Marshalls Creek Bridge Replacement

Addendum review of environmental factors 1

Transport for NSW

August 2023

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Transport for NSW | August 2023

Prepared by NGH and Transport for NSW

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Approval and authorisation

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1 Introduction

1.1 Proposed modification overview

Transport for NSW proposes to modify the Marshalls Creek Bridge Replacement project by amending the temporary light vehicle detour routes, the temporary pedestrian crossing and minor boundary adjustments (proposed modification).

Key features of the proposed modification would include:

- Amended light and local vehicle detour traffic route for Marshalls Creek bridge during construction
- Location and construction methodology for the temporary pedestrian crossing
- Adjustment of the land acquisition boundary on both sides of the bridge to accommodate bridge abutment scour protection and a new drainage outlet (easement).

The location of the proposed modification is shown in Figure 1-1, Figure 1-3, and Figure 1-4. See Section 3.6 and Figure 3-2, Figure 3-3, and Figure 3-4 for proposed acquisition boundary details. Chapter 3 describes the proposed modification in more detail.

A review of environmental factors (REF) was prepared for the Marshalls Creek Bridge Replacement and determined on 10 September 2021 (referred to in this addendum REF as the Project REF). The Project REF is published on the project website.

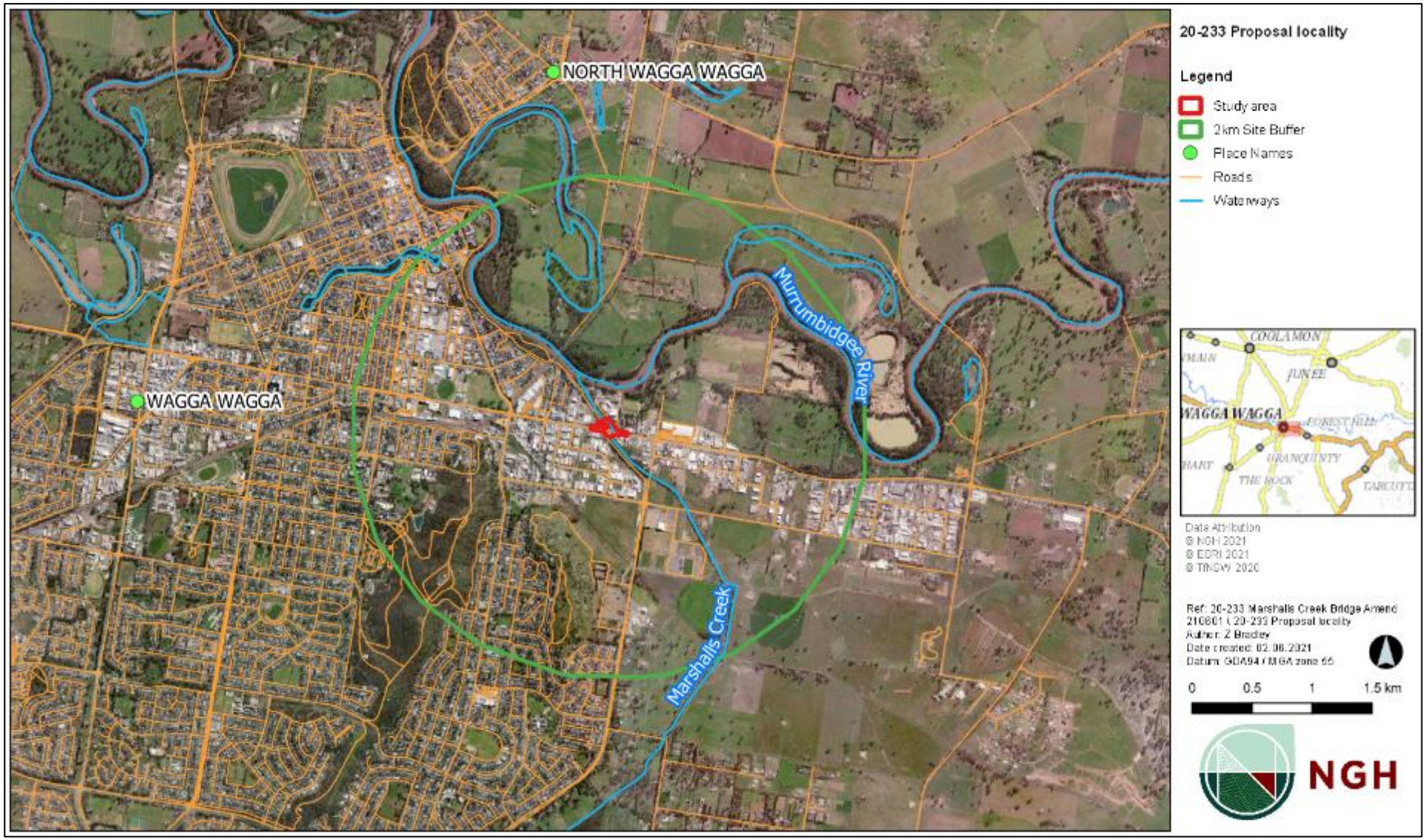

Figure 1-1 Location of the proposed modification – Project Locality

