areas of suitable habitat.
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	When in Australia, this species is distributed widespread along the coast. The species prefers habitat with muddy edges of fresh or brackish water. Forage in saltmarsh, grass or sedges. Also in sewage ponds and hypersaline environments. They are widespread in most regions of New South Wales (NSW) and Victoria, especially in coastal areas, but they are sparse in the south-central Western Plain and east Lower Western Regions of NSW, and north-east and north-central Victoria. In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, salt pans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgeland and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. They may be attracted to mats of algae and water weed either floating or washed up around terrestrial wetlands, and coastal areas with much beachcast seaweed. Sometimes they occur on rocky shores and rarely on exposed reefs"	Mi		Moderate: The proposed modification area represents marginal habitat for wetland birds. This species may occur as an occasional visitor to the proposed modification area, and wider study area. It may utilise resources in the riparian zone within the proposed modification area and study area Unlikely: The species is unlikely to be dependent on habitat to be impacted by the proposed modification. As the impact area is small, this species is considered sufficiently mobile to traverse the study area to other areas of suitable habitat.
Curlew Sandpiper	<i>Calidris ferruginea</i>	The Curlew Sandpiper is distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-	CE	E	Moderate: The proposed modification area represents marginal habitat for wetland birds. This species may occur as an occasional visitor

Common name	Scientific name	Habitat description	EPBC Act listing	BC Act listing	Likelihood of occurrence within the area of the proposed modification / Impact
		Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. The Curlew Sandpiper breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.			to the proposed modification area, and wider study area. It may utilise resources in the riparian zone within the proposed modification area and study area Unlikely: The species is unlikely to be dependent on habitat to be impacted by the proposed modification. As the impact area is small, this species is considered sufficiently mobile to traverse the study area to other areas of suitable habitat.
Pectoral Sandpiper	<i>Calidris melanotos</i>	The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands (Higgins & Davies 1996).	Mi		Moderate: The proposed modification area represents marginal habitat for wetland birds. This species may occur as an occasional visitor to the proposed modification area, and wider study area. It may utilise resources in the riparian zone within the proposed modification area and study area Unlikely: The species is unlikely to be dependent on habitat to be impacted by the proposed modification. As the impact area is small, this species is considered sufficiently mobile to traverse the study area to other areas of suitable habitat.
Little Lorikeet	<i>Glossopsitta pusilla</i>	The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs.		V	Likely: This species has been previously recorded within the locality, and suitable open woodland habitat is available in the study area. This species may be an occasional visitor to the proposed modification area. Unlikely: While this species may utilise the proposed modification area for foraging at

Common name	Scientific name	Habitat description	EPBC Act listing	BC Act listing	Likelihood of occurrence within the area of the proposed modification / Impact
		Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species."			times, the species is unlikely to be dependent on habitat to be impacted by the proposal site. As the impact area is small, this species is considered sufficiently mobile to traverse the study area to other areas of suitable habitat.
Painted Honeyeater	<i>Grantiella picta</i>	Nomadic, occurring in low densities across most of NSW. Highest concentrations and almost all breeding occur on inland slopes of the Great Dividing Range. Inhabits Boree, Brigalow and Box Gum woodlands and Box-Ironbark forests. Specialist forager on the fruits of mistletoes, preferably of the Amyema genus. Nests in outer tree canopy. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema."	V	V	Low: This species has not been previously recorded and preferred habitat is not present within the study area. Unlikely: This species is unlikely to occur within the study area, and therefore is unlikely to be impacted by the proposed modification.
Eastern Curlew	<i>Numenius madagascariensis</i>	The Curlew is a migratory bird that travels from Australia to Russia. In Australia it is primarily coastal, residing in estuaries, bays, harbours, inlets and coastal lagoons. Forages on crabs and molluscs on mudflats (Marchant and Higgins, 1993).	CE		Moderate: The proposed modification area represents marginal habitat for wetland birds. This species may occur as an occasional visitor to the proposed modification area, and wider study area. It may utilise resources in the riparian zone within the proposed modification area and study area Unlikely: The species is unlikely to be dependent on habitat to be impacted by the proposed modification. As the impact area is small, this species is considered sufficiently mobile to traverse the study area to other areas of suitable habitat.
Osprey	<i>Pandion haliaetus</i>	The distribution of the species around the northern coast (south-western Western Australia to south-eastern NSW) appears continuous except for a possible gap at Eighty Mile Beach. Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia	Mi		Moderate: The proposed modification area represents marginal habitat for wetland birds. This species may occur as an occasional visitor to the proposed modification area, and wider

Common name	Scientific name	Habitat description	EPBC Act listing	BC Act listing	Likelihood of occurrence within the area of the proposed modification / Impact
		and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging. They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes. Eastern Ospreys occur sympatrically and sometimes interact with White-bellied Sea-Eagles.			study area. It may utilise resources in the riparian zone within the proposed modification area and study area Unlikely: The species is unlikely to be dependent on habitat to be impacted by the proposed modification. As the impact area is small, this species is considered sufficiently mobile to traverse the study area to other areas of suitable habitat.
Scarlet Robin	<i>Petroica boodang</i>	The Scarlet Robin is found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps."		V	Low: This species has been previously recorded within the wider study area, however, vegetation within the proposed modification area is not consistent with the preferred habitat type for this species. Unlikely: This species is unlikely to occur within the study area, and therefore is unlikely to be impacted by the proposed modification.
Flame Robin	<i>Petroica phoenicea</i>	The Flame Robin is endemic to south eastern Australia, and ranges from near the Queensland border to south east South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense."		V	Low: This species has been previously recorded within the wider study area, however, vegetation within the proposed modification area is not consistent with the preferred habitat type for this species. Unlikely: This species is unlikely to occur within the study area, and therefore is unlikely to be impacted by the proposed modification.

Common name	Scientific name	Habitat description	EPBC Act listing	BC Act listing	Likelihood of occurrence within the area of the proposed modification / Impact
Night Parrot	<i>Pezoporus occidentalis</i>	Thought to be extinct but recently found again in Queensland, the Night Parrot is a highly elusive nocturnal ground dwelling parrot found in the arid and semi-arid zones of Australia; it is one of only three ground-dwelling parrots in Australia. The Night Parrot is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans. Suitable habitat is characterized by the presence of large and dense clumps of Spinifex, and it may prefer mature spinifex that is long and unburnt.	E	Presumed extinct	Low: This species is thought to be extinct in NSW and there are no previous records within 10 km of the proposed modification area. Preferred habitat is marginal within the study area. Unlikely: This species is unlikely to occur within the study area, and therefore is unlikely to be impacted by the proposed modification.
Greenshank	<i>Tringa nebularia</i>	This species has the widest national distribution than any other shorebird in Australia, as it occurs inland and on the coast throughout all states in Australia. The typical habitat for the common greenshank includes inland wetlands and sheltered coastal habitats. Coastal habitats with mudflats and saltmarsh, mangroves, or seagrass is favoured.	Mi		Moderate: The proposed modification area represents marginal habitat for wetland birds. This species may occur as an occasional visitor to the proposed modification area, and wider study area. It may utilise resources in the riparian zone within the proposed modification area and study area Unlikely: The species is unlikely to be dependent on habitat to be impacted by the proposed modification. As the impact area is small, this species is considered sufficiently mobile to traverse the study area to other areas of suitable habitat.
Sloane's Froglet	<i>Crinia sloanei</i>	Sloane's Froglet has been recorded from widely scattered sites in the floodplains of the Murray-Darling Basin, with the majority of records in the Darling Riverine Plains, NSW South Western Slopes and Riverina bioregions in New South Wales. It has not been recorded recently in the northern part of its range and has only been recorded infrequently in the southern part of its range in NSW. At a number of sites where records are verified by museum specimens, the species has not been subsequently detected during more recent frog surveys in the vicinity (e.g. Holbrook, Nyngan, Wagga Wagga and	E	V	Moderate: This species has been previously recorded within 10 km of the proposed modification area and preferred habitat is present in wider study area. Unlikely: no wetland features are present within the proposed modification area. Indirect impacts on this species could potentially occur as a result of sedimentation impacts, however

Common name	Scientific name	Habitat description	EPBC Act listing	BC Act listing	Likelihood of occurrence within the area of the proposed modification / Impact
		Tocumwal). The low number of sites, low number of recorded individuals per site, and the low proportion of records of this species in regional surveys all indicate that a moderately low number of mature individuals exist. The apparent loss from previous recorded sites and decline in recording rates indicates that this is not just a rare or uncommonly encountered species, but that there has been a reduction in population size and range. It is typically associated with periodically inundated areas in grassland, woodland and disturbed habitats."			impacts would be managed in accordance with sediment control and hygiene measures identified in Table 7-1.
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	Roosts in camps within 20km of a regular food source, typically in gullies, close to water and in vegetation with a dense canopy. Forages in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths, swamps and street trees, particularly in eucalypts, melaleucas and banksias. Highly mobile with movements largely determined by food availability (Eby & Law, 2008). Will also forage in urban gardens and cultivated fruit crops.	V	V	Moderate: Potential habitat is available, however there are no previous records of this species within 10 km of the proposed modification area. While they may be seen flying over the locality at times, it is unlikely that this species relies on the poor quality habitat within the proposed modification area. Unlikely: This species is unlikely to occur within the study area, and therefore is unlikely to be impacted by the proposed modification

Key: CE (Critically Endangered), E (Endangered), V (Vulnerable), Mi (Migratory)

Conclusion on significance of impacts

The proposed modification would remove 0.17 hectares of native vegetation and fauna habitat, including the removal of one hollow bearing tree. The removal of 0.17 hectares of habitat is unlikely to have a significant impact on any threatened species or ecological community.

The cumulative impact from the approved project and the proposed modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the BC Act or FM Act and therefore a Species Impact Statement is not required.

The cumulative impact from the approved project and the proposed modification is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act.

6.2.4 Safeguards and management measures

The impacts of the proposed modification would be managed through implementation of the safeguards and management measures described in Table 7-1 of this addendum REF.

6.3 Aboriginal heritage

6.3.1 Methodology

Assessments undertaken as part of the Echuca-Moama Bridge (NSW) addendum REF (November 2019) by Heritage Insight (2019) as well as subsequent statutory consultation and a cultural heritage assessment report completed by Kelleher Nightingale Consulting (2019) assessed the area required for the proposed modification (refer to Section 3.6 of the Echuca-Moama Bridge (NSW) addendum REF (November 2019)).

A preliminary archaeological assessment was undertaken by TfNSW in 2020 for the proposed modification, in accordance with Stage 1 of the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI)(TfNSW, 6 March 2020). A copy of the preliminary assessment results is provided in Appendix E.

6.3.2 Existing environment

The area required for the proposed modification is privately-owned land covered by regrowth vegetation. The existing environment in relation to Aboriginal cultural heritage is consistent with Section 6.7 of the REF for the approved project and Section 3.6 of the Echuca-Moama Bridge (NSW) addendum REF (November 2019).

6.3.3 Potential impacts

The preliminary archaeological assessment (Appendix E) determined the proposed modification is unlikely to have a significant impact on Aboriginal cultural heritage based on the following (due diligence) considerations:

- The project is unlikely to harm known Aboriginal objects or places
- The AHIMS search indicated Aboriginal objects adjacent to the study area, however they are well outside the proposed modification area and mitigation measures outlined in Section 7 would be implemented

- The study area contains landscape features that indicate the presence of Aboriginal objects, based on the *Due Diligence Code of Practice for the Protection of Aboriginal objects in NSW* and the Roads and Maritime Services' procedure, but the cultural heritage potential of the study area appears to be reduced due to past disturbance
- There is an absence of sandstone rock outcrops likely to contain Aboriginal art.

Subsequently, no further assessment, investigation, or consultation is required in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (OEH, 2010), or *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010).

6.3.4 Safeguards and management measures

The mitigation measures outlined in the Echuca-Moama Bridge Crossing Submission Report (29 April 2016) are applicable to this proposed modification. No additional or revised mitigation measures are required.

6.4 Other impacts

For the remaining environmental factors where the potential impact of the proposed modification was considered to be minor, an assessment was conducted and the results summarised in Table 6-8. These remaining issues comprise:

- Non-Aboriginal heritage
- Landscape and visual amenity
- Soil and water
- Traffic and access
- Air quality
- Land use and property
- Socio-economic
- Waste management
- Hazards and risks
- Greenhouse gas and climate change.

Safeguards and management measures identified as part of the approved project as well as any additional measures identified to address the potential impacts of the proposed modification are detailed in Chapter 7.

Table 6-8 Other environmental impacts

Environmental factor	Existing environment	Potential impacts
Non-Aboriginal heritage	<p>The non-Aboriginal heritage located in the area surrounding the proposed modification area is described in detail in section 6.8 of the REF for the approved project.</p> <p>Heritage sites within the study area are shown in Figure 6.42 and described in Table 6.27 of the REF for the approved project. As reported, no evidence of any historic cultural remains was observed in the study area.</p> <p>No known heritage sites are located within the proposed modification area.</p>	<p>Construction</p> <p>As there are no known heritage sites within the area of the proposed modification. There are no impacts anticipated as a result of construction.</p> <p>Operation</p> <p>There are no expected impacts during operation.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Landscape and visual amenity	<p>A landscape and visual impact assessment was completed by SPIIRE (2015) for the REF for the approved project. The assessment considered two landscape character zones. The proposed modification is located in the 'River Floodplain' character zone. The REF for the approved project describes the river floodplain character zone as follows:</p> <p><i>The 'River Floodplain' landscape character type occurs in the low lying area between Moama and the Murray River. The landscape character of this area is defined by the presence of remnant trees and understorey vegetation across the flat of low floodplain landform. The density of trees and understorey vegetation varies from relatively dense areas to quite open areas.</i></p> <p><i>The existence of substantial areas of remnant floodplain vegetation throughout this character type results in a substantial contribution to a 'sense of place' for both Moama and Echuca. Both the accessible and inaccessible areas of this character type provide users and viewers with an improved urban amenity through the provision of wild spaces.</i></p>	<p>Construction</p> <p>Construction of the proposed modification would involve the removal of 0.17 ha of native vegetation from the River Floodplain character zone. This vegetation contributes to the amenity and character of the local area.</p> <p>Operation</p> <p>The proposed modification involves the removal of vegetation and extension of the earth embankment within the River Floodplain character zone, which would result in a change to the scenic quality and visual character of the floodplain. The vegetation removal would not increase the width of vegetation removed on the floodplain (115 m as outlined In Section 6.3 of the REF for the approved project), and therefore visual impacts of the proposed modification would not significantly differ to those outlined in the approved project.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

Environmental factor	Existing environment	Potential impacts
Soils, water quality and groundwater	The proposed modification is located on the Murray River floodplain topographic zone. The existing environment is consistent with that described in Section 6.3 of the REF for the approved project.	<p>Construction</p> <p>There would be a minor increase in the area of exposed surface and earthworks movement required for the proposed modification.</p> <p>The extension of the bridge embankments would temporarily increase the risk of soil erosion and water quality impacts from site runoff. However implementation of the sediment and erosion controls for the approved project is likely to be adequate to manage any impacts of the proposed modification.</p> <p>The removal of a single pier would also reduce the interaction with and the potential impact to groundwater.</p> <p>Operation</p> <p>There are no expected impacts during operation.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Traffic and access	Details of the existing road network, public transport, traffic volumes, level of service and crash history for the project is provided in Section 6.11 of the REF for the approved project.	<p>Construction</p> <p>No additional traffic or access impacts are expected as a result of the proposed modification.</p> <p>Operation</p> <p>There are no additional impacts as a result of the proposed modification expected during operation.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

Environmental factor	Existing environment	Potential impacts
Air quality	The existing environment of the study is described in detail in Section 6.12 of the REF for the approved project.	<p>Construction</p> <p>Construction activities associated with adjustment to the earth embankments have the potential to result in a minor increase in air quality impacts. However, given the distance to the nearest sensitive receiver, it is not expected to result in a noticeable impact.</p> <p>Operation</p> <p>There are no expected impacts during operation.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Land use and property	A planning and land use impact assessment (GHD, 2015), social impact assessment (AECOM, 2015) and economic impact assessment (Essential Economics, 2015) are summarised in Section 6.9 of the REF for the approved project.	<p>Construction</p> <p>An additional 0.17 ha of private land on the Murray River floodplain would be acquired for the proposed modification. Details of the proposed property acquisition are provided in Table 3-1 of this addendum REF. Potential impacts of the proposed land acquisition, infrastructure land uses, amenity and access, and disruption to recreation, community and tourism uses are consistent with the assessment provided in Section 6.9 of the REF for the approved project.</p> <p>All property valuations and acquisitions would be carried out in accordance with the Roads and Maritime Land acquisition information guide (2014) and the <i>Land Acquisition (Just Terms Compensation) Act 1991</i>.</p> <p>Operation</p> <p>Refer to Table 6-1 which indicates potential flooding impacts to properties in a 100 year ARI event of between -25-+25 millimetres compared to the approved project.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

Environmental factor	Existing environment	Potential impacts
Socio-economic	<p>The existing environment is described in detail in section 6.10 of the REF for the approved project.</p>	<p>Construction</p> <p>During construction, the potential socio-economic impacts associated with the proposed modification are consistent with those described in the REF for the approved project and submissions report.</p> <p>Rehabilitation works are to commence as soon as practicable after works are completed in any area.</p> <p>Operation</p> <p>No additional impacts are anticipated during operation.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Waste management	<p>TfNSW is committed to ensuring responsible management of unavoidable waste and to promoting the reuse of such waste through appropriate measures in accordance with the resource management hierarchy principles embodied in the <i>Waste Avoidance and Resource Recovery Act 2001</i>. The resource management hierarchy principles in order of priority as outlined in the <i>Waste Avoidance and Resource Recovery Act 2001</i> are:</p> <ul style="list-style-type: none"> • Avoidance of unnecessary resource consumption • Resource recovery (including reuse, reprocessing, recycling and energy recovery) • Disposal. <p>By adopting these principles, TfNSW encourages the most efficient use of resources and reduces cost and environmental harm in accordance with the principles of ecologically sustainable development.</p>	<p>Construction</p> <p>The proposed modification will reduce the length of the Murray River bridge deck by one span, avoiding the use of unnecessary resources and reducing the amount of construction materials to that described in the REF for the approved project. However, the project will still require the use of a number of resources and the generation of a range of waste streams. The impacts and requirements of the proposed modification would be consistent with those stated in section 6.13 of the REF for the approved project.</p> <p>Operation</p> <p>No impacts are anticipated during operation.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

Environmental factor	Existing environment	Potential impacts
Hazards and risks	The existing hazards and risks in the study area are generally associated with operation of the existing road network. Congestion of the local road network has the potential to cause accidents.	<p>Construction</p> <p>No impacts are anticipated for construction of the proposed modification. Refer to the assessment in Section 6.14 of the REF for the approved project.</p> <p>Operation</p> <p>No impacts are anticipated during operation.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Climate change and greenhouse gas	A summary of the existing environment and context is included in Section 6.15.2 of the REF for the approved project.	<p>Construction</p> <p>No impacts are anticipated during construction of the proposed modification as the construction duration would be unchanged. Refer to the assessment in Section 6.15.3 of the REF for the approved project.</p> <p>Operation</p> <p>No impacts are anticipated during operation.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

6.5 Cumulative impacts

Cumulative impacts have the potential to arise from the interaction of individual elements within the project and the additive effects of other projects, including external projects. TfNSW is required under Clause 228 (2) of the EP&A Act, to take into account potential cumulative impacts as a result of the proposed modification.

The modification would increase the extent of vegetation clearing in the locality by 0.17 hectares.

In addition, based on the updated hydraulic assessment compared to the approved project, the afflux for the modification is generally greater. This is due to the further constriction of the floodplain caused by the increased length of embankment. As a result, the change in flood levels upstream of the structure has increased by between 25 and 50 millimetres.

Given the small area of the modification, and large areas of native vegetation present in the locality, cumulative impacts on biodiversity of the modification are expected to be negligible overall.

Based on the updated hydraulic assessment, the identified properties in Table 6-1 where afflux above the approved project is predicted still meet the project flood criteria of an increase of less than 50 millimetres afflux (refer section 6.1.1).

7. Environmental management

7.1 Environmental management plans

A number of safeguards and management measures have been identified to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposed modification. Should the proposed modification proceed, these safeguards and management measures would be incorporated into the Construction Environmental Management Plan (CEMP) and implemented during construction.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures for the Echuca-Moama Bridge Crossing are summarised in Table 7-1. There are no additional safeguards and management measures identified in this addendum REF. The safeguards and management measures will be incorporated into the detailed design phase of the proposed modification, and the CEMP and implemented during construction and operation of the proposed modification, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding