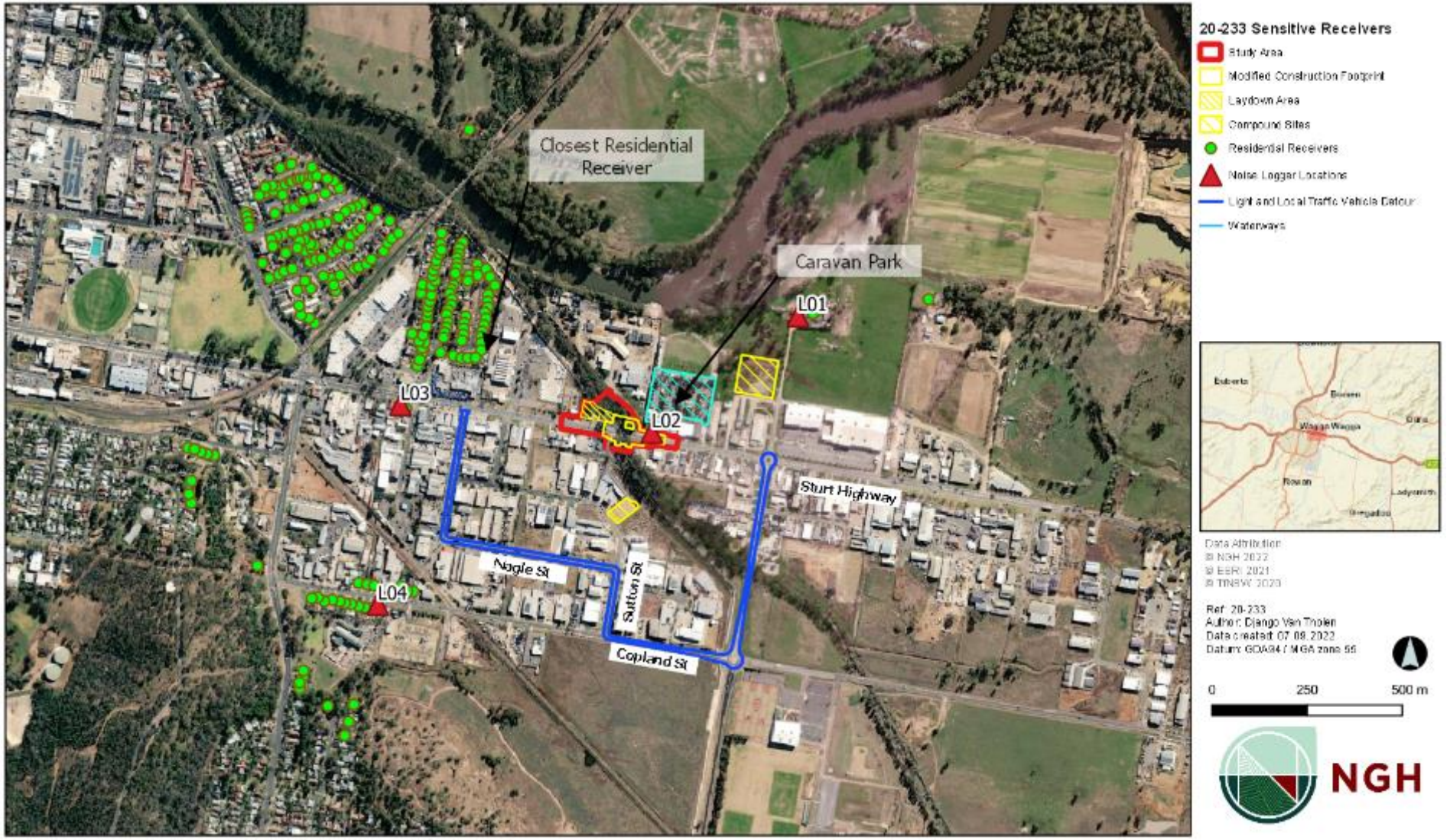

Figure 1-2 Sensitive receivers and proposed detour

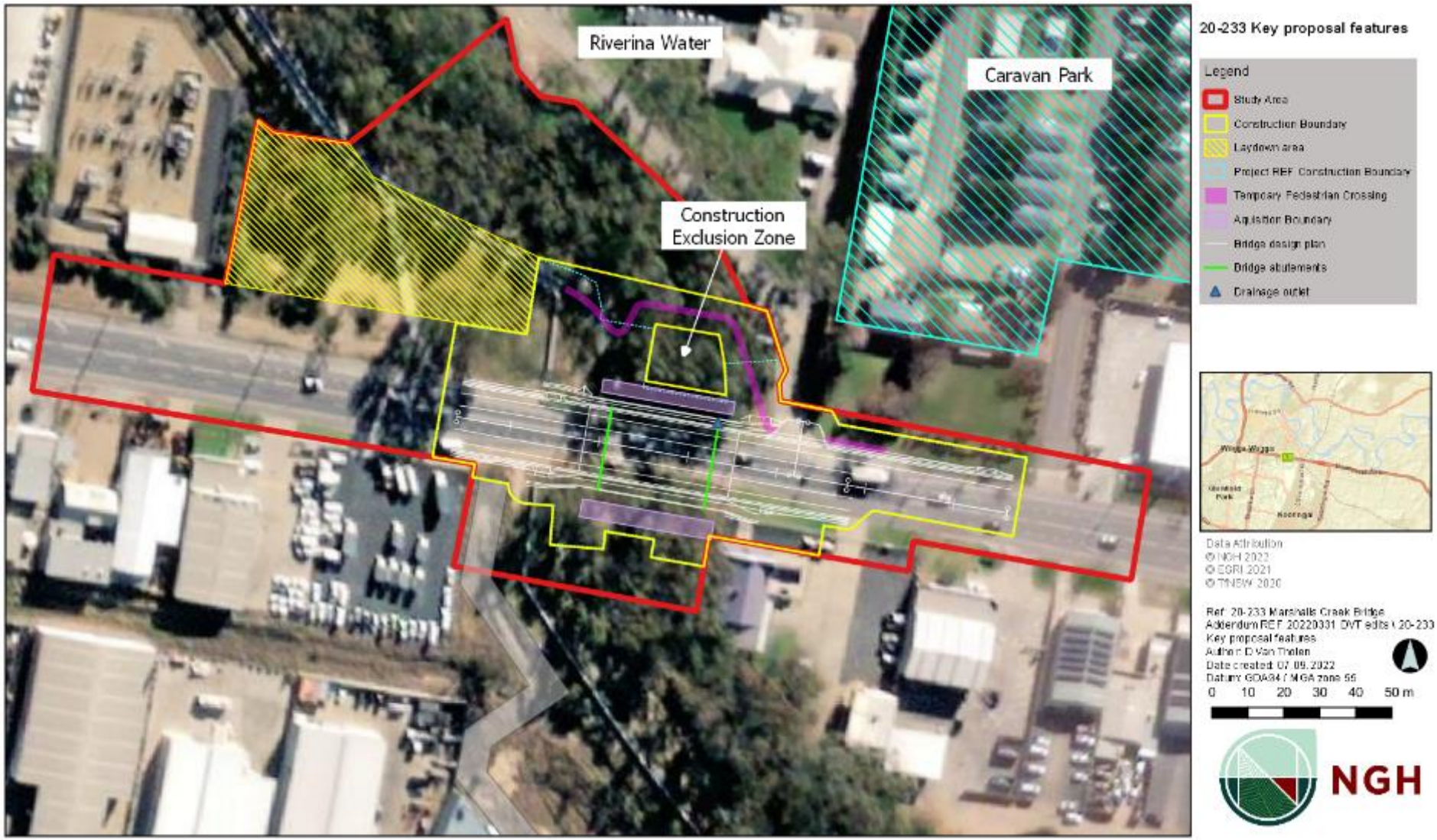

Figure 1-3 Key Proposal Features

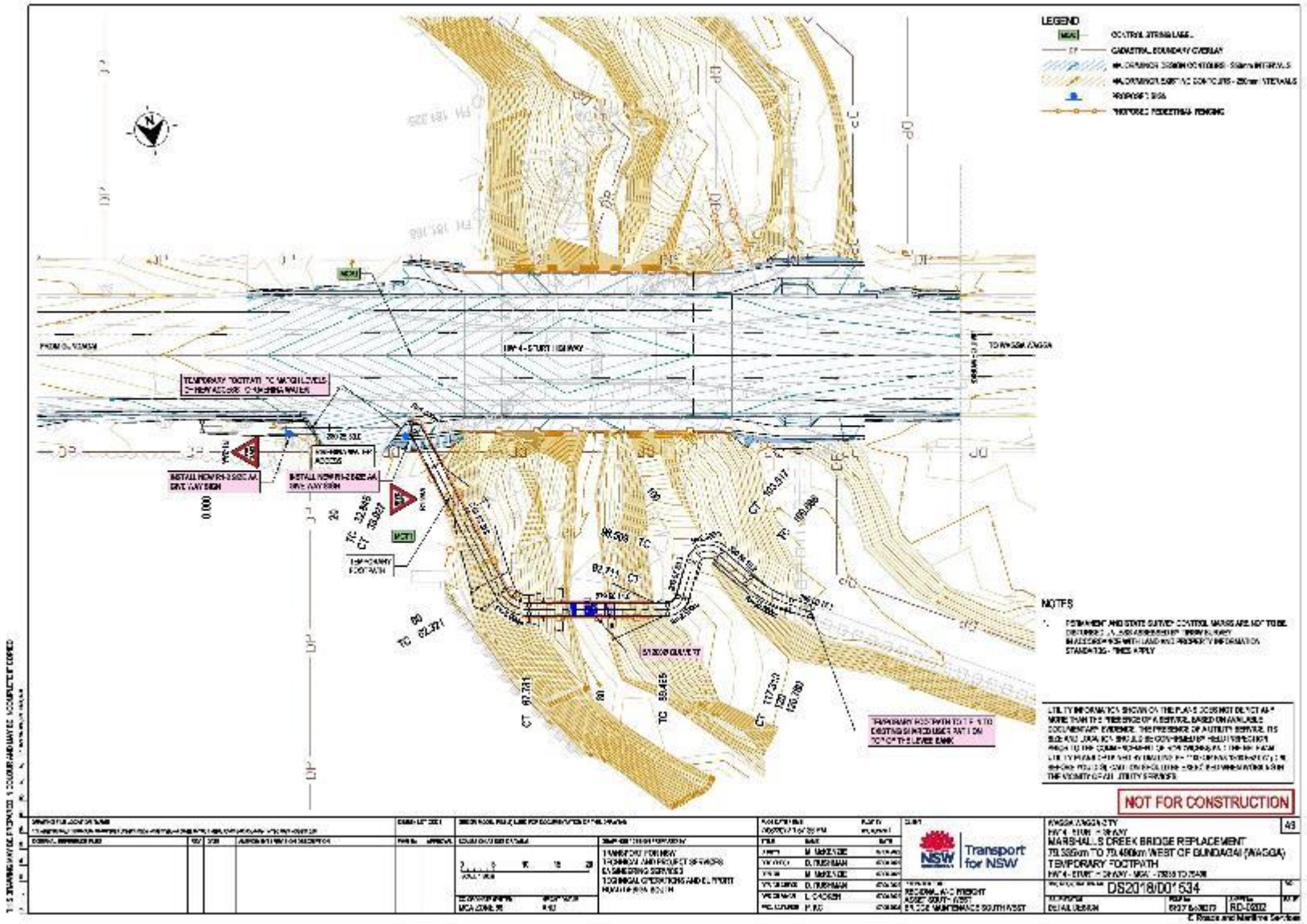

Figure 1-4 Detailed Temporary Pedestrian Crossing Design

1.2 Purpose of the report

This addendum review of environmental factors (addendum REF) has been prepared by NGH Pty Ltd (NGH) on behalf of Transport for NSW (Transport) . For the purposes of these works, Transport for NSW is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This addendum REF is to be read in conjunction with the Project REF. The purpose of this AREF 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.

The description of the proposed work and assessment of associated environmental impacts has been undertaken in context of Section 171(1) of the Environmental Planning & Assessment Regulations 2021, Part 5.1 Environmental Assessment Guidelines 2022), the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The addendum REF helps to fulfil the requirements of Section 5.5 of the EP&A Act including that Transport 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 and Public Spaces 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 Agriculture, Water and the 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

Chapter 2 of the Project REF addresses the strategic need for the project, the project objectives and the options that were considered. The proposed modification described and assessed in this addendum REF is consistent with the strategic need for the project.