Table 7-1 Summary of safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
1	General	<ul style="list-style-type: none"> All environmental safeguards must be incorporated within the following: <ul style="list-style-type: none"> Detailed design stage Contract specifications for the proposed modification Construction Environmental Management Plan. 	Project manager	Pre-construction	REF for the approved project
2	General	<ul style="list-style-type: none"> A risk assessment must be carried out in accordance with the Roads and Maritime Project Pack and Roads and Maritime risk assessment procedures to determine an audit and inspection program for the works. The recommendations of the risk assessment are to be implemented A review of the risk assessment must be undertaken after the initial audit or inspection to evaluate is the level of risk chosen for the project is appropriate Any works resulting from the proposed modification and as covered by the REF may be subject to environmental audit(s) and/or inspection(s) at any time during their duration. 	Project manager and regional environmental staff	Pre-construction After first audit	REF for the approved project
3	General	<ul style="list-style-type: none"> The environmental contract specifications Roads and Maritime QA Specification G36 'Environmental Protection (Management System)', Roads and Maritime QA Specification G38 'Soil and Water Management (Soil and Water Plan)' and Roads and Maritime QA Specification G40 'Clearing and Grubbing' must be forwarded to the Roads and Maritime Environmental Manager for review and approval at least 10 working days prior to the tender stage A contractual hold point must be maintained until the CEMP is reviewed and approved by the Roads and Maritime Environmental Manager. 	Project manager	Pre-construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
4	General	<ul style="list-style-type: none"> The Roads and Maritime Project Manager must notify the Roads and Maritime Environmental Officer [South West Region] at least 5 days prior to work commencing. 	Project manager	Pre-construction	REF for the approved project
5	General	<ul style="list-style-type: none"> All businesses and residences likely to be affected by the proposed works must be notified at least 5 working days prior to the commencement of the proposed activities. 	Project manager	Pre-construction	REF for the approved project
6	General	<ul style="list-style-type: none"> Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors. 	Contractor	Pre-construction and during construction as required.	REF for the approved project
7	Terrestrial ecology – loss of native vegetation habitat	<ul style="list-style-type: none"> A detailed biodiversity management plan will be prepared as part of the Construction Environmental Management Plan (CEMP) to minimise the ecological impacts of the proposed modification The biodiversity management plan will include post-construction monitoring for threatened species for two consecutive years. This will include monitoring of Squirrel Gliders during autumn for two consecutive years The pre-clearing process detailed in RTA (2011b) – ‘Biodiversity Guidelines Guide 1: Pre-clearing process’ will be implemented before commencement of the works An exclusion zone plan will be implemented in line with RTA (2011b) – ‘Biodiversity Guidelines Guide 2: Exclusion zones’ Detailed design will seek to minimise loss of native vegetation while still meeting operational objectives for road safety, design and water quality basin operation The limits of the project will be defined by survey before clearing and grubbing. 	Project manager and contractor	Pre-construction	REF for the approved project
	Terrestrial ecology – loss of native vegetation habitat	<ul style="list-style-type: none"> No removal or disturbance of vegetation would occur in areas marked as ‘Exclusion Zone’. Refer to Figure 3.7-16 and Figure 3.7-17 in the Addendum REF for these exclusion zones areas. Pruning is to be conducted in accordance with Australian Standard 4373 (2007) ‘Pruning of Amenity Trees’ and RTA (2011) – ‘Biodiversity Guidelines Guide 4: Clearing of Vegetation and Removal of Bushrock’. 	Project manager and contractor	Construction	Addendum REF (2019)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
8	Terrestrial ecology – loss of native vegetation habitat	<ul style="list-style-type: none"> A biodiversity offset strategy will be developed and implemented to compensate for the biodiversity impacts of the proposed modification consistent with the Roads and Maritime Offset Guide (Nov 2011) and the Department of Primary Industries policy and guidelines for fish habitat conservation and management (update 2013). Vegetation survey and condition assessment datasheets will be provided to OEH. 	TfNSW	Pre-construction	REF for the approved project
9	Terrestrial ecology – loss of mature trees, including hollow bearing trees	<ul style="list-style-type: none"> A nest box strategy will be developed in line with RTA (2011b) – ‘Biodiversity Guidelines Guide 8: Nest boxes’ to compensate for removal of hollow-bearing trees Nest boxes will be constructed according to specifications provided in the OEH submission to the REF Nest boxes will be placed in areas where few current suitable den trees exist but where other habitat components (connectivity and foraging) are of good quality Large and hollow-bearing trees to be retained will be defined by survey before clearing and protected by physical barrier or fence. 	Project manager and contractor	Pre-construction	REF for the approved project
10	Terrestrial ecology – loss of habitat connectivity	<ul style="list-style-type: none"> Detailed design will seek to avoid large and hollow-bearing trees and maintain canopy cover adjacent to the road as much as possible for Squirrel Gliders to cross the site Squirrel Glider crossing zones will be established (see Figure 3.9 of the REF for the approved project) Squirrel Glider crossings will have the design considerations detailed in the Squirrel Glider habitat linkage strategy (Brett Lane & Associates 2015b) Detailed design and placement of the crossings will be developed and approved by an expert in Squirrel Glider ecology. 	Project manager and contractor	Pre-construction	REF for the approved project
11	Terrestrial ecology – weed spread and establishment	<ul style="list-style-type: none"> A weed management plan will be prepared in line with RTA (2011b) – ‘Biodiversity Guidelines Guide 6: Weed management’. 	Project manager and contractor	Pre-construction	REF for the approved project
12	Terrestrial ecology –spread of pathogens	<ul style="list-style-type: none"> Appropriate pathogen management controls will be prepared in accordance with RTA (2011b) – ‘Biodiversity Guidelines Guide 7: Pathogen management’. 	Project manager and contractor	Pre-construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
13	Terrestrial ecology – loss of vegetation communities	<ul style="list-style-type: none"> All staff will be inducted and informed of the limits of vegetation clearing and the areas of vegetation to be retained All vehicles and equipment used for construction will adhere to the access tracks, existing roads and exclusion areas outlined in the traffic management plan Native vegetation will be re-established in accordance with RTA (2011b) – ‘Biodiversity Guidelines Guide 3: Re-establishment of native vegetation’ Locally native species will be used for revegetation Revegetation work will aim to re-create the original vegetation structure Revegetation will include preferred forage species for Squirrel Gliders. 	Project manager and contractor	Construction	REF for the approved project
14	Terrestrial ecology – loss of mature trees	<ul style="list-style-type: none"> Removal of mature trees, including hollow-bearing trees, will be minimised wherever possible Pruning or lopping of limbs will be conducted in preference to tree removal wherever possible. 	Project manager and contractor	Construction	REF for the approved project
15	Terrestrial ecology – impacts to fauna	<ul style="list-style-type: none"> Pre-clearing surveys for Sloane’s Froglet will be carried out before clearing and according to the relevant guidelines (including after rain). If the Sloane’s Froglet is found during these surveys, a frog management plan will be developed and implemented The timing of noisy work will avoid the breeding season of threatened and migratory fauna known or likely to occur in the study area, to minimise disturbance, where feasible and practical Clearing of vegetation, including a staged habitat removal procedure, will be undertaken as detailed in RTA (2011b) – ‘Biodiversity Guidelines Guide 4: Clearing of vegetation and removal of bushrock’ Fauna handling during vegetation removal will be undertaken by a licensed fauna ecologist or wildlife carer, as detailed in RTA (2011b) – ‘Biodiversity Guidelines Guide 9: Fauna handling’ Artificial lighting along the proposed alignment should be kept to a minimum outside of the urban area Road lighting that directs light down to the road and minimises light pollution of the night sky will be used to minimise disorientation of nocturnal species moving through the area. 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
16	Terrestrial ecology – loss of woody debris habitat	<ul style="list-style-type: none"> Woody debris will be re-used as detailed in RTA (2011c) – ‘Biodiversity Guidelines Guide 5: Re-use of woody debris and bushrock’ Some of the large woody debris generated by the proposed modification will be relocated outside the site and retained as habitat on the ground. The woody debris will be spread in a fashion that replicates the natural occurrence of woody debris in the environment and will not be stacked Coarse and fine woody debris should be placed under the raised carriageway as fauna ‘furniture’ 	Project manager and contractor	Construction	REF for the approved project
17	Terrestrial ecology – impacts to threatened species	<ul style="list-style-type: none"> If unexpected threatened fauna or flora species are discovered, works will stop immediately and the Roads and Maritime ‘Unexpected threatened species find procedure’ in RTA (2011c) – ‘Biodiversity Guidelines Guide 1: Pre-clearing process’ will be followed. 	Project manager and contractor	Construction	REF for the approved project
18	Terrestrial ecology – loss of habitat connectivity	<ul style="list-style-type: none"> Tall trees on the edge of the site will be retained where practicable, to maintain natural connectivity for Squirrel Gliders and other fauna as much as possible Where possible, revegetation will occur adjacent to the site where the median strip would be for any future duplication of the road Revegetation will aim to connect areas of high quality habitat and will provide connectivity along the Murray River. Coarse woody debris and vegetation will be installed and planted to help facilitate fauna passage under bridges. Fauna fencing would be installed where considered feasible and the fence type, location and extent would be designed in consultation with an ecologist. 	Project manager and contractor	Construction	REF for the approved project
19	Terrestrial ecology – weed spread and establishment	<ul style="list-style-type: none"> All new vehicles to site will be cleaned to reduce the incidence of weed spread and establishment The spread of introduced plant species within the site will be monitored by the contractor and Roads and Maritime during construction Weed control will be undertaken if introduced plant species become prevalent in the site Declared noxious weeds will be managed according to the requirements of the <i>Noxious Weeds Act 1993</i>. 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
20	Terrestrial ecology – loss of habitat connectivity	<ul style="list-style-type: none"> Post-implementation monitoring at a population-wide scale will be undertaken to determine the effectiveness of the Squirrel Glider crossings. 	TfNSW	Operation	REF for the approved project
21	Terrestrial ecology – weed spread and establishment	<ul style="list-style-type: none"> Weed control will be undertaken during operation if declared noxious weed species become prevalent in the site 	TfNSW	Operation	REF for the approved project
22	Aquatic ecology – impacts to fauna	<ul style="list-style-type: none"> A biodiversity management plan will be prepared as part of the CEMP, which will incorporate measures to minimise aquatic ecology impacts The biodiversity management plan will include aquatic fauna salvage and translocation measures for work in the main river channel (where necessary). 	Project manager and contractor	Pre-construction	REF for the approved project
23	Aquatic ecology – disturbance to river banks	<ul style="list-style-type: none"> An exclusion zone plan will be implemented in line with RTA (2011b) – ‘Biodiversity Guidelines Guide 2: Exclusion zones’ and ‘Guide 10: Aquatic habitats and riparian zones’. Exclusion zones will be established to prevent unnecessary clearing or disturbance of the river banks and floodplain billabongs. 	Project manager and contractor	Pre-construction	REF for the approved project
24	Aquatic ecology – aquatic weed spread and establishment	<ul style="list-style-type: none"> A weed management plan will be prepared in line with RTA (2011b) – ‘Biodiversity Guidelines Guide 6: Weed management’. This will include measures to monitor and manage the potential introduction and spread of aquatic weeds. 	Project manager and contractor	Pre-construction	REF for the approved project
25	Aquatic ecology – clearing of riparian and aquatic vegetation	<ul style="list-style-type: none"> Clearing of riparian and aquatic vegetation will be minimised and managed in line with RTA (2011b) – ‘Biodiversity Guidelines Guide 10: Aquatic habitats and riparian zones’ and ‘Guide 4: Clearing of vegetation and removal of bushrock’. 	Project manager and contractor	Construction	REF for the approved project
26	Aquatic ecology – disturbance to river banks	<ul style="list-style-type: none"> Access to the Murray River and floodplain wetland and billabongs will be managed in line with RTA (2011b) – ‘Biodiversity Guidelines Guide 10: Aquatic habitats and riparian zones’ Access to the Murray River will be via the existing boat ramp, with no disturbance to the river banks or surrounding vegetation Activities in aquatic habitats and riparian zones will be avoided as much as practicable Areas adjacent to the Murray River and floodplain wetland and billabongs disturbed during construction will be rehabilitated in line 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p>with RTA (2011b) – ‘Biodiversity Guidelines Guide 10: Aquatic habitats and riparian zones’</p> <ul style="list-style-type: none"> Boats, barges or other water craft will be used in a manner that minimises boat wash that could cause erosion of the river banks. 			
27	Aquatic ecology – disturbance to woody debris habitat	<ul style="list-style-type: none"> Snags and woody debris will be managed in line with RTA (2011b) – ‘Biodiversity Guidelines Guide 10: Aquatic habitats and riparian zones’ Disturbance to snags will be minimised wherever possible Any snags removed from the site will be relocated, where it is safe to do so, to maintain aquatic habitat The potential for re-using woody debris generated by vegetation removal on the floodplain (such as root boles) as in-stream snag habitat will be investigated. 	Project manager and contractor	Construction	REF for the approved project
27a	Aquatic ecology – disturbance to aquatic fauna during breeding season	<ul style="list-style-type: none"> The timing of noisy work will avoid the breeding season of aquatic fauna to minimise disturbance, where feasible and practical. 	Project manager and contractor	Pre-construction	Submission Report
28	Soils and water quality – soil erosion, sedimentation and water quality	<ul style="list-style-type: none"> A soil and water management plan will be prepared as part of the CEMP in accordance with Roads and Maritime specification G38 – ‘Soil and Water Management’ The soil and water management plan will also address the following: <ul style="list-style-type: none"> ‘Code of Practice for Water Management’ (RTA 1999) the Roads and Maritime ‘Erosion and Sedimentation Procedure’ The Blue Book - ‘Soils and Construction – Managing Urban Stormwater Volume 1’ (Landcom 2004) and Volume 2 (DECC 2008a) Technical Guideline: ‘Temporary Stormwater Drainage for Road Construction’ (Roads and Maritime 2011b) Technical Guideline: ‘Environmental Management of Construction Site Dewatering’ (Roads and Maritime 2011c) The soil and water management plan will include but not be limited to: <ul style="list-style-type: none"> A primary erosion and sedimentation control plan and a maintenance schedule for ongoing maintenance of temporary erosion and sediment controls A sediment basin management plan to guide appropriate management of runoff during construction and operation 	Project manager and contractor	Pre-construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> ○ An incident emergency spill plan which will include measures to avoid and manage spillages of fuels, chemicals, and fluids onto any surfaces or into any adjacent/nearby waterways ● The design will include scour protection at locations subject to concentrated flows (eg bridge abutments), as required. 			
29	Soils and water quality – soil contamination	<ul style="list-style-type: none"> ● The CEMP will include a contaminated land management plan, which must comply with the <i>Contaminated Land Management Act 1997</i>, 'Contaminated Land Management Guideline' (Roads and Maritime 2013a), 'Environmental Incident Classification and Reporting Procedure' (Roads and Maritime 2014), and EPA guidelines on contaminated land management ● The contaminated land management plan will provide for: <ul style="list-style-type: none"> ○ Areas of known contamination (if any) ○ Unexpected contamination finds ○ Any land contamination caused during construction. 	Project manager and contractor	Pre-construction	REF for the approved project
30	Soils and water quality – groundwater	<ul style="list-style-type: none"> ● The soil and water management plan will include measures to manage groundwater that is unexpectedly encountered during construction ● The contractor will consider the beneficial uses, quality and quantity of groundwater when determining the ongoing management of groundwater. 	Project manager and contractor	Pre-construction	REF for the approved project
31	Soils and water quality – soil erosion	<ul style="list-style-type: none"> ● Sediment and erosion controls (including sediment basins), clean water diversions and culverts will be constructed and be on line before the commencement of earthworks ● Sediment basins will be regularly serviced and maintained to comply with water quality and capacity requirements ● Clearing of vegetation and stabilisation/revegetation activities will be carried out progressively to limit the time disturbed areas are exposed to erosion processes ● Site stabilisation of disturbed areas will be undertaken progressively as stages are completed ● Topsoil and mulch will each be stockpiled separately for possible reuse in landscaping and rehabilitation works ● High risk soil erosion activities such as earthworks will not be undertaken immediately before or during high rainfall or wind events ● Any material transported onto pavement surfaces will be swept and removed at the end of each working day 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> Erosion and sediment control measures will be maintained until the works are complete and areas are stabilised by revegetation. 			
32	Soils and water quality – sedimentation	<ul style="list-style-type: none"> The stability of the river banks will be protected as much as possible by restricting construction work to within the confined zone of the bridge Where construction activities have the potential to disturb the river banks, measures will be put in place to minimise erosion of soil from the river bank and sedimentation, such as: <ul style="list-style-type: none"> Laying geofabric on exposed soils and disturbed areas on the river bank Installing sediment netting down-slope of disturbed areas Waterway improvements and/or bank stabilisation work will be completed where required to allow for any changes to flow characteristics caused by the proposed modification Coffer dams will be installed around bridge pier locations close to waterways to reduce the potential for water quality impacts through sedimentation and spills Low lying areas of construction formations and excavations that collect stormwater or groundwater will be dewatered in accordance with the soil and water management plan and Technical Guideline: 'Environmental management of construction site dewatering' (Roads and Maritime 2011c) Removing trees from the river banks will be avoided wherever possible. Where tree removal is necessary, the stump and roots will be retained where possible to minimise destabilisation of the river bank. 	Project manager and contractor	Construction	REF for the approved project
33	Soils and water quality – water contamination	<ul style="list-style-type: none"> All fuels, chemicals, and liquids will be stored at least 50 metres away from any drainage lines and will be stored in an impervious bunded area within the compound sites Compounds and storage locations will be located away from areas subject to flooding wherever practicable The refuelling of plant and planned maintenance of machinery and plant will be undertaken 50 metres away from waterways Machinery will be checked daily for leaks of oil, fuel or other liquids Control of dirty water will be managed onsite to avoid release in to drainage lines and/or waterways Potable water will be used for wash down Containment material will be used to capture/filter water used in vehicle wash- downs 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> • Vehicle and plant wash downs and/or concrete truck washouts will be undertaken within a designated bunded area with an impervious surface or will be undertaken off-site • A facility for collecting, treating and disposing of concrete wastes generated during construction will be installed on site • Vehicles and plant will be properly maintained and regularly inspected for fluid leaks • Visual monitoring of local water quality (ie turbidity, hydrocarbon spills/slicks) will be undertaken on a regular basis to identify any potential spills or deficient erosion and sediment controls. A record will be kept of these inspections • Emergency spill kits will be kept on-site at all times • All staff will be inducted about incident and emergency procedures and made aware of the locations of emergency spill kits • Should a spill occur during construction, the emergency response plan will be implemented, and the Roads and Maritime regional environmental manager contacted. OEH will also be notified as per Part 5.7 of the POEO Act. 			
34	Soils and water quality – soil contamination	<ul style="list-style-type: none"> • In the event that indicators of contamination are encountered during construction (such as odours or visually contaminated materials), work in the area will cease until advice on the need for remediation or other action is obtained from an environmental consultant. 	Project manager and contractor	Construction	REF for the approved project
35	Soils and water quality – groundwater	<ul style="list-style-type: none"> • If dewatering any excavations is required, groundwater will be disposed of in accordance with EPA waste guidelines. 	Project manager and contractor	Construction	REF for the approved project
36	Soils and water quality – soil erosion and sedimentation	<ul style="list-style-type: none"> • Undertake surveillance to monitor the effectiveness of landscaping and soil stabilisation and erosion management measures • Additional erosion management measures will be implemented if the measures implemented during construction are not performing to requirements. Measures may include re-mulching, inserted erosion control mats or seeding with grass (hydroseeding). 	TfNSW and construction contractor (defects liability period about two years)	Operation	REF for the approved project
37	Soils and water quality – spills	<ul style="list-style-type: none"> • If a spill occurs during the operation of the new road, maintenance contractors or staff will implement an incident response plan. Relevant agencies will be contacted to manage the spill and implement appropriate traffic control measures. 	TfNSW and maintenance contractors/staff	Operation	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
37a	Soils and water quality - erosion	<ul style="list-style-type: none"> Appropriate erosion and sediment controls would be installed before the start of works in accordance with the technical document, Landcom (2006) Edition 4 'Managing Urban Stormwater: Soils & Construction' (the Blue Book). 	Project manager and contractor	Construction	Addendum REF
38	Hydrology and flooding – proposed works result in change to hydraulic conditions	<ul style="list-style-type: none"> During detailed design, structures within waterways (such as culverts) will be sized and sited to minimise afflux, consistent with Murray Darling Basin Authority requirements. 	Project manager and contractor	Pre-construction	REF for the approved project
38a	Hydrology and flooding – flood impact assessment	<ul style="list-style-type: none"> Prior to the commencement of works, a report must be prepared to the satisfaction of the North Central Catchment Management Authority and then be submitted to the (Victorian) Minister for Planning. The report must include: <ul style="list-style-type: none"> An updated flood frequency analysis for the Murray and Campaspe Rivers at Echuca (including post 1997 floods) A commentary on the changes in flow rates and flood levels. 	TfNSW	Pre-construction	Submissions Report
39	Hydrology and flooding – construction risk of impact on the floodplain function during a flood event	<ul style="list-style-type: none"> A construction flood management plan will be prepared before construction, which will include the following measures: <ul style="list-style-type: none"> Weather and flood warnings will be monitored and plans established for each stage of construction to minimise flooding impacts In the event of a flood warning, equipment and blockages on the floodplain will be removed wherever possible. 	Project manager and contractor	Construction	REF for the approved project
40	Noise and vibration – operational noise impacts to 2 Boundary Rd and Madison Spa Resort and River Country Inn	<ul style="list-style-type: none"> The detailed design of the proposed modification will incorporate the following noise mitigation measures (see Appendix G of noise and vibration assessment in Appendix H of this REF) <ul style="list-style-type: none"> Architectural treatment to 2 Boundary Road Adjacent to Madison Spa Resort: 3.5 metre high noise wall on the eastern side of the road with a length of about 150 metres (chainage 3200 – 3350) Low noise pavement (dense graded or stone mastic asphalt) for a length of about 255 metres from the edge of the floodplain to near the Moama Marketplace. Roads and Maritime would provide architectural fresh air ventilation in the River Country Inn's Meninya Street-facing rooms (subject to detailed assessment by appropriate acoustic experts), which would allow tenants 	Project manager and contractor	Pre-construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		to maintain ventilation without the need to open windows, reducing noise impacts.			
40a		<ul style="list-style-type: none"> Work that is performed outside normal work hours or on Sundays or public holidays must implement measures to minimise noise impact and be in accordance with the Roads and Maritime Construction Noise and Vibration Guideline (2016) and Roads and Maritime Construction Noise Calculator (2016) 	Project manager and contractor	Construction	Addendum REF (2019)
41	Noise and vibration – construction noise and vibration impacts	<ul style="list-style-type: none"> A noise and vibration management plan will be prepared as part of the CEMP. The plan will include control measures for all high noise and vibration generating activities Targeted measures to achieve vibration levels less than the required vibration criteria for sensitive receivers, including the heritage-listed Cranford House adjacent to the northern end of the site (3 mm/sec (1-10Hz)), will be included in the noise and vibration management plan A detailed construction noise assessment will be prepared based on information provided by the contractor during the detailed design phase. Targeted control measures to mitigate any noise levels found likely to exceed the relevant criteria will be included in the noise and vibration management plan Building condition surveys will be conducted at all sensitive receivers identified in the construction noise and vibration management plan. 	Project manager and contractor	Pre-construction	REF for the approved project
42	Noise and vibration – community consultation	<ul style="list-style-type: none"> Communications with people living and working in the vicinity of the site will be established at the beginning of construction and will be maintained. The person selected to liaise with the community will be adequately trained and experienced in keeping people informed of progress and responding to complaints and enquiries quickly The community will be kept informed of the nature, timing and duration of impending work The contractor will nominate a contact person in the construction noise and vibration management plan to directly address any noise and/or vibration complaints that the community may have during the construction phase of the project A management procedure will be put in place to deal with noise and vibration complaints that may arise from construction activities. 	Project manager and contractor	Pre-construction and construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
43	Noise and vibration – construction noise impacts	<ul style="list-style-type: none"> Noise impacts will be minimised in accordance with Roads and Maritime's 'Environmental Noise Management Manual' (RTA 2001). 	Project manager and contractor	Construction	REF for the approved project
44	Noise and vibration – out of hours construction work	<ul style="list-style-type: none"> Work will generally be carried out during standard working hours (ie 7am to 6pm Monday to Friday; 8am to 1pm Saturdays, no work on Sundays and public holidays). Before any out of hours work, the Roads and Maritime Environment Manager will be consulted and will advise on any additional assessment requirements. Assessment will be in accordance with Practice Note 7 of Roads and Maritime's Environmental Noise Management Manual 2001. This will include notifying any nearby residents in advance of out of hours work Where work is planned outside normal hours, an 'out of hours work procedure' will be prepared as part of the construction noise and vibration management plan. 	Project manager and contractor	Construction	REF for the approved project
45	Noise and vibration – construction noise	<ul style="list-style-type: none"> Noise management and/or mitigation measures will be considered to reduce noise levels as much as possible, eg using bored piles rather than impact-driven piles if necessary Plant and equipment will be properly maintained Provide special attention to the use and maintenance of 'noise control' or 'silencing' kits fitted to machines to ensure they perform as intended Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel Noisy plant such as the tub grinder/mulcher will be located 500 metres or more from sensitive receivers where practicable Avoid any unnecessary noise when carrying out manual operations and when operating plant Any equipment not in use for extended periods during construction work will be switched off Noise compliance monitoring will be undertaken for all major equipment and activities before commencement of work Where noise level exceedances cannot be avoided, consideration will be given to implementing time restrictions and/or providing periods of respite for residents, where practicable The layout of the construction compound will be arranged so that primary noise sources are at a maximum distance from residences, with solid structures (sheds, containers etc) placed between residences and noise sources (and as close to the noise sources as is practical) 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> • Enclosures will be used to shield fixed noise sources such as pumps, compressors, fans, screens (where practicable) • Maintenance work on all construction plant will be carried out away from noise sensitive receivers and confined to standard construction hours and work compound where feasible • Non-tonal reversing beepers (or an equivalent mechanism) will be fitted and used on all construction vehicles and mobile plant where practicable • Site inductions will be provided to train staff on ways to minimise construction noise impacts on-site. Responsible working practices include: <ul style="list-style-type: none"> ○ Avoid the use of outdoor radios during the night-time period ○ Avoid shouting and slamming of doors ○ Where practical, operate machines at low speed or power and switched off when not being used rather than left idling for prolonged periods ○ Minimise reversing ○ Avoid dropping materials from height and avoid metal to metal contact on material. 			
46	Noise and vibration – vibration impacts	<ul style="list-style-type: none"> • Vibration will be managed to comply with the requirements of AS2187, DIN4150 & BS6472 • Carry out vibration testing of actual equipment on site to determine acceptable site-specific buffer distances to sensitive occupancies • Carry out additional vibration monitoring when construction activities are at the nearest point to potentially affected receivers. This monitoring may signal to the contractor by way of a buzzer or flashing light etc when levels approach/exceed the recommended limits in nearby occupancies • Carry out periodic monitoring at all critical or sensitive areas. Vibration levels will be tested for compliance with the set vibration limits. This monitoring will be undertaken in accordance with the noise and vibration management plan • Where vibration is found to be excessive, management measures will be implemented to ensure vibration compliance is achieved. Management measures may include modification of construction methods such as establishment of safe buffer zones and if necessary, time restrictions for the most excessive vibration activities. Time restrictions should be negotiated with affected receivers • Where construction activities, including pile driving, excavation by hammering or ripping, dynamic compaction or demolition of structures may cause damage through vibration or air blast to 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p>nearby public utilities, structures, buildings and their contents, or if the items are located within the distance from the construction activity noted below, a building condition inspection of these items will be undertaken:\</p> <ul style="list-style-type: none"> ○ Pile driving – 200 metres ○ Vibration compaction >7 tonne plant – 50 metres ○ Vibration compaction <7 tonne plant – 25 metres ○ Demolition of structures – 50 metres <ul style="list-style-type: none"> ● In relation to human perception of vibration, where reasonable and feasible, a buffer distance of 50 metres for rolling and compacting activities will be implemented. Where work is required within this buffer distance, potentially impacted residents will be informed of the nature and duration of the work 			
47	Noise and vibration – complaints	<ul style="list-style-type: none"> ● Each complaint will be investigated ● Construction noise or vibration monitoring will be considered if a complaint is received in accordance with the requirements of the Roads and Maritime 'Specification G36 Environmental Protection' and the 'Interim Construction Noise Guideline' (DECC 2009a) ● Where noise or vibration, which is the subject of a complaint, is in excess of allowable limits, appropriate amelioration measures will be implemented. 	Project manager and contractor	Construction and operation	REF for the approved project
48	Landscape and visual – visual impacts of bridges	<ul style="list-style-type: none"> ● The proposed bridges will be designed in accordance with Roads and Maritime's bridge aesthetics guidelines (Roads and Maritime 2012c) ● Bridge structures will be designed to be simple and elegant structures which make a positive visual contribution to the environment. They will: <ul style="list-style-type: none"> ○ Provide correct geometric relationships in the overall structural arrangement and display visual integration of the deck, beams, piers, railings, barriers, lighting, associated furniture and abutments ○ Display visual integration of the structure with the road and landform ○ Ensure lines that delineate elements of the structure are smooth and unbroken in both the horizontal and vertical planes ○ Make use of the haunched main and adjacent spans to integrate with the piers and frame the river visually ○ Use surface treatments that are in harmony with the structural shape and scale such that visual clutter is avoided ○ Provide maximum open light spaces beneath the structure 	Project manager and contractor	Pre-construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> ○ Provide views out beyond the sides of the bridge for motorists, passengers, pedestrians and cyclists travelling over the bridge. 			
48a	Landscape and visual – visual impact	<ul style="list-style-type: none"> • Before development starts, detailed design plans for the project must be prepared that achieve a high quality design outcome, which need to be submitted to and approved by the Victorian Minister for Planning. The plans must be drawn to scale with dimensions and three copies must be provided. The plans must include: <ul style="list-style-type: none"> ○ A site layout plan showing the location of key elements of the project ○ Elevation plans showing the bridge approaches and structures, noise walls and any retaining structures ○ A materials and finishes schedule for the bridge structures, noise walls or other key elements ○ Landscaping and planting within the project area along with a planting schedule. • Once endorsed, the plans must not be altered without the written consent of the Victorian Minister for Planning. 	TfNSW	Pre-construction	Submissions Report
49	Landscape and visual – general visual impacts	<ul style="list-style-type: none"> • Design will allow for a grass verge along the new driveway from Francis Street to the River Country Inn. Roads and Maritime will consult with the River Country Inn and consider providing for potential additional landscaping • Roads and Maritime will consult with the River Country Inn and consider providing for potential light screening for motel rooms, as required, to minimise light nuisance impacts associated with vehicles entering the River Country Inn from Francis Street • If it is identified during detailed design that the new entrance/exit to the River Country Inn is likely to cause light nuisance impacts to sensitive receivers in the vicinity of the River Country Inn, Roads and Maritime will implement light screening measures to minimise these impacts • Road embankment design will use materials, pattern, colour and texture which are sympathetic to the setting and congruous with their surrounds • The construction footprint will be kept to a minimum to minimise earthworks and vegetation removal wherever possible • Water detention basins will be shaped to create a natural appearance and to soften the visual impact where practicable • Watercourse crossings will be located and designed to minimise loss of riparian vegetation and to accommodate erosion control methods 	Project manager and contractor	Pre-construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> The proposed noise wall will be designed in accordance with Roads and Maritime's noise wall design guideline (RTA 2006) Noise wall design and materials will be congruous with the existing surrounding environment Landscaping will be designed in accordance with Roads and Maritime's landscape guideline (RTA 2008) Screen plantings using locally native vegetation will be implemented wherever possible between the road and bridge infrastructure and surrounding users, environs and other key viewpoints, including: <ul style="list-style-type: none"> Screening the road from adjacent residences and other sensitive receivers Screening the bridge structures from adjacent river bank areas Screening views of the water detention basins Plantings will be located along new shared paths to provide sufficient shade and shelter. 			
50	Landscape and visual – general visual impacts	<ul style="list-style-type: none"> Fencing with material attached (eg shade cloth) to shield views will be provided around the construction compound and other areas where necessary The work site will be left in a tidy manner at the end of each work day Road batters and water detention basins will be planted and mulched to reduce the risk of erosion. 	Project manager and contractor	Construction	REF for the approved project
51	Aboriginal heritage – impacts on potential unknown sites of Aboriginal heritage significance	<ul style="list-style-type: none"> As part of the site induction, all workers will be advised of their obligations in relation to Aboriginal heritage under the NPW Act before construction begins and the guidelines to follow if unanticipated heritage items or deposits are located during construction In the event of an unexpected find of an Aboriginal heritage item (or suspected item), work will cease in the affected area and Roads and Maritime's Environment Officer and the Roads and Maritime Aboriginal Cultural Heritage Officer will be contacted for advice on how to proceed. The 'Unexpected Heritage Items Procedure' (Roads and Maritime 2015b) will be followed. 	Project manager and contractor	Construction	REF for the approved project
52	Non-Aboriginal heritage – vibration damage to Cranford House	<ul style="list-style-type: none"> Targeted measures to achieve vibration levels less than the required vibration criteria for the heritage-listed Cranford House adjacent to the northern end of the site will be implemented as detailed in section 6.5. 	TfNSW and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
53	Non-Aboriginal heritage – inadvertent impacts on heritage items	<ul style="list-style-type: none"> As part of the site induction, all workers will be advised of their obligations in relation to heritage before construction begins and the guidelines to follow if unanticipated heritage items or deposits are located during construction. 	TfNSW and contractor	Construction	REF for the approved project
53a	Non-Aboriginal heritage – impacts on potential unknown sites of non-Aboriginal heritage significance	<ul style="list-style-type: none"> In the event of an unexpected find of a non-Aboriginal heritage item (or suspected item), work will cease in the affected area and Roads and Maritime's Environment Officer will be contacted for advice on how to proceed. The 'Unexpected Heritage Items Heritage Procedure 02' (November 2015) (Roads and Maritime 2015b) will be followed. 	TfNSW and contractor	Construction	Submissions Report
54	Land use and property – land use impacts	<ul style="list-style-type: none"> A construction program will be developed to maintain access and amenity for all land uses adjacent to the site as far as is practicable All property acquisition will be undertaken in accordance with the Roads and Maritime 'Land Acquisition Information Guide' (RTA 2011c) and the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> Affected landowners and tenants will be consulted on an ongoing basis regarding the status and timing of acquisition. 	Project manager and contractor	Pre-construction and construction	REF for the approved project
55	Land use and property – impacts to Murray River users	<ul style="list-style-type: none"> Include in the construction contract a suspension of construction work in the vicinity of the Southern 80 Ski Race event venue over the two week period to allow for event set-up, event staging and decommissioning of the event site (terms to be agreed) Develop the construction program in consultation Southern 80 Ski Race organisers to ensure the construction process allows for the annual event to run with minimum disruption. As a minimum, the construction program will ensure that access to the boat ramp car park is available during the Southern 80 event Ensure sufficient and safe access is provided for all river users (especially large paddle steamers) during construction. 	Project manager and contractor	Pre-construction and construction	REF for the approved project
56	Land use and property – impacts to utilities	<ul style="list-style-type: none"> Roads and Maritime and VicRoads will consult with relevant service providers during detailed design and construction to minimise the potential for service interruptions. 	Project manager and contractor	Pre-construction and construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
57	Land use and property – impacts to Moama Community Lions Park	<ul style="list-style-type: none"> The play equipment and steam engine at the Lions Community Park will be relocated in consultation with the Lions Club and Murray Shire Council. 	Project manager and contractor	Construction	REF for the approved project
58	Socio-economic – construction general community impacts	<ul style="list-style-type: none"> Potentially affected residents and businesses will be contacted before the commencement of work, in accordance with the Roads and Maritime 'Community Engagement and Communication Manual' (Roads and Maritime 2012b). Residents will be notified via door knocks, newsletters or letter box drops providing information on the proposed works, working hours and a contact name and number should any complaints wish to be registered Ongoing consultation during detailed design phase will occur with Murray Shire Council Working hours during major community events will be identified in consultation with Murray Shire Council and other relevant stakeholders at the time of contract preparation A complaints management procedure and register will be included in the construction environment management plan. 	Project manager and contractor	Pre-construction	REF for the approved project
59	Socio-economic – impacts to businesses	<ul style="list-style-type: none"> Ongoing consultation will occur with the River Country Inn operator, especially during the detailed design stage, to resolve concerns relating to access to the motel for northbound traffic Roads and Maritime will consider providing for potential additional landscaping, signage adjustments and light screening etc required as a result of the construction of the new entrance to the motel from Francis Street Consider providing signage specific to the River Country Inn to indicate access Ongoing consultation will occur with the Moama Marketplace property owner and centre manager, especially during the detailed design stage, to resolve concerns relating to land acquisition and site access (deliveries and customer). 	Project manager and contractor	Pre-construction and construction	REF for the approved project
60	Socio-economic – impacts to Murray River users	<ul style="list-style-type: none"> Potentially affected recreational community groups and businesses that use the Murray River (such as the Southern 80 Ski Race organisers and paddle steamer operators and house boat businesses) will be notified before the commencement of work, in accordance with the Roads and Maritime 'Community Engagement and Communication Manual' (Roads and Maritime 2012b) 	Project manager and contractor	Pre-construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> In consultation with river-based businesses, minimise the number, extent and duration of partial river closures during the bridge crossing phase of construction Minimise the number and duration of closures of the Echuca boat ramp during construction and provide notice of closures to the local community. 			
61	Socio-economic – opportunities on private land	<ul style="list-style-type: none"> Consultation will occur with Bridge Arts Project representatives during detailed design. 	Project manager and contractor	Pre-construction and construction	REF for the approved project
62	Socio-economic – construction impacts on the community traffic impacts	<ul style="list-style-type: none"> Local residents, potentially affected businesses and road users will be kept regularly informed of construction activities during the construction process. 	Project manager and contractor	Construction	REF for the approved project
63	Traffic and access – general construction	<ul style="list-style-type: none"> A detailed traffic management plan will be prepared in accordance with the 'Traffic Control at Work Sites Manual' (RTA 2010a) and Roads and Maritime 'Specification G10 - Control of Traffic' Management of water vessels in the Murray River during construction will be included in the traffic management plan or will be subject to a separate management plan The traffic management plan will identify, assess and eliminate, reduce or mitigate road safety hazards. It will include measures to provide safe access points to work areas from the adjacent road network, safety barriers where necessary, temporary speed restrictions when necessary, adequate sight distances and prominent warning signage Construction traffic routes will be designated and managed as part of the traffic management plan. Construction routes will be designed to avoid, where possible, disruption or severing of local access routes The traffic management plan will include plans and a procedure for providing access for pedestrians and cyclists through the site at designated locations during construction Residents and businesses will be notified of any specific impacts to property access and arrangements required during construction. 	Project manager and contractor	Pre-construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
64	Traffic and access – construction impacts to Murray Shire Council roads	<ul style="list-style-type: none"> A road condition survey will be undertaken on Boundary Road, Forbes Street and any other local roads used for haulage of materials, before and after construction. Defects arising from construction access will be rectified before completion of construction unless otherwise agreed with Murray Shire Council. 	Project manager and contractor	Pre-construction and construction	REF for the approved project
65	Traffic and access – construction impacts to public transport	<ul style="list-style-type: none"> Consultation will be undertaken with bus operators before and during construction. 	Project manager and contractor	Pre-construction and construction	REF for the approved project
66	Traffic and access – construction impacts to property access	<ul style="list-style-type: none"> U-turns may be provided at the northbound right turn lane on the Cobb Highway/Perricoota Road intersection in the detailed design to enable direct access to the River Country Inn for northbound traffic, subject to a road safety audit If necessary, and in consultation with the River Country Inn operator, an alternative permanent entrance to the motel will be provided from Francis Street in the detailed design, including relocation of signage 	Project manager and contractor	Pre-construction	REF for the approved project
67	Traffic and access – construction impacts to traffic	<ul style="list-style-type: none"> The community will be kept informed about construction and changes to access for road users in accordance with the 'Community Engagement and Communication Manual' (Roads and Maritime 2012b). This may include through advertisements in the local media and prominently placed advisory notices or variable message signs Work to tie in the new road to existing roads will be undertaken during off-peak periods where possible to minimise the impacts on traffic flow Construction traffic will enter/exit the construction zone only in areas designated for this purpose in the traffic management plan The community will be kept informed about upcoming road construction activities, including through advertisements in the local media and by prominently placed advisory notices. 	Project manager and contractor	Construction	REF for the approved project
68	Traffic and access – construction impacts to property access	<ul style="list-style-type: none"> Property access will be maintained at all times unless otherwise agreed with affected property owners. Where changes to access arrangements are necessary, owners and tenants will be advised and consulted on alternative access arrangements. 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
69	Air quality – general air quality impacts	<ul style="list-style-type: none"> The CEMP will include a procedure for air quality management, including monitoring and reporting procedures A management procedure will be put in place to deal with air quality complaints that may arise from construction activities. 	Project manager and contractor	Pre-construction	REF for the approved project
69a	Air quality – general air quality impacts	<ul style="list-style-type: none"> Where dust is visible outside the proposed modification boundary area, measures to suppress dust such as watering would be utilised. Regular watering along the unsealed sections of Kirchhofer Street and Lignum Road would occur when these roads are used by construction vehicles. 	Project manager and contractor	Construction	Addendum REF (2019)
70	Air quality – dust management	<ul style="list-style-type: none"> Exposed surfaces will be watered regularly to minimise dust emissions as necessary Clearing of natural vegetation will be minimised where possible During periods of high winds, dust generating activities will cease Stabilisation of disturbed surfaces will take place as soon as practicable Stockpiles or areas that may generate dust will be managed to suppress dust emissions in accordance with Roads and Maritime Stockpile Site Management Guideline (RTA 2011a) All trucks will be covered when transporting dust generating material to and from the site Dust and/or particulate matter (PM10) will be monitored if considered necessary to identify the potential for nuisance dust impacts. 	Project manager and contractor	Construction	REF for the approved project
71	Air quality – other air emissions	<ul style="list-style-type: none"> Plant and machinery will be turned off when not in use as much as possible and will be fitted with emission control devices complying with Australian Design Standards where practicable Construction plant, vehicles and equipment will be maintained in a good working condition in order to limit impacts on air quality No burning of any materials will occur. 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
72	Waste management – general impacts	<ul style="list-style-type: none"> • A waste management plan will be prepared and included in the CEMP in accordance with Roads and Maritime Specification G36 'Environmental Protection'. The plan is to be guided by the following publications: <ul style="list-style-type: none"> ○ EPA Waste Classification Guidelines ○ NSW Government 'Waste Reduction and Purchasing Policy' ○ Roads and Maritime waste fact sheets for virgin excavated natural material, excavated natural material, excavated public road materials, recovered aggregates, asbestos waste and waste sampling. 	Project manager and contractor	Pre-construction	REF for the approved project
72a	Waste management – general impacts	<ul style="list-style-type: none"> • A pre-construction land condition assessment and report would be conducted for all ancillary facility locations. It would be done in line with the Environmental Procedure – Management of Wastes on Roads and Maritime Services Land 2014. This preconstruction land condition report would be included in the waste management plan for construction. 	Project manager and contractor	Pre-construction	Addendum REF (2019)
73	Waste management – general impacts	<ul style="list-style-type: none"> • Resource management hierarchy principles will be followed: <ul style="list-style-type: none"> ○ Avoid unnecessary resource consumption as a priority ○ Recover resources as far as is practicable (including reuse of materials, reprocessing, and recycling and energy recovery) ○ Disposal is undertaken as a last resort (in accordance with the <i>Waste Avoidance and Resource Recovery Act 2001</i>). • Site inductions will be undertaken (and recorded) by a site supervisor for all staff, to provide a thorough knowledge of all key environmental/safety issues, including waste disposal protocols • All wastes will be managed and disposed of in accordance with the Waste Classification Guidelines (DECC 2009b) and managed in accordance with the POEO Act • Stockpiles will be managed to avoid causing pollution or contamination in accordance with the Stockpile Site Management Guideline (RTA 2011a) • Waste will not be burned at the site • Garbage receptacles will be provided and recycling of materials encouraged. Rubbish will be transported to an appropriate waste disposal facility • All working areas will be maintained, kept free of rubbish and cleaned up at the end of each working day. 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
74	Waste management – excess materials	<ul style="list-style-type: none"> Excavated material and topsoil will be reused on-site for landscaping where feasible Bulk project waste (eg excess fill) sent to a site not owned by Roads and Maritime (excluding OEH licensed landfills) for land disposal is to have prior formal written approval from the landowner, in accordance with Roads and Maritime Environmental Direction No. 20 'Legal Off- site disposal of Bulk RTA Project Wastes' <ul style="list-style-type: none"> Where appropriate, excess roadside materials will be disposed of according to the following (in order): Transfer to nearby Roads and Maritime projects for immediate use Transfer to an approved Roads and Maritime stockpile site for future use during projects or routine maintenance Transfer to a Roads and Maritime approved site for reuse on a concurrent private/local government project Disposal at an approved materials recycling or waste disposal facility As otherwise provided for by the relevant waste legislation. 	Project manager and contractor	Construction	REF for the approved project
75	Waste management – concrete	<ul style="list-style-type: none"> A facility for collecting, treating and disposing of concrete wastes generated in the construction of the development will be installed on site A dedicated concrete washout facility will be provided during construction so that run-off from the washing of concrete machinery and equipment can be collected and disposed of at an appropriate waste facility. 	Project manager and contractor	Construction	REF for the approved project
76	Waste management – coal tar asphalt	<ul style="list-style-type: none"> If coal tar asphalt is identified and is to be removed, it is to be disposed of to landfill in accordance with Roads and Maritime Environmental Direction No.21 'Coal Tar Asphalt Handling and Disposal'. 	Project manager and contractor	Construction	REF for the approved project
77	Waste management – green waste	<ul style="list-style-type: none"> Cleared weed-free vegetation will be chipped and reused on-site as part of the proposed landscaping and to stabilise disturbed soils where possible. 	Project manager and contractor	Construction	REF for the approved project
78	Waste management – sewage	<ul style="list-style-type: none"> Portable toilets will be provided for construction workers and will be managed by the service provider to ensure the appropriate disposal of sewage. 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
79	Hazards and risk – general	<ul style="list-style-type: none"> Emergency response plans will be incorporated into the CEMP An incident response plan will be developed and implemented as required as part of the CEMP to manage any identified risks on site. 	Project manager and contractor	Pre-construction	REF for the approved project
80	Hazards and risk – road safety	<ul style="list-style-type: none"> A safety audit of the design will be undertaken before construction. 	Project manager and contractor	Pre-construction	REF for the approved project
81	Climate change – impacts of climate change	<ul style="list-style-type: none"> Detailed design will take into consideration the potential effect of climate change on the proposed modification, including flooding and drainage requirements, in accordance with the Roads and Maritime climate change plan. 	Project manager and contractor	Pre-construction	REF for the approved project
81a	Climate change – greenhouse gas emissions	<ul style="list-style-type: none"> Investigations into opportunities for reducing greenhouse emissions during construction and operation of the proposed modification will be undertaken during the detailed design phase. 	Project manager and contractor	Pre-construction	REF for the approved project
82	Climate change – greenhouse gas emissions during construction	<ul style="list-style-type: none"> Material and waste transport will be scheduled to achieve full loads and to minimise required number of vehicle trips Materials will be transported from local suppliers, and surplus materials and wastes will be transported to local sites and facilities, wherever possible Appropriately sized construction equipment, plant and vehicles will be used Regular servicing of equipment will be undertaken to maintain optimal performance, and to minimise down time (which can improve overall efficiency) The layout of access, machinery and facilities will be designed to minimise movement and vegetation clearing The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate Energy efficiency and related carbon emissions will be considered in the selection of vehicles, plant and equipment. 	Project manager and contractor	Construction	REF for the approved project