The proposed modification of the construction detour is to use light and local traffic usage routes, which will minimise potential traffic congestion during construction and reduce issues for pedestrians and cyclists during construction of the project.

Light and local vehicle detour routes were amended to minimise any potential impacts on school/childcare and long detour routes as compared to the original Project REF detour route. The Wagga Wagga City Council is also in favour of amended route.

Additionally, following completion of detailed design, the location and construction methodology for a proposed temporary pedestrian crossing has been amended. Detailed design also identified that minor land acquisition is also required on the northern (downstream) and southern (upstream) sides of the bridge to accommodate bridge abutment scour protection and a new drainage outlet.

2.2 Proposal objectives and development criteria

Section 2.3 of the Project REF identifies the proposal objectives and development criteria that apply to the proposed modification.

The objectives identified in the Project REF for the proposal are consistent and remain unchanged. The proposed modifications relate primarily to planning and construction phase development criteria.

Development Criteria

The development criteria for the project proposed includes:

- Maintain through traffic during construction
- Improve road safety and remove constriction on the bridge and along the Sturt Highway
- Improve pedestrian and cyclist safety and access
- Maintain existing horizontal and vertical road/bridge alignment.

2.3 Alternatives and options considered

The proposed modifications have emerged as a consequence of detailed design development of some of the approved works. Details are provided below.

2.3.1 Methodology for selection of preferred option

The proposed modification (as described in Section 3.1) involves several changes that have arisen during detailed design and did not require consideration of other options. In this context, the process of option evaluation had two broad stages:

- A consideration of whether the proposal in any configuration could be justified. This is an evaluation of the ‘do nothing’ option
- An evaluation of other options by reference to the respective impacts and benefits.

2.3.2 Identified options

The following options were considered for the proposed modification:

- ‘Do nothing’ option – This option involves carrying the project as described in the Project REF, without any additional scope of work.

Option 1 – this option involves:

- Amended light vehicle and local traffic detour route for construction phase
- Design refinement of temporary pedestrian crossing
- Land acquisition and proposal boundary adjustment

2.3.3 Analysis of options

‘Do nothing’ option

The ‘Do nothing’ option does not address the identified project objectives which includes the improvement of road safety and traffic flow along the Sturt Highway as well as pedestrian/cyclist safety and access across the bridge. Further, the ‘Do nothing’ option would also not meet the development criteria which includes maintaining through traffic, improving road safety and traffic constriction, and ensuring pedestrian and cyclist safety and access during construction, as well as accommodating for the design and engineering standards for the bridge structure. The ‘Do nothing’ option was not considered further.