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
83	Demand on resources – general impacts	<ul style="list-style-type: none"> Water captured in water detention basins during construction will be reused for dust suppression, watering of landscaped areas and any other suitable construction activity where feasible and appropriate Procurement will endeavour to use materials and products with a recycled content where that material or product is cost and performance effective. 	Project manager and contractor	Pre-construction	REF for the approved project
84	Cumulative impacts – traffic and access impacts	<ul style="list-style-type: none"> The traffic management plan will be prepared in consultation with Murray and Campaspe Shire Councils to minimise potential cumulative impacts on traffic and access. 	Project manager and contractor	Pre-construction	REF for the approved project
85	Cumulative impacts – traffic, noise and vibration impacts	<ul style="list-style-type: none"> Ongoing coordination and consultation will be undertaken with other proponents to ensure cumulative noise, vibration and traffic impacts are appropriately assessed and managed The CEMP will be revised to consider potential cumulative impacts from surrounding development activities as they become known. 	Project manager and contractor	Pre-construction and construction	REF for the approved project

7.3 Licensing and approvals

A summary of relevant licenses, permits, notifications and approvals needed for the Echuca – Moama Bridge addendum REF and when they need to be obtained are listed in Table 7-2.

Table 7-2 Summary of licensing and approval required

Requirement	Timing
Acquisition of private land would be required adjacent to the Murray River. All property valuations and acquisitions would be carried out in accordance with the Roads and Maritime <i>Land acquisition information guide (2014)</i> and the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> .	Prior to the start of the activity

8. Conclusion

8.1 Justification

The proposed modification would assist the construction of a new bridge crossing over the Murray River. The new bridge is of regional importance as it is a critical link for both passenger and freight traffic between southern NSW and northern Victoria. The new link will ensure the long-term viability of the strategic transport network between these regions and a key north-south freight route.

The proposed modification is considered to be justified as it would provide:

- Improved sustainability outcomes by reducing the amount of resources and construction materials including steel and concrete required to construct the project
- Cost savings for the project.

While there would be environmental impacts as a consequence of the proposed modification, they have been avoided or minimised wherever possible through design and site-specific safeguards summarised in Chapter 6.

The adverse impacts to the environment are expected to be minor. The benefits of the proposed modification are considered to outweigh the minor impacts on the environment. No additional safeguards are required for the proposed modification to minimise the potential impact on the environment.

8.2 Objects of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The design for the project, including the proposed modification, safeguards and management measures allow for the proper management, development and conservation of natural and artificial resources.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	The proposed modification would comply with the principles of ecologically sustainable development.
1.3(c) To promote the orderly and economic use and development of land.	The proposed modification is required to cater for the safe and efficient movement of people and goods across the Murray River.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposed modification.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	Construction of the proposed modification would require the clearing and permanent modification of existing vegetation. The proposed modification would not have a significant impact on biological diversity and ecological integrity. The vegetation within the proposed modification is not an endangered ecological community. Any potential direct and indirect impacts would be managed through the environmental safeguards identified Section 7 of this addendum REF.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposed modification is not expected to impact on existing cultural heritage. Refer to Section 6.3.

Object	Comment
1.3(g) To promote good design and amenity of the built environment.	The design of the project, including the proposed modification, has been developed with the consideration to minimise the social and environmental impacts, including consideration of the safety of the workers and motorists during construction and maintenance, property impact, visibility and noise impact.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the proposed modification.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the proposed modification.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Consultation with the community and relevant government agencies was carried out during the development of the proposed modification. Details of this consultation are provided in Section 5 of this addendum REF.

8.3 Conclusion

This addendum REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed modification.

This has included consideration where relevant, of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the Federal EPBC Act.

A number of potential environmental impacts from the proposed modification have been avoided or reduced during the design development and options assessment. The proposed modification as described in the addendum REF best meets the project objectives, but would still result in some impacts on hydrology and biodiversity. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed modification would improve sustainability outcomes, safety and design quality. On balance the proposed modification is considered justified and the following conclusions are made.

Significance of impact under NSW legislation

The proposed modification would not result in a change to the findings of the Echuca-Moama Bridge (NSW) addendum REF (November 2019), Echuca-Moama Bridge Crossing REF (April 2016), Echuca-Moama Bridge Crossing Submissions Report (April 2016), and the Victorian Environmental Effects Statement (September 2015), and would be unlikely to cause a significant impact on the environment. Therefore it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

Significance of impact under Australian legislation

The proposed modification would not likely cause a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the EPBC Act. A referral to the Australian Government Department of Agriculture, Water and the Environment is not required.

9. Certification, review, decision

9.1 Certification

This addendum review of environmental factors provides a true and fair review of the proposed modification in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed modification.

Prepared by:



Erin Davis
Environmental Planner
GHD Pty Ltd
June 2020

Addendum REF reviewed by:



Lucy Bourne
Senior Environmental Scientist
GHD Pty Ltd
Date: 23 June 2020

9.2 Environment staff review

The addendum REF has been reviewed and considered against the requirements of Sections 5.5 and 5.7 of the *Environmental Planning and Assessment Act 1979*.

In considering the proposal this assessment has examined and taken into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of that activity as addressed in the addendum REF and associated information. This assessment is considered to be in accordance with the factors required to be considered under clause 228 of the Environmental Planning and Assessment Regulation 2000.

The proposal described in the addendum REF will have some environmental impacts which can be ameliorated satisfactorily. Having regard to the safeguard and management measures proposed, this assessment has considered that these impacts are unlikely to be significant and therefore an approval for the proposal does not need to be sought under Division 5.2 of the *Environmental Planning and Assessment Act 1979*.

The assessment has considered the potential impacts of the activity on areas of outstanding value and on threatened species, ecological communities or their habitats for both terrestrial and aquatic species as defined by the *Biodiversity Conservation Act 2016* and the *Fisheries Management Act 1994*.

The proposed modification described in the addendum REF, will not affect areas of outstanding value. The activity described in the addendum REF will not significantly affect threatened species ecological communities or their habitats. Therefore a species impact statement is not required.

The assessment has also addressed the potential impacts on the activity on matters of national environmental significance and any impacts on the environment of Commonwealth land and concluded that there will be no significant impacts. Therefore there is no need for a referral to be made to the Australian Government Department of the Environment and Energy for a decision by the Commonwealth Minister for the Environment and Energy on whether assessment and approval is required under the *Environment Protection and Biodiversity Conservation Act 1999*.

The addendum REF is considered to meet all relevant requirements.

10. References

Aboriginal Heritage Information Management System (AHIMS) 2020, AHIMS Search:

<http://www.environment.nsw.gov.au/awssapp/login.aspx>

Australian Soil Resource Information System 2020, Maps: <http://www.asris.csiro.au>

BCD 2020a, NSW Threatened Species and EEC Wildlife Atlas:

<http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>

BCD 2020b, NSW threatened species profiles. NSW Office of the Environment and Heritage, online database: <http://www.environment.nsw.gov.au/threatenedspecies/>

Cardno, 2015. *Echuca-Moama Bridge EES specialist hydrology report*

Department of Agriculture, Water and Environment 2020a, Australian Heritage Database:

<http://www.environment.gov.au/cgi-bin/ahdb/search.pl>

Department of Agriculture, Water and Environment 2020b, Protected Matters Search Tool – EPBC Ac:

<http://www.environment.gov.au/erin/ert/epbc/index.html>

GHD, March 2020. Echuca Moama Bridge Project – Stage 3 Design Package 4500, Flood and Hydrology Design Report

Heritage Insight Pty Ltd, 2019. *Potential Site compounds and Bridge Pier 6, Moama: Archaeological Due Diligence*. Report for Roads and Maritime Services

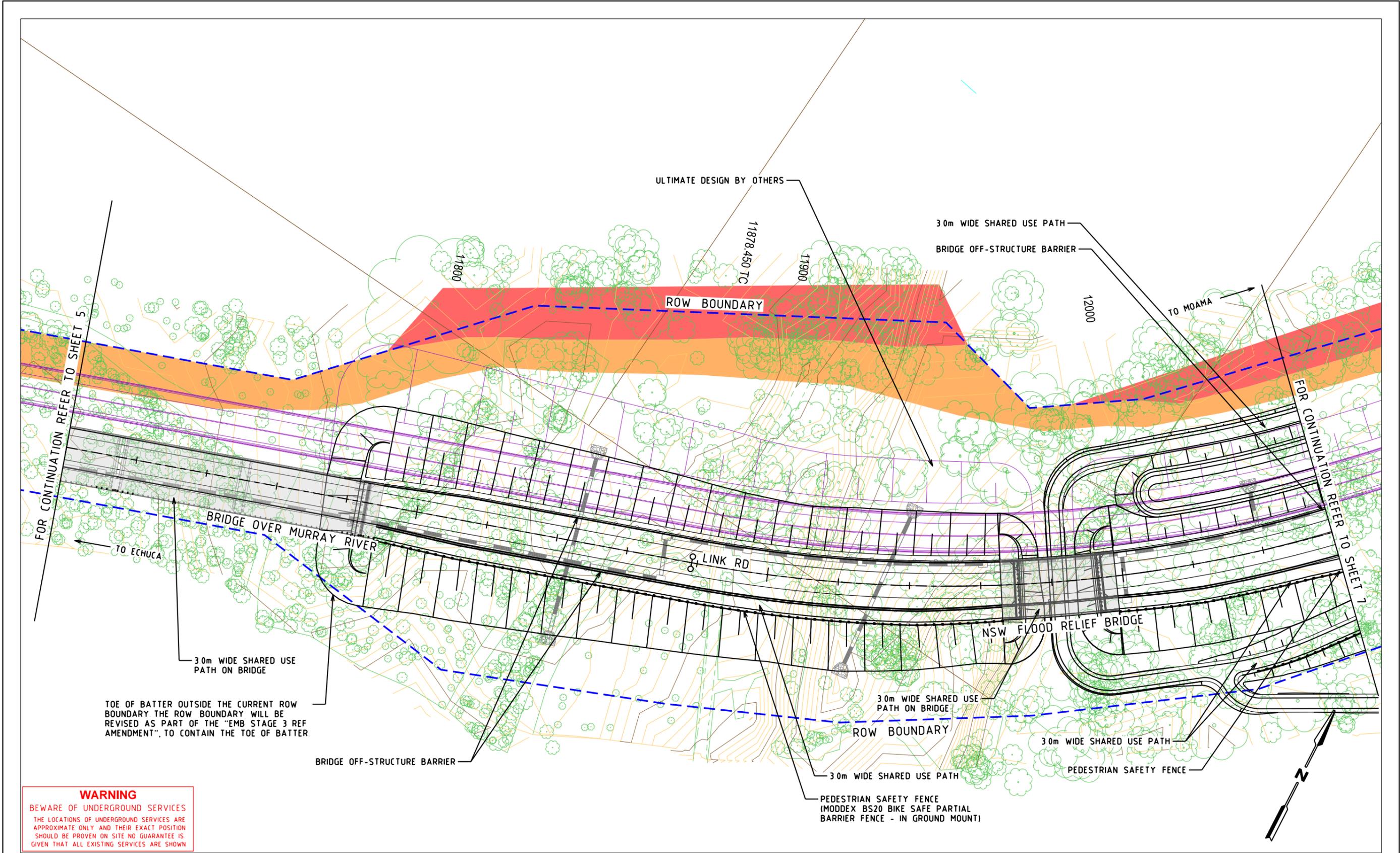
Kelleher Nightingale Consulting Pty Ltd, 2019. *Echuca Moama Bridge Project – Aboriginal Cultural Heritage Assessment Report*. Prepared for Roads and Maritime Services

NGH Consulting, 2019 Echuca-Moama Bridge Crossing (NSW) Review of Environmental Factors Addendum

Terms and acronyms used in this addendum REF

Term / Acronym	Description
BC Act	<i>Biodiversity Conservation Act 2016 (NSW).</i>
CEMP	Construction / Contractor's environmental management plan
EIA	Environmental impact assessment
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW).</i> Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth).</i> Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
Heritage Act	<i>Heritage Act 1977 (NSW)</i>
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
NES	Matters of national environmental significance under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999.</i>
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
TfNSW	Transport for NSW (formerly Roads and Maritime Services)

Appendix A Design of the proposed modification



WARNING
 BEWARE OF UNDERGROUND SERVICES
 THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN



DETAILED DESIGN

No	DATE	DESIGNED	TEAM LEADER	DESIGN MANAGER	AMENDMENT
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A	28/11/19	LM	MT	GB	PRELIMINARY DESIGN

DESIGN CONSULTANT

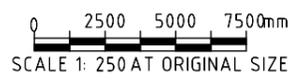
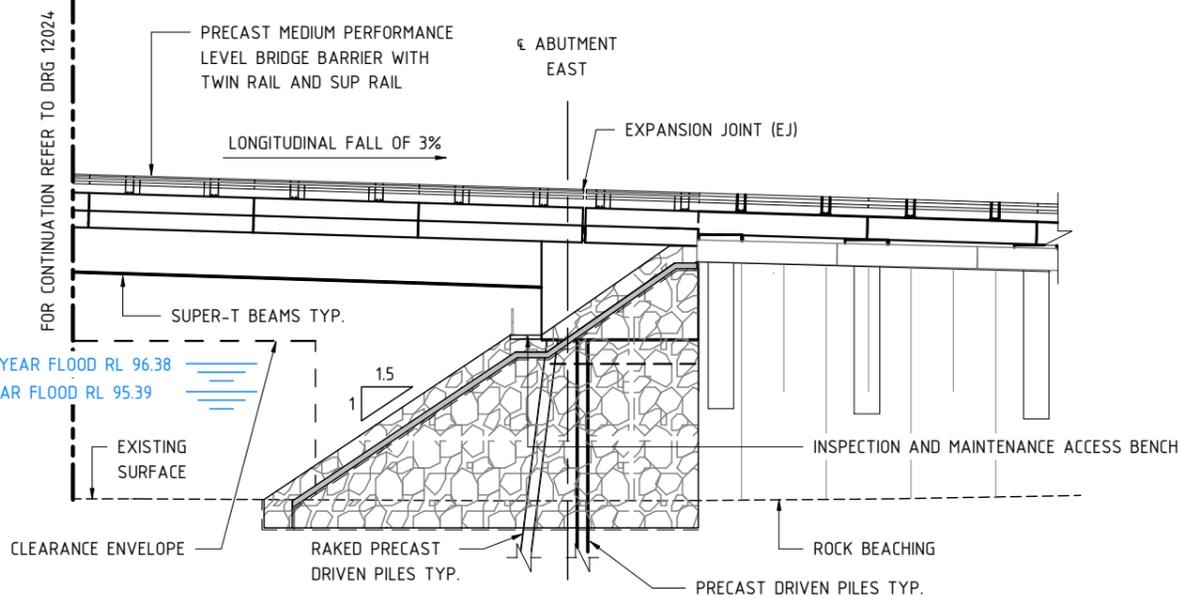
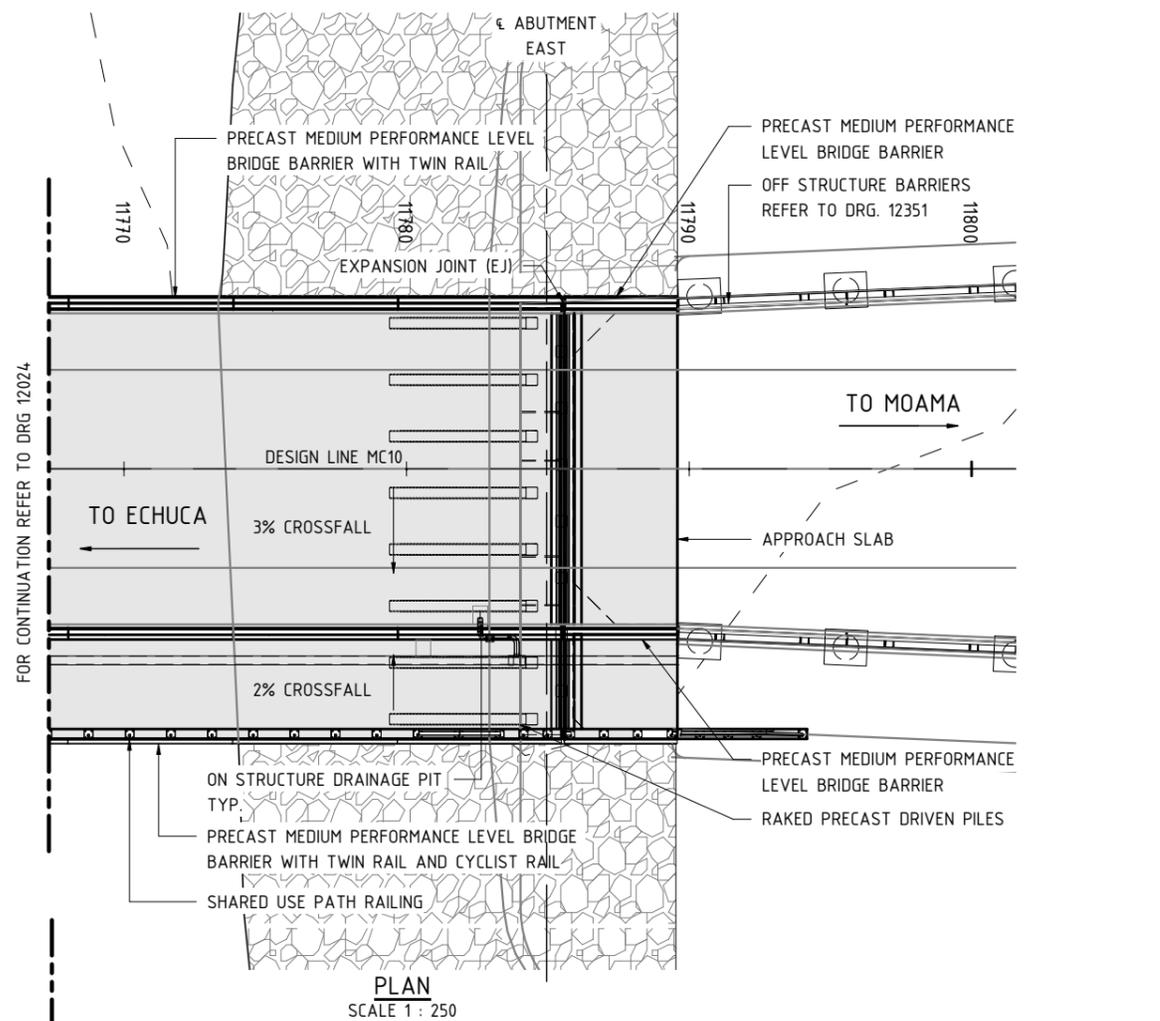
 CONTRACT No.
 ASSET ID

CLIENT

 DESIGN AND CONSTRUCTION CONTRACTOR

CLIENT	PROJECT		
MRPV	ECHUCA-MOAMA BRIDGE		
SECTION	STAGE 03		
DRAWN M. ROLDAN	DRAFTING CHECK P. VAN HULST	VERIFIER J.T. FAM	DESIGN MANAGER G. BANKS
DESIGNED L. MARTINEZ	TEAM LEADER M. TAYLOR		

TITLE		
ROAD ALIGNMENT PLAN SHEET 6 OF 7		
SCALE 1:1000	DRAWING No 9674-03-CRD-DRG-6000-10116	REV B



- NOTES:**
1. FOR GENERAL NOTES REFER TO DRGs 12011 TO 12015.
 2. ALL LONGITUDINAL SPAN DIMENSIONS MEASURED ALONG DESIGN LINE.
 3. FOR SCOUR PROTECTION DETAILS REFER TO DRGs. 124.11 TO 124.16.

DETAILED DESIGN

No	DATE	DESIGNED	TEAM LEADER	DESIGN MANAGER	AMENDMENT
B	02/04/20	JV	VM	GB	DETAILED DESIGN
A	12/12/19	JV	VM	GB	PRELIMINARY DESIGN

DESIGN CONSULTANT

CONTRACT No.

ASSET ID

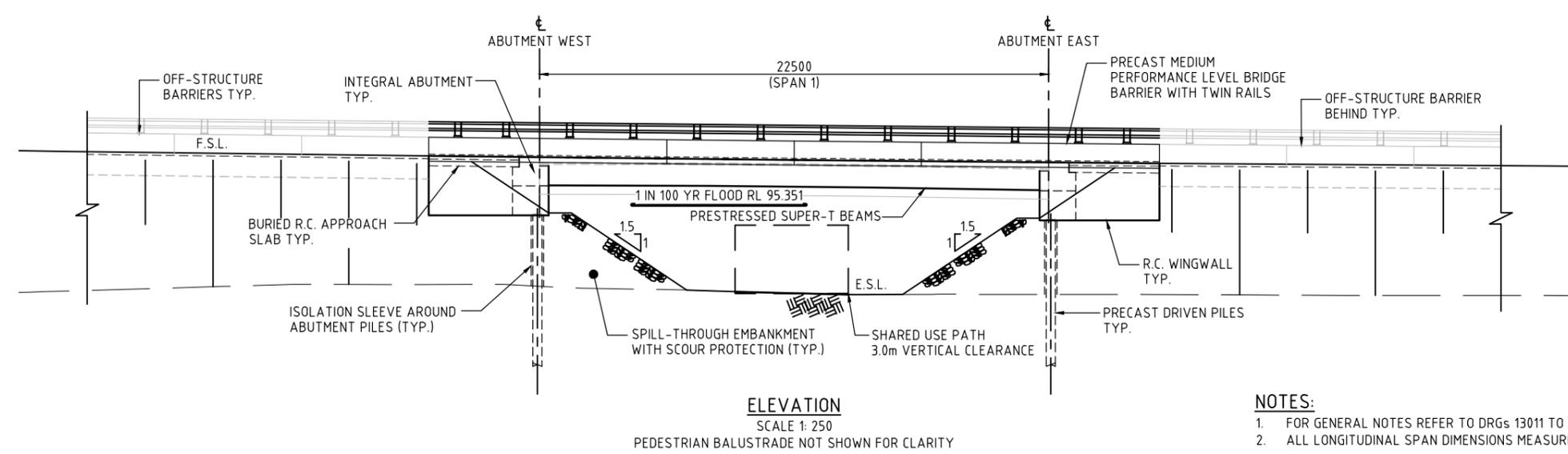
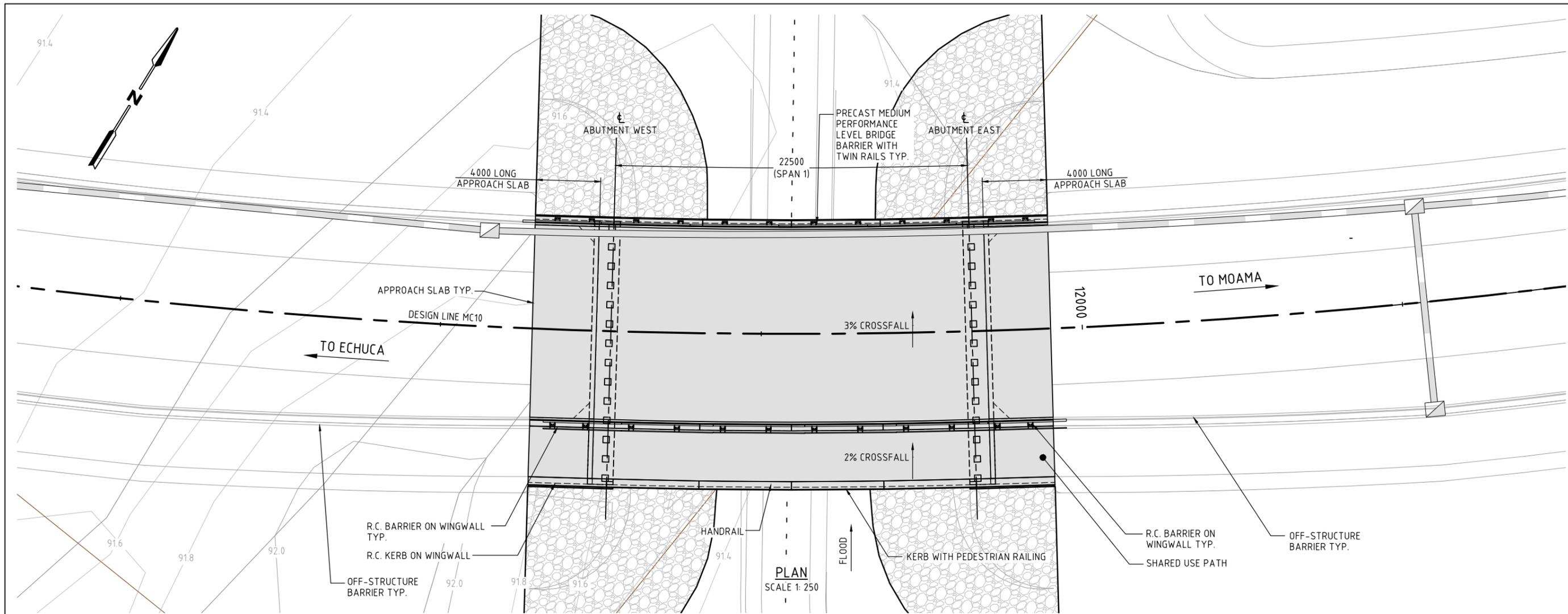
CLIENT

DESIGN AND CONSTRUCTION CONTRACTOR

CLIENT	MRPV			PROJECT	ECHUCA-MOAMA BRIDGE	
SECTION	STAGE 3					
DRAWN	A. QUEK	DRAFTING CHECK	L. PARRY	VERIFIER	DESIGN MANAGER	
DESIGNED	J. VASS	TEAM LEADER	V. M. KIAN	G. BANKS		

TITLE		
2100 - MURRAY RIVER CROSSING APPROACH SPANS GENERAL ARRANGEMENT PLAN AND ELEVATION - SHEET 5		
SCALE	DRAWING No	REV
1 : 250	9674-03-SBR-DRG-2100- 12025	B

2/04/2020 2:09:18 PM BIM 360://12519170 - Echuca Moama Bridge Project/12519170-ST-EMBP-MRA.rvt



- NOTES:**
- FOR GENERAL NOTES REFER TO DRGs 13011 TO 13015.
 - ALL LONGITUDINAL SPAN DIMENSIONS MEASURED ALONG THE DESIGN LINE.



PRELIMINARY

No	DATE	DESIGNED	TEAM LEADER	DESIGN MANAGER	AMENDMENT
A	10/02/20	AJ	VM	GB	PRELIMINARY DESIGN

DESIGN CONSULTANT

CONTRACT No.

ASSET ID

CLIENT

DESIGN AND CONSTRUCTION CONTRACTOR

CLIENT	MRPV	PROJECT	ECHUCA-MOAMA BRIDGE
SECTION	STAGE 03		
DRAWN	S.KOKLAS	DRAFTING CHECK	VERIFIER
DESIGNED	A.JOHAL	TEAM LEADER	V.M.KIAN
		DESIGN MANAGER	G.BANKS

TITLE		2500 - NSW FLOOD RELIEF STRUCTURE
		GENERAL ARRANGEMENT
		PLAN AND ELEVATION
SCALE	DRAWING No	REV
AS SHOWN	9674-03-SBR-DRG-2500-13021	A

27/02/2020 H:\AN\Brisbane\Projects\31\3000\CAD\Drawings\674-03-SBR-DRG-2500-13021.dwg

Appendix B

Consideration of clause 228(2) factors and matters of National Environmental Significance and Commonwealth land

In addition to the requirements of the *Is an EIS required?* (1995/1996) guideline and the *Roads and Related Facilities EIS Guideline* (DUAP, 1996) as detailed in the addendum REF, the following factors, listed in clause 228(2) of the Environmental Planning and Assessment Regulation 2000, have also been considered to assess the likely impacts of the proposed modification on the natural and built environment.