Option 1

Alternate routes for heavy and light vehicles during construction were identified based on the ability to handle increased detour traffic load in accordance with their functional classification.

The design of the temporary pedestrian crossing was based on the detailed design and construction staging required.

Land acquisition areas were determined following detailed design, which identified the additional areas required to accommodate the scour protection and new drainage outlet.

Option 1 was selected as it meets the project objectives and development criteria including:

- Optimise light traffic routes and minimise potential traffic congestion and minimise noise impacts during construction
- Ensure safety and convenience for pedestrians and cyclists during construction
- Locate pedestrian crossing to prevent or minimise impacts on construction activities and ensure environmental safeguards are achieved
- Meeting required design and engineering standards and requirements for the bridge structure.

2.4 Preferred option

Option 1, the modification, was selected as the preferred option as this enables the project objectives and development criteria to be met.

3 Description of the proposed modification

3.1 The proposed modification

Transport for NSW proposes to modify the Marshalls Creek Bridge Replacement REF to include amended temporary light vehicle detour routes, a temporary pedestrian crossing and minor boundary adjustments. The proposed modification is shown in Figure 1-2 and Figure 1-3.

Key features of the proposed modification would include:

- Amended light and local vehicle detour routes identified in Figure 1-2 which include the utilisation of Kooringal Road, Copland Street, Sutton Street and Nagle Street (Detour Traffic Route). Street names are shown on Figure 1-2.
- Design refinement and relocation downstream of the temporary pedestrian crossing, as shown in Figure 1-2 to Figure 1-4 and construction methodology
- Land acquisition and proposal boundary adjustment, as shown in Figure **3-2**, Figure 3-3, and Figure 3-4.

3.2 Design

3.2.1 Design criteria

The relevant design standards and design criteria are outlined in the Project REF in Section 3 Design. Section 6 of the Project REF lists potential environmental impacts and safeguard management measures to aid impact prevention or mitigation. These could be considered design standards in which all aspects of the proposed modification have been aligned.

3.2.2 Engineering constraints

The engineering constraints for the Project REF are outlined in Section 3.2 of the Project REF. Two of the key engineering constraints identified in the Project REF are relevant to the proposed modification relating to the design refinements and land acquisition boundaries. These are:

- Flood sensitivity
- Marshalls Creek.

3.2.3 Main features of the modification

The main features of the modification are the incorporation of design refinements of the land acquisition boundary and an easement around the bridge, the temporary pedestrian crossing and amendments to the light vehicle detour routes for the construction phase of the Marshalls Creek Bridge replacement.

These refinements are in addition to the scope of works presented in the Project REF. There are no substantial changes to the design since the Project REF was determined.

Refer to Appendix A for 100% detailed design plans. Details of the main features of the proposed modification are provided below.

Light vehicle and local traffic routes

As detailed within the Project REF 6.3.2, during the early phase of construction, bridge replacement requires partial lane closure of the Sturt Highway. During night works (10-15 nights), closure of both lanes in both directions would be required. Where this occurs a

detour route for incoming Heavy Vehicles will be established utilising Eunony Bridge Road, Byrnes Road, Merino Road, and Olympic and Sturt Highways. Detour routes for light vehicles and local traffic including heavy vehicles in the Project REF included Lake Albert Road and Kooringal Road.

For light vehicles and local traffic including local heavy vehicles the project routes have been modified as shown in Figure 1-2 and are as follows:

- The detour traffic route is proposed to utilise Kooringal Road, Copland Street, Sutton Street and Nagle Street (Detour Traffic Route). Sutton Street and Nagle Street are surrounded by industrial precinct.

Temporary pedestrian crossing

The proposed temporary pedestrian crossing would be located at the north of the bridge crossing downstream of Marshalls creek (Figure 1-3). The proposed design and construction methodology would be a simple reinforced concrete pipe culvert crossing (see full methodology description in Section 3.3, Figure 1-4 and Figure **3-1** and Appendix A for design specifications). The surface level of the pedestrian crossing has been designed to accommodate a two-year Average Recurrence Interval (ARI) flooding at a relative level of 177.8 meters Australian Height Datum (AHD).

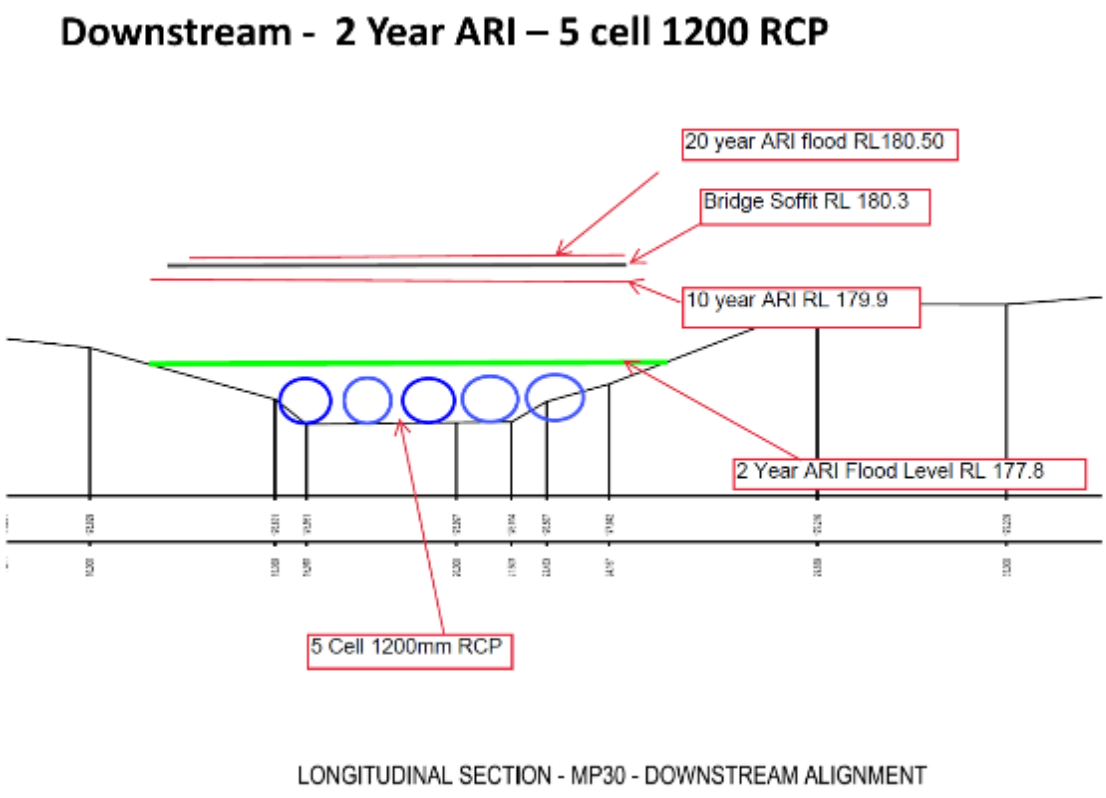

Figure 3-1 Proposed Temporary Pedestrian Crossing Longitudinal Section

Boundary Adjustment

The 100% detailed design identified that minor land acquisition is required on the northern (downstream) and southern (upstream) sides of the bridge to accommodate bridge abutment scour protection and new drainage outlet; see Section 3.6 for further information.

3.3 Construction activities

3.3.1 Work methodology

The work methodology for the temporary pedestrian crossing over Marshalls Creek involves the following:

Pipe Culvert Installation

- Install environmental measures/ erosion and sediment controls and temporary drainage
- Clear minor vegetation from creek bank for approach ramps and pipe culvert
- Construct approach ramps
- Install flow diversion, if required
- Excavate the creek bank to accommodate pipes
- Lay geotextile fabric over the creek width
- Cover the geotextiles with clean aggregate with low levels of228 fines
- Install pipe culverts and fill the gap between pipes with aggregate
- Cover pipe with minimum 300mm layer of rocks to provide trafficable surface
- Construct access ramps
- Regularly monitor and maintain the temporary pedestrian crossing
- Remove all materials on the completion of the works
- Restore approach ramps.

Materials required are as follows:

- Pipe culverts 5 cell 1200mm round concrete pipe (RCP)
- Clean aggregates
- Geotextile fabric.

The amended work methodologies in relation to construction activities are limited to the construction of proposed temporary pedestrian crossing. No changes are proposed to the work methodology for the remainder of the approved project.

3.3.2 Construction hours and duration

Construction would take place over about 12 – 18 months, weather permitting.

Work hours during construction would generally be limited to Standard Working Hours, with the exception of night work where needed for activities such as girder installation and stitch pouring.

Standard working hours:

- Monday – Friday 7:00 am to 6:00 pm
- Saturday 8:00 am to 1:00 pm
- Sunday and Public Holidays No work

See Section 3.3 Construction Activities of the Project REF for further details on construction details.

3.3.3 Plant and equipment

Plant and equipment required for the construction of the proposed temporary pedestrian crossing may require:

- Excavator
- Dump trucks
- Wacker packer
- Rollers
- Loaders
- Chainsaw
- Crane
- Delivery trucks
- Light vehicles
- Compactors
- Hand tools.

See Section 3.3 Construction Activities of the Project REF for further details on required plant and equipment.

3.3.4 Earthworks

The estimated earthwork volume for the proposed temporary pedestrian crossing and approach ramps would be approximately 50 m^3. The proposed construction footprint of the modification is expected to be 0.03 hectares (ha) (in addition to the approved Project REF footprint).

See Section 3.3 Construction Activities of the Project REF for further details on Earthworks.

3.3.5 Source and quantity of materials

Several sources of materials would be required for the construction of the proposed modification. These include:

- Quarry materials such as select fill, base and sub-base
- Aggregates.

All materials would be sourced from a local commercial provider.