Factor	Impact
<p>a. Any environmental impact on a community? During the construction of the proposed modification, there would be impacts to the community associated with noise, air quality and visual amenity. These impacts are likely to occur throughout the construction period and would be managed by implementation of the safeguards listed in Chapter 7 of this addendum REF.</p> <p>The long term benefits of the project would reduce traffic congestion on the bridge and in the Moama town centre, improving the amenity of the town and safety for motorists, cyclists and pedestrians.</p>	<p>Long-term moderate Negative</p> <p>Long-term positive</p>
<p>b. Any transformation of a locality? The proposed modification would result in changes to the locality (a 0.17 ha increase to the project boundary) including vegetation. These impacts would be managed by implementation of the safeguards listed in Section 7 of this addendum REF, including rehabilitation and landscaping of disturbed areas.</p>	Minor negative
<p>c. Any environmental impact on the ecosystems of the locality? The environment in which the proposed modification would be located comprises River Red Gum – Black Box woodland. A desktop assessment of the existing local environment was carried out to identify and manage any potential impacts of the project on local biodiversity. The proposed modification would not have a significant impact on biological diversity and ecological integrity. Project impacts would be managed by implementation of the safeguards listed in Section 7 of this addendum REF.</p>	Minor negative
<p>d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The project, including the proposed modification, would result in changes to the locality through the removal of a small amount of native vegetation (refer Figure 1-2). These impacts would be managed by implementation of the safeguards listed in Chapter 7 including rehabilitation and landscaping of disturbed areas.</p>	Minor negative
<p>e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposed modification is unlikely to affect a locality, place or buildings within the area.</p>	Nil

Factor	Impact
<p>f. Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)?</p> <p>The proposed modification would remove 0.17 hectares of River Red Gum and Black Box woodland, which is potential habitat for a large number of native fauna species protected under the NPW Act. Habitat loss would include one hollow-bearing tree. The addendum REF is unlikely to have a significant impact on any listed species (refer Section 6.1). Detailed design and implementation of safeguards and management measures would aim to minimise impacts on biodiversity.</p>	Minor negative
<p>g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</p> <p>The proposed modification would remove 0.17 hectares of River Red Gum vegetation, which provides potential habitat for a number of threatened species. Habitat loss would include one hollow-bearing tree. The addendum REF is unlikely to have a significant impact on any listed species (refer Section 6.1). Detailed design and implementation of safeguards and management measures would aim to minimise impacts on biodiversity.</p>	Minor negative
<p>h. Any long-term effects on the environment?</p> <p>The project including the proposed modification would cause long-term ecological impacts. Detailed design and implementation of safeguards and management measures would aim to minimise impacts on biodiversity as described in Section 6.1.</p> <p>The proposed modification is likely to have benefits for the Echuca-Moama community due to better sustainability outcomes, improved road infrastructure, improved access between Echuca and Moama, and relief of traffic congestion in the town centres.</p>	<p>Long-term negative</p> <p>Long-term positive</p>
<p>i. Any degradation of the quality of the environment?</p> <p>The proposed modification would result in short-term negative impacts to the local community as a result of construction noise, vibration, visual impacts, and dust. Additional minor impacts to biodiversity are also anticipated as stated in (g) above. No additional water quality impacts are expected as a result of the proposed modification.</p> <p>With the implementation of safeguards in Chapter 7, the risk of impacts would be minor.</p>	<p>Short-term moderate Negative</p> <p>Short-term minor negative</p>
<p>j. Any risk to the safety of the environment?</p> <p>The proposed modification would improve the safety of the road network for the Echuca-Moama community through improved road infrastructure, improved access between Echuca and Moama, and relief of traffic congestion in the town centres.</p>	<p>Nil</p> <p>Long-term positive.</p>
<p>k. Any reduction in the range of beneficial uses of the environment?</p> <p>The proposed modification would not result in any reduction in beneficial uses of the environment. The long-term benefits of the project, including the proposed modification, would include improved road safety, improved travel times, and improved safety for pedestrians and cyclists.</p>	<p>Nil</p> <p>Long-term positive</p>

Factor	Impact
<p>l. Any pollution of the environment? The proposed modification would not involve the generation of any waste streams that would be problematic for disposal.</p> <p>There is the potential for accidental spills of chemicals during the construction period which could affect surrounding land and the Murray River. Erosion and sedimentation if not controlled would result in impact on water quality within the Murray River.</p> <p>There is expected to be minimal change in air quality and noise during operation of the new bridge design compared to the existing.</p>	<p>Nil</p> <p>Short-term negative</p> <p>Nil</p>
<p>m. Any environmental problems associated with the disposal of waste? The proposed modification would be unlikely to generate contaminated waste. Other waste streams generated during construction are common and would pose no difficulty in their disposal. Waste would be recycled wherever possible. Waste would be managed in accordance with the safeguards outlined in Section 7.2</p>	<p>Nil</p>
<p>n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? All resources required for the proposed modification are readily available and are not in short supply. The proposed modification would result in a reduction of the construction materials required for the project, leading to a long term positive impact on the environment due to improved resource use.</p>	<p>Long-term positive</p>
<p>o. Any cumulative environmental effect with other existing or likely future activities? The proposed modification would not result in any additional adverse impacts beyond those assessed in the REF for the approved project.</p>	<p>Nil</p>
<p>p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposed modification is not located within a coastal area, and would not cause any impact on coastal processes and coastal hazards.</p>	<p>Nil</p>

Matters of National Environmental Significance and Commonwealth land

Under the environmental assessment provisions of the EPBC Act, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposed modification should be referred to the Australian Government Department of the Environment.

Under the EPBC Act strategic assessment approval a referral is not required for proposed road actions that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. Impacts on these matters are assessed in detail as part of this addendum REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor	Impact
a. Any impact on a World Heritage property? The proposed modification will not impact on a World Heritage property.	Nil
b. Any impact on a National Heritage place? The proposed modification will not impact on a World Heritage place.	Nil
c. Any impact on a wetland of international importance? Two wetlands of international importance (Gunbower Forest and NSW Central Murray state forest Ramsar Sites) are located about 60 kilometres by river downstream of the proposed modification site. Provided the mitigation measures detailed in Section 7.2 of this addendum REF are implemented the risk of impacts on a wetland of international importance would be low.	Minor
d. Any impact on a listed threatened species or communities? The proposed removal of habitat is unlikely to have significant impacts on threatened species due to a number of these species being unlikely to make significant use of the habitat in the proposed modification area, their mobility and the low likelihood that the fragmentation of habitat would significantly affect these species.	Minor
e. Any impacts on listed migratory species? The proposed modification would not have a significant impact on listed migratory species. Refer to Section 6.2 for further details.	Minor short-term negative
f. Any impact on a Commonwealth marine area? The proposed modification is not located near a marine area and would be unlikely to have an impact on a marine area	Nil
g. Does the proposed modification involve a nuclear action (including uranium mining)? The proposed modification would not involve a nuclear action.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The proposed modification would no impact (either directly or indirectly) on Commonwealth land.	Nil

Appendix C

Statutory consultation checklists

Infrastructure SEPP

Council related infrastructure or services

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	ISEPP clause
Stormwater	Are the works likely to have a <i>substantial</i> impact on the stormwater management services which are provided by council?	No	Murray River Council	ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will <i>strain</i> the capacity of the existing road system in a local government area?	No	Murray River Council	ISEPP cl.13(1)(b)
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a <i>substantial</i> impact on the capacity of any part of the system?	No	Murray River Council	ISEPP cl.13(1)(c)
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a <i>substantial</i> volume of water?	No	Murray River Council	ISEPP cl.13(1)(d)
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a <i>minor</i> or <i>inconsequential</i> disruption to pedestrian or vehicular flow?	No	Murray River Council	ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than <i>minor</i> or <i>inconsequential</i> excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No	Murray River Council	ISEPP cl.13(1)(f)

Local heritage items

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s)	ISEPP clause
Local heritage	Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than <i>minor</i> or <i>inconsequential</i> ?	No	Murray River Council	ISEPP cl.14

Flood liable land

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a <i>minor</i> extent?	Yes – the works are not expected to change flood patterns beyond a minor extent.	Murray River Council	ISEPP cl.15
Flood liable land	Are the works located on flood liable land? (to any extent). If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance	Yes – the works are not expected to change flood patterns beyond a minor extent.	State Emergency Services Email: erm@ses.nsw.gov.au	ISEPP cl.15AA

Public authorities other than councils

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the <i>National Parks and Wildlife Act 1974</i> , or on land acquired under that Act?	No	Office of Environment and Heritage	ISEPP cl.16(2)(a)
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No	Office of Environment and Heritage	ISEPP cl. 16(2)(b)
Aquatic reserves and marine parks	Are the works adjacent to an aquatic reserve or a marine park declared under the <i>Marine Estate Management Act 2014</i> ?	No	Department of Industry	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the <i>Sydney Harbour Foreshore Authority Act 1998</i> ?	No	Sydney Harbour Foreshore Authority	ISEPP cl.16(2)(d)
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No	Rural Fire Service	ISEPP cl.16(2)(f)
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No	Director of the Siding Spring Observatory	ISEPP cl. 16(2)(g)
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).	No	Secretary of the Commonwealth Department of Defence	ISEPP cl. 16(2)(h)
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the <i>Mine Subsidence Compensation Act 1961</i> ?	No	Mine Subsidence Board	ISEPP cl. 16(2)(i)

Appendix D

Biodiversity desktop search results



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 06/04/20 21:31:05

[Summary](#)

[Details](#)

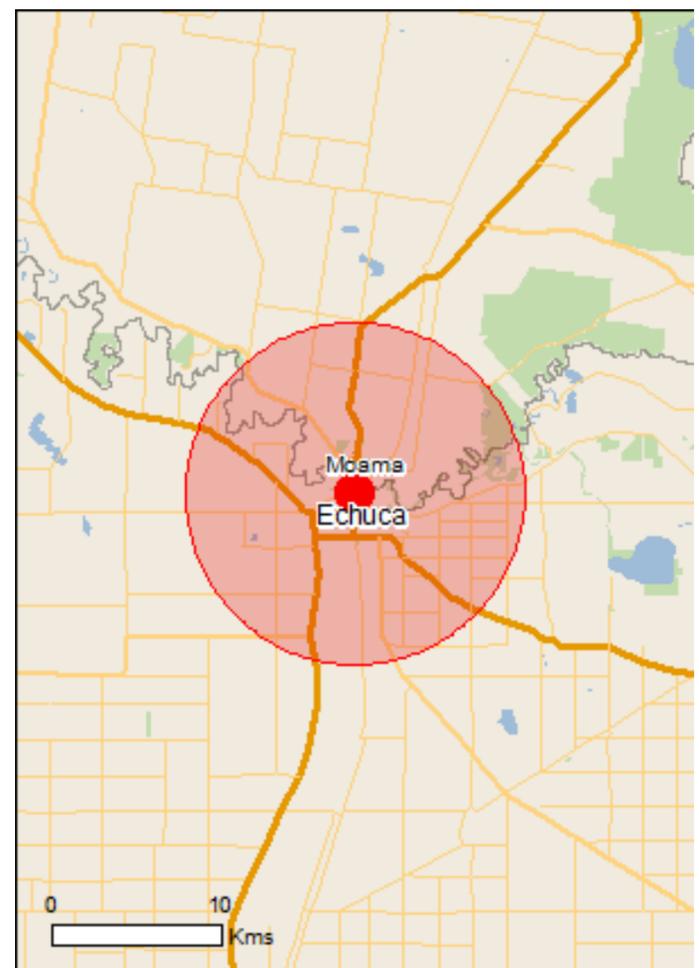
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

[Buffer: 10.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	6
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	31
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	20
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	5
Regional Forest Agreements:	None
Invasive Species:	31
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Historic		
Echuca Wharf	VIC	Listed place

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Banrock station wetland complex	400 - 500km upstream	
Gunbower forest	10 - 20km upstream	
Hattah-kulkyne lakes	200 - 300km upstream	
Nsw central murray state forests	Within 10km of Ramsar	
Riverland	400 - 500km upstream	
The coorong, and lakes alexandrina and albert wetland	400 - 500km upstream	

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Natural Grasslands of the Murray Valley Plains	Critically Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within

Name	Status	Type of Presence area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Bidyanus bidyanus Silver Perch, Bidyan [76155]	Critically Endangered	Species or species habitat known to occur within area
Craterocephalus fluviatilis Murray Hardyhead [56791]	Endangered	Species or species habitat may occur within area
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat known to occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Crinia sloanei Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Insects		
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat known to occur within area
Mammals		
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Amphibromus fluitans River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat known to occur within area
Brachyscome muelleroides Mueller Daisy [15572]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Caladenia tensa Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat likely to occur within area
Myriophyllum porcatum Ridged Water-milfoil [19919]	Vulnerable	Species or species habitat likely to occur within area
Pimelea spinescens subsp. spinescens Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat known to occur within area
Pterostylis despectans Lowly Greenhood [6272]	Endangered	Species or species habitat may occur within area
Sclerolaena napiformis Turnip Copperburr [11742]	Endangered	Species or species habitat known to occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Swainsona plagiotropis Red Darling-pea, Red Swainson-pea [10804]	Vulnerable	Species or species habitat likely to occur within area

Reptiles

Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area
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Listed Migratory Species

[[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
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Migratory Marine Birds

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
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Migratory Terrestrial Species

Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
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Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
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Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
--	--	--

Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
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Migratory Wetlands Species

Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
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Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
--	--	--

Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
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Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Corporation Defence - BOBDUBI BARRACKS - ECHUCA

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Echuca West B.R.	VIC
Goulburn River	VIC
Murray Valley	NSW
River Murray Reserve	VIC
River Murray Reserve (non-PV)	VIC

Invasive Species

[[Resource Information](#)]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species

Name	Status	Type of Presence
<p>Alauda arvensis Skylark [656]</p>		<p>habitat likely to occur within area</p> <p>Species or species habitat likely to occur within area</p>
<p>Anas platyrhynchos Mallard [974]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Carduelis carduelis European Goldfinch [403]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Passer domesticus House Sparrow [405]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Passer montanus Eurasian Tree Sparrow [406]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Streptopelia chinensis Spotted Turtle-Dove [780]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Sturnus vulgaris Common Starling [389]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Turdus merula Common Blackbird, Eurasian Blackbird [596]</p>		<p>Species or species habitat likely to occur within area</p>
Mammals		
<p>Canis lupus familiaris Domestic Dog [82654]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Capra hircus Goat [2]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Felis catus Cat, House Cat, Domestic Cat [19]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Lepus capensis Brown Hare [127]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Mus musculus House Mouse [120]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Oryctolagus cuniculus Rabbit, European Rabbit [128]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Rattus rattus Black Rat, Ship Rat [84]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Sus scrofa Pig [6]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Vulpes vulpes Red Fox, Fox [18]</p>		<p>Species or species</p>

Name	Status	Type of Presence
habitat likely to occur within area		
Plants		
<p>Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]</p>		Species or species habitat likely to occur within area
<p>Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]</p>		Species or species habitat likely to occur within area
<p>Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]</p>		Species or species habitat may occur within area
<p>Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]</p>		Species or species habitat likely to occur within area
<p>Lycium ferocissimum African Boxthorn, Boxthorn [19235]</p>		Species or species habitat likely to occur within area
<p>Nassella neesiana Chilean Needle grass [67699]</p>		Species or species habitat likely to occur within area
<p>Opuntia spp. Prickly Pears [82753]</p>		Species or species habitat likely to occur within area
<p>Rubus fruticosus aggregate Blackberry, European Blackberry [68406]</p>		Species or species habitat likely to occur within area
<p>Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]</p>		Species or species habitat likely to occur within area
<p>Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]</p>		Species or species habitat likely to occur within area
<p>Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]</p>		Species or species habitat likely to occur within area
<p>Ulex europaeus Gorse, Furze [7693]</p>		Species or species habitat likely to occur within area
Nationally Important Wetlands		[Resource Information]
Name	State	
Lower Goulburn River Floodplain	VIC	

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-36.1219 144.75195

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Appendix E Stage 1 PACHCI letter



6 March 2020

Rick Koschel
Project/Contract Manager
Transport for NSW
193 – 195 Morgan Street
Wagga Wagga NSW 2650

Dear Rick,

Preliminary assessment results for Echuca-Moama bridge crossing: Stage 3 (REF boundary adjustments 2020), based on Stage 1 of the *Procedure for Aboriginal cultural heritage consultation and investigation* (the procedure).

The project, as described in the “*Stage 1 Roads and Maritime Services assessment (PACHCI resource 3)*” was assessed as being unlikely to have an impact on Aboriginal cultural heritage.

The assessment is based on the following due diligence considerations:

- The project is unlikely to harm known Aboriginal objects or places.
- The AHIMS search did indicate Aboriginal objects adjacent to the study area. These objects are well outside the project study area and appropriate safeguards will be implemented.
- The study area does contain landscape features that indicate the presence of Aboriginal objects, based on the Office of Environment and Heritage’s *Due diligence Code of Practice for the Protection of Aboriginal objects in NSW* and the Roads and Maritime Services’ procedure, but, the cultural heritage potential of the study area appears to be reduced due to past disturbance.
- There is an absence of sandstone rock outcrops likely to contain Aboriginal art.

Your project may proceed in accordance with the environmental impact assessment process, as relevant, and all other relevant approvals.

If the scope of your project changes, you must contact me and your regional environmental staff Dan Francis (Ext 76634) to reassess any potential impacts on Aboriginal cultural heritage.

If any potential Aboriginal objects (including skeletal remains) are discovered during the course of the project, all works in the vicinity of the find must cease. Follow the steps outlined in the Roads and Maritime Services’ Procedure: Unexpected Heritage Items (PN 285 P02).

For further assistance in this matter do not hesitate to contact me.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Andrew Whitton', written in a cursive style.

Andrew Whitton
Aboriginal Cultural Heritage Officer – South West

Stage 1 Roads and Maritime Services assessment

Procedure for Aboriginal cultural heritage consultation and investigation: Resource 3

Aim

The project manager must provide the information requested in this checklist to the regional Aboriginal cultural heritage adviser. This information will assist them in determining whether the project may affect Aboriginal cultural heritage in accordance with Stage 1 of the procedure.

Please **provide** this completed cover sheet, along with the required information, to your regional Aboriginal cultural heritage adviser.