See Section 3.3 Construction Activities of the Project REF for further details on Earthworks.

3.3.6 Traffic management and access

To manage traffic flow during construction, a Traffic Management Plan (TMP) would be prepared in accordance with the 'Traffic Control at Work Sites Manual' (Transport for NSW, Sep 2020) and current Transport Specification *G10 – Traffic Management*, before commencement of construction. The plan would provide details of traffic management to be implemented during construction and how to manage traffic flow and driving conditions during construction. Access is also possible directly between the laydown area and proposed temporary pedestrian crossing location at the northwest of the project site.

See Section 3.3 Construction Activities of the Project REF for further details on traffic management and access.

3.4 Ancillary facilities

As outlined in the Project REF Section 3.4, during construction, compound and stockpile sites would be needed. These facilities would be managed in accordance with Transport stockpile management procedure. Two potential compound and stockpile sites have been identified as suitable for use during construction. The two compound sites (Site 1 and Site 2) are located approximately 290 metres northeast of Marshalls Creek Bridge (Site 1) and the other is located 170 metres south-east of Marshalls Creek Bridge (Site 2), as shown in Figure 1-2.

Access to Site 1 would be via the Sturt Highway and Kooringal Road. Access to Site 2 would be from either the Sturt Highway or Nesbitt Street via the Sturt Highway, Kooringal Road, Sutton Street and Jones Street. No vegetation clearing is required at the proposed location of both stockpile and compound sites. Both sites have been subject to substantial disturbance and filling associated with past development.

The compound site would be comprised of transportable buildings, ablution facilities, a plant and materials laydown area and parking for the workforce. The stockpile site would be used to temporarily stockpile excavated and imported pavement material.

Construction and operation of the site compound and stockpile site would be managed so that it does not create odour, dust or other particulate matter. No acid sulfate soils, or contaminated waste would be stockpiled on site. The stockpile sites would be managed in accordance to Section 2.6 of the QA Specification R44 – Earthworks.

As outlined in the Project REF Section 3.4, operation of the compound and stockpile sites would generally be limited to standard work hours, except for night work during girder installation and stich pouring. The nearest residential dwelling is located about 175 metres northeast of site one, and 540 metres north-west of site two and is unlikely to be highly noise affected by the operation of site.

If it is identified that during the detailed design phase the location of the stockpile and compound sites needs to be changed, then the following must be considered when selecting an alternative site.

The alternative site is to be located:

- At least 40 metres away from the nearest waterway
- On land of low ecological and heritage conservation significance
- At least 100 metres away from residential dwellings and other land uses that may be sensitive to noise
- On relatively level ground
- On land outside the 1 in 10-year Average Recurrence Interval (ARI) floodplain.

3.5 Public utility adjustment

Public utilities located within the proposal footprint include:

- APA Gas pipeline
- Water main
- Electrical power poles and Street lights
- Telstra optic fibre
- NBN CO

The APA GAS pipeline currently runs parallel to the existing highway and under the footpath across the bridge on the southern side.

See Section 3.5 of the Project REF for further information on Public utility adjustment. No additional utilities are required to be adjusted for the purpose of the proposed modification.

3.6 Property acquisition

An easement for up to 319.24m^2 (0.0319 ha) is required on the northern (downstream) and southern (upstream) sides of the bridge to accommodate bridge abutment scour protection and new drainage outlet. These lands are owned by Riverina Water County Council, ROWSUP Pty Ltd and Wagga Wagga City Council.

Negotiations between Transport and property owners has resulted in the following land acquisitions (Table 3-1).

Table 3-1 Proposed property acquisition

Area ID	Description	Total area m^2	Acquisition type	Current owner	Lot and DP	Land use zone (LEP)
1	Easement	133.632	Required acquisition	Riverina Water County Council	Lot 2, DP 540063	SP2
2	Easement	89.411	Required acquisition	ROWSUP Pty Ltd	Lot 1 DP 1182799	B6
3	Easement	96.199	Required acquisition	Wagga Wagga City Council	Lot 1 DP 223258	IN1