Contact details for this project

Name of project:

Echuca-Moama bridge crossing: Stage 3

Project manager

Rick Koschel

Environmental officer undertaking/managing the environmental impact assessment

Michael Suidgeest 0476826942

Corporate communications officer, if any

Belinda Barker

Date:

18/02/2020

Action	Status <input checked="" type="checkbox"/>
<p>Item 1 Attach an overview of the project. The overview must include the known scope and extent of the proposed works; compound site requirements; access and movement of plant; re-location and/or provision of utilities; the location of noise walls, sedimentation basins, shared pathways, cycle ways, etc...</p> <p>Figure 1 attached identifies two areas that have been previously assessed by Heritage Insight but are not included in the current project REF boundary. Area 1a and 1b are located in the middle of the NSW floodplain. Detailed design of the Murray River Bridge has resulted in two less bridge segments and an associated extended earth fill embankment. The REF boundary needs to be extended to allow for the extended earth fill embankment. This extended area is within the area already assessed in previous investigations.</p> <p>Area B is located at the back on the NSW floodplain south of Boundary Road. This REF boundary adjustment is required to allow water main relocation in the Forbes Street road reserve. The adjustment also encompasses an existing access track that will be utilised to access the bridge alignment during construction. The existing access track and proposed water main alignment have been assessed in previous investigations but are not included in the current REF boundary.</p>	<input type="checkbox"/>
<p>Item 2 Attach a map/plan of the study area that clearly outlines the extent and scope of the project. The map/plan should also include topographical information where available.</p> <p>Figure 1 identifies area 1A and 1B toward the centre of the NSW floodplain and area B near Forbes Street at the back of the NSW Floodplain.</p> <p>Figure 2 shows the study area of previous Heritage Insights investigations.</p>	<input type="checkbox"/>
<p>Item 3 If land acquisition is required, provide details about this.</p> <p>Additional land acquisition is required for areas 1A and 1B but it is not required for area B. The acquisition process is underway and is being managed by TfNSW staff. The land being acquired is the same parcel of land that has already been acquired for the bridge by TfNSW.</p>	<input type="checkbox"/>
<p>Item 4 Attach a brief description of current and past land use, where known. For example, the study area land is currently used as a car park/road reserve/farming/etc. and was formally used for a car park/road reserve/farming/etc...</p> <p>The area surrounding areas 1A and 1B is private land covered in regrowth native vegetation. Historic land uses are described in Heritage Insights report that is attached.</p> <p>Forbes Street is a gravel road that receives very little vehicle traffic. Forbes Street is closed off by bollards at Boundary Road most of the time. The road reserve has been previously cleared but has a mixture of planted and native mature trees. Some of these trees will be removed to build the new water main.</p>	<input type="checkbox"/>

<p>Figure 3 is taken from Heritage Insights report. It is attached below.</p>	
<p>Item 5 Describe the timeframe for the project along with key milestones and deliverables.</p> <p>The Murray River Bridge will take about 2 years to build. On site works will begin in March 2020.</p>	<input type="checkbox"/>
<p>Item 6 Please attach the results of the Office of Environment and Heritage's Aboriginal Heritage Information Management System (AHIMS) Basic Search - http://www.environment.nsw.gov.au/licences/WhatInformationCanYouObtainFromAHIMS.htm</p> <p>If required, please include the results of an AHIMS Extensive Search. These results should be plotted on a map/plan covering the study area.</p> <p>Heritage Insights and KNC Consulting describe and map known AHIMS records in these previous investigations.</p> <p>See attached reports</p>	<input type="checkbox"/>
<p>Item 7 Attach the results of the following heritage searches relevant to the study area:</p> <ul style="list-style-type: none"> • Native Title Register search • State Heritage Inventory search • Australian Heritage Database search <p>See attached reports</p>	<input type="checkbox"/>
<p>Item 8 Attach a copy of any heritage assessment (Aboriginal or non-Aboriginal) previously prepared for the study area/project?</p> <ul style="list-style-type: none"> • KNC consulting: Cultural Heritage Assessment Report, 2019 • Heritage Insight: PACHI stage 2, Moama compounds and NSW river bank investigations, 2019 • Heritage Insight: Cultural Heritage Report – Mid west 2 option for VicRoads, 2013 • Heritage Insight: Cultural Heritage Report, 2010b <p>A collection of relevant sections of the above reports is provided below:</p> <ul style="list-style-type: none"> • KNC: CHAR Pg. 18 - No Aboriginal archaeological sites or areas of potential archaeological deposit were found in the Mid-West Option on the NSW side of the Murray River and the assessment determined that it was “unlikely that construction of a road in the NSW study area will impact on Aboriginal cultural heritage” (Terra Culture 2010b: 19). The MLALC expressed concerns about potential impact to Aboriginal cultural heritage due to the removal of tree roots from the banks of the Murray River (Terra Culture 2010b: 19). • KNC CHAR Pg. 32 - The current study area forms part of a new potential corridor (Mid-West Option) downstream of Warren Street that was 	<input type="checkbox"/>

developed as an alternative and was subsequently selected as the preferred option due to environmental, social and economic considerations. Archaeological assessments of the current study area, including archaeological survey and a test excavation program have been undertaken between 2007 and 2019. No Aboriginal archaeological sites were identified in the current study area.

- **KNC: CHAR pg. 34**

- *8.2 Significance assessment criteria*

- The wider local area has cultural value for the local Aboriginal community. The identified cultural value is a feeling of attachment and responsibility for the land.
 - To date, no areas of Aboriginal cultural significance have been identified within the immediate study area. The study area does not display any identified archaeological, historic or aesthetic significance in relation to Aboriginal heritage values.

- **Heritage Insight 2019 pg. 2: Cultural and archaeological background**

There have been three surveys of the road alignment in NSW, none of which encompassed the three work compound sites, but all of which surveyed the location of Pier 6 and the floodplain. An initial survey of road alignments was conducted in 2007, in association with Damien Morgan Buller, Travis Morgan and Uncle Col Walker from the Yorta Yorta Nation Aboriginal Corporation and Joe Day from the Moama Local Aboriginal Land Council. No Aboriginal sites were found during this survey and it was noted that the floodplain in NSW had been extensively disturbed by logging. A large sand hill which had been subject to mining was identified as an area of potential sensitivity for Aboriginal sites during the field survey (Rhodes 2010b, pp.12–13). Areas of sand in the Coonambidgal Formation outside the Moama Cemetery were also identified as areas of potential sensitivity for pre and post-contact ancestral burials (Rhodes 2010b, p.13) However, the sand deposits in the Coonambidgal Formation were also an area of sensitivity for pre-contact ancestral burials. This includes the Coonambidgal Formation sands in the Cemetery Road compound (see Section 3.0), although the latter was not included in the original surveys.

- A second survey of a revised alignment in NSW was carried out during 2008 in association with Uncle Col Walker and Uncle George from the Yorta Yorta Nation Aboriginal Corporation and Phil Hudson from the Moama Local Aboriginal Land Council (Rhodes 2010b, p.14). The alignment was moved further east to avoid the sand hill identified during 2007. The 2008 survey found that the road alignment on the floodplain in NSW had been extensively disturbed by past logging, apart from a natural levee and swale above the bank of the Murray River (Rhodes 2010b, p.15).
- The 2008 survey found that the study area cut across a number of levee banks on the floodplain. The levee banks had been made by bulldozing soil on the surface of the floodplain and scraping it into mounds. It also found that the majority of red gum trees distributed across the floodplain were young regenerated red gum, apart from the trees near the river banks. The survey area was crossed by multiple vehicle tracks and there were also large areas where open excavation using mechanical equipment had taken place (Rhodes 2010b, p.15). Evidence of saw milling sites and burning of waste timber products was also found across the floodplain. No Aboriginal sites were found during this survey.

<ul style="list-style-type: none"> • Heritage Insight 2019 pg. 5 Geology and landforms To the south of Boundary Road in Moama, the landform is the recent alluvial floodplain of the Murray River. This is formed from alluvial deposits of gravel, sand and silt transported by the Murray River. If dating by Stone (2006) is correct, the alluvial sediments on the floodplain may be <1000 years in age. • Heritage Insight 2019 pg. 9 Recent land use history The floodplain of the Murray River, including near the site of the present bridge, has been almost completely cleared of timber, except for a line of trees on the riverbank (Figure 1). Anecdotal oral history obtained by Bob Adams (VicRoads) and supplied by Heather Rendle in 2008, indicates that the floodplain was logged repeatedly until recently and also that timber milling occurred on the site (Rhodes 2010a, p.22). Following floods in 1956, there was extensive logging and timber clearing on this land and possibly some cropping on the site. 	
<p>Item 9 Attach a copy of any environmental impact assessment previously prepared for the study area/project?</p> <ul style="list-style-type: none"> • GHD: Review of Environmental Factors, 2016 • NGH: Addendum Review of Environmental Factors, 2019 	□

Figure 1: Proposed REF boundary adjustments
Figure 2: Heritage Insight: Previous study area
Figure 3: Terra Culture: Previous study area

- Attachment 1: KNC 2019 
- Attachment 2: Heritage insight 2019 
- Attachment 3: Heritage Insight 2013 
- Attachment 4: Heritage Insight 2010B 
- Attachment 5: [TfNSW major projects: Echuca project documents](#)



Figure 2. Study area details

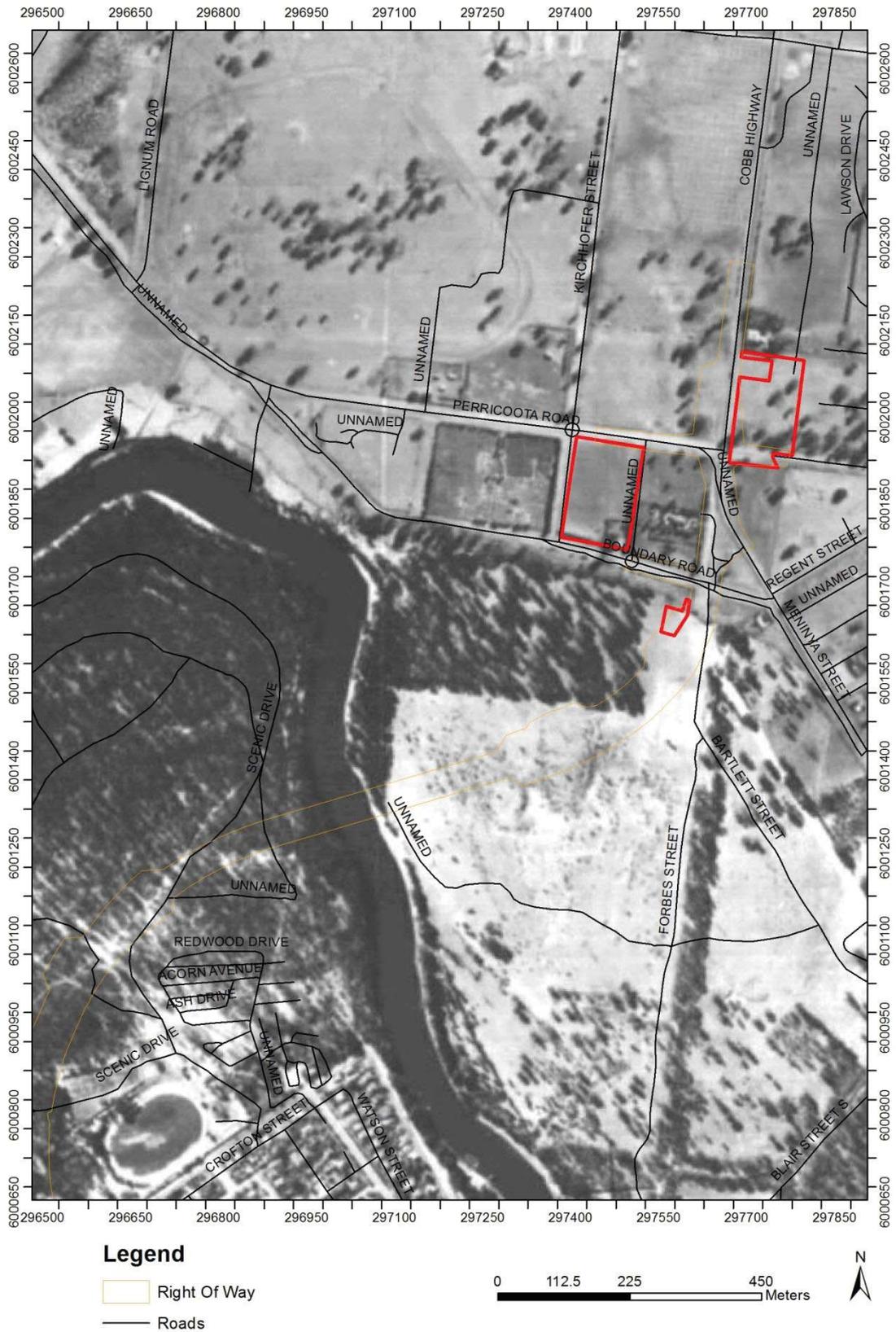
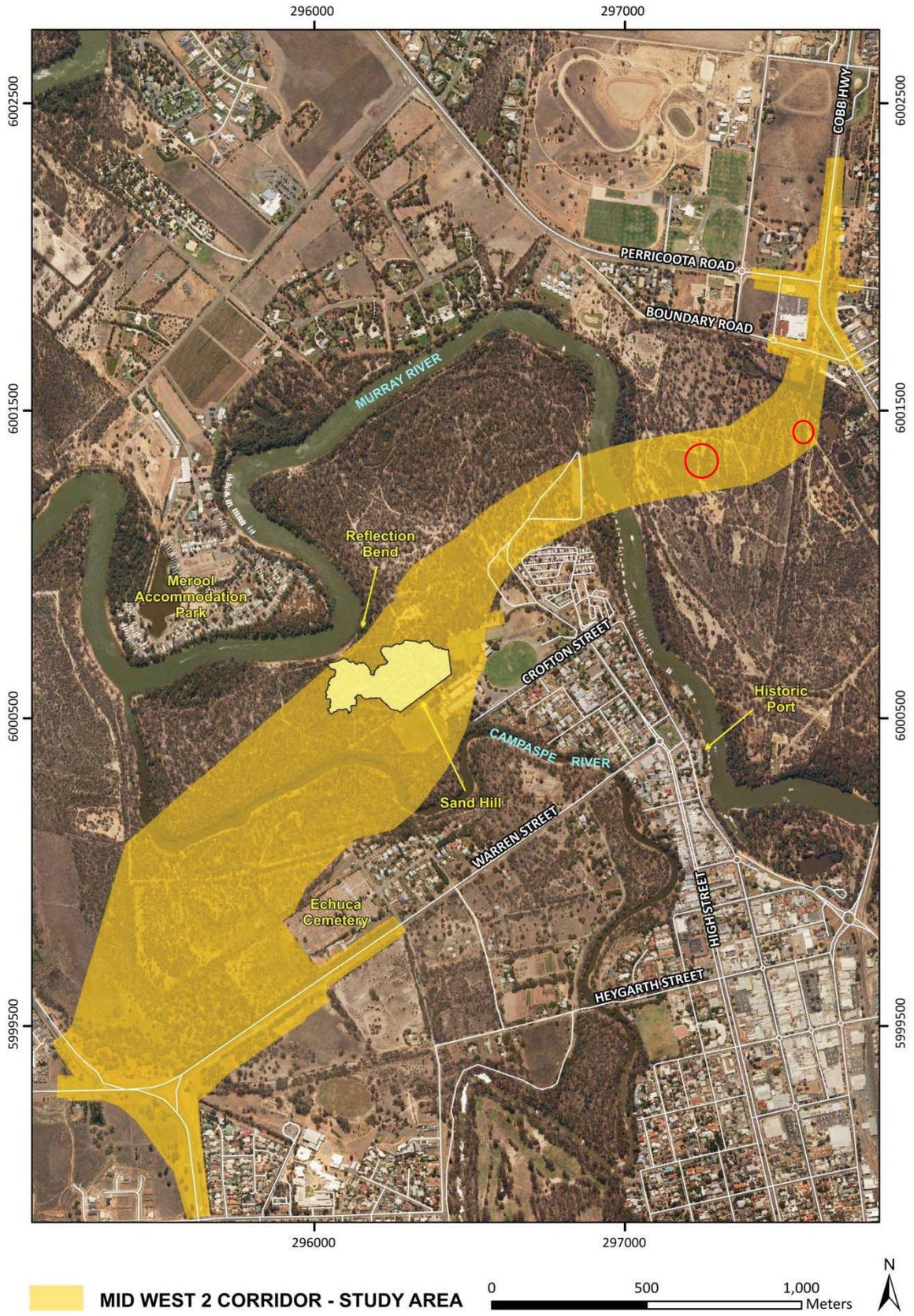


Figure 2: 1945 Aerial showing the three work compound sites



Map 2: Detailed location map of the study corridor



Figure 2. Showing an aerial view of the current study area.



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