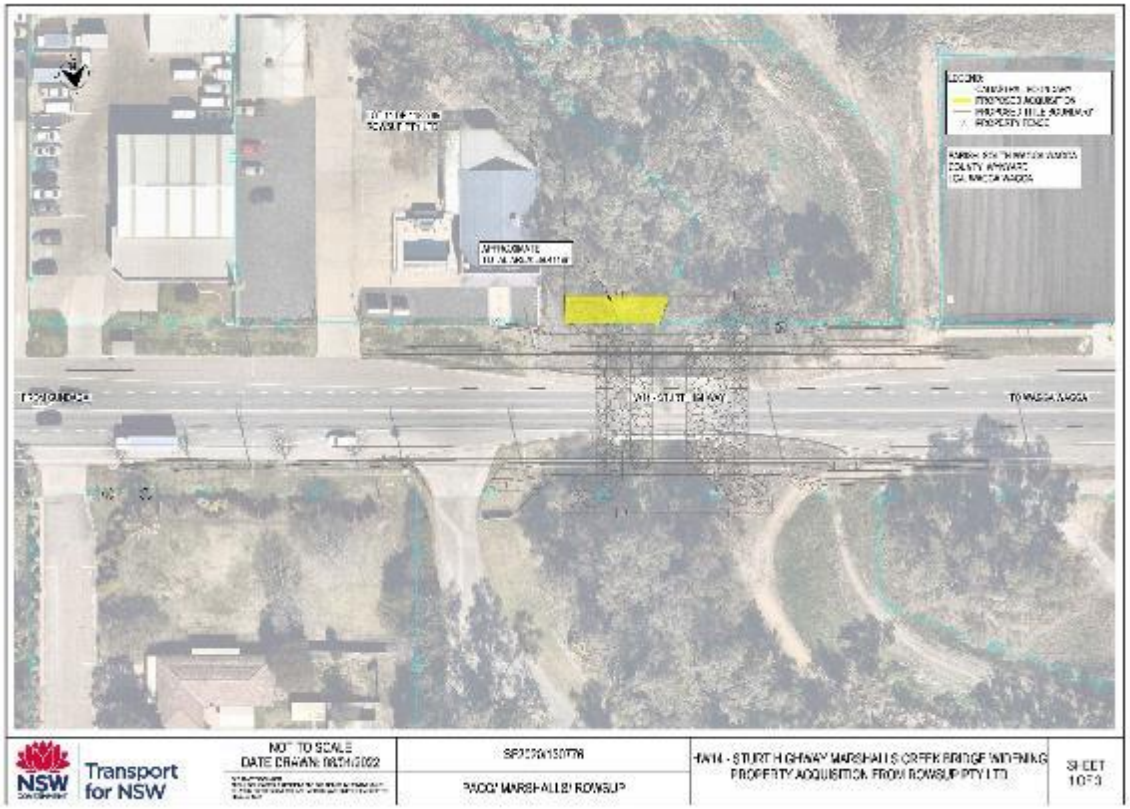

Figure 3-2 Proposed property acquisition – Lot 11 DP 1182799

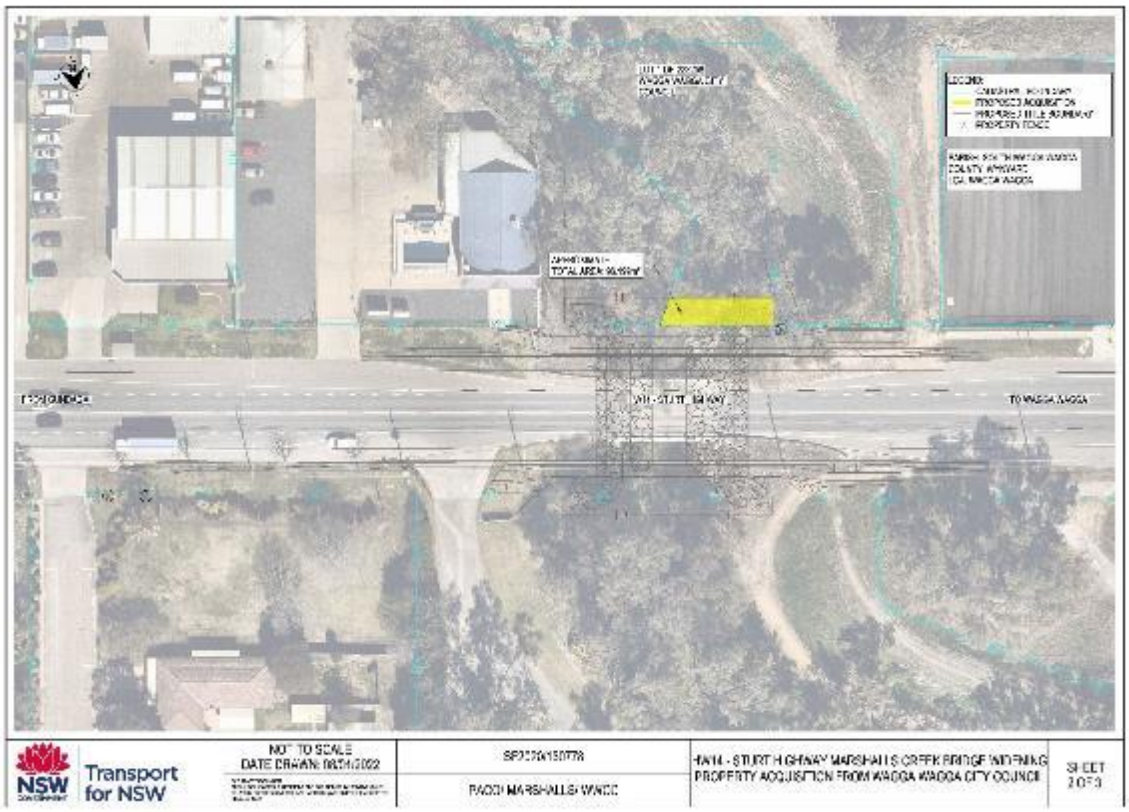

Figure 3-3 Proposed property acquisition – Lot 1 DP 223258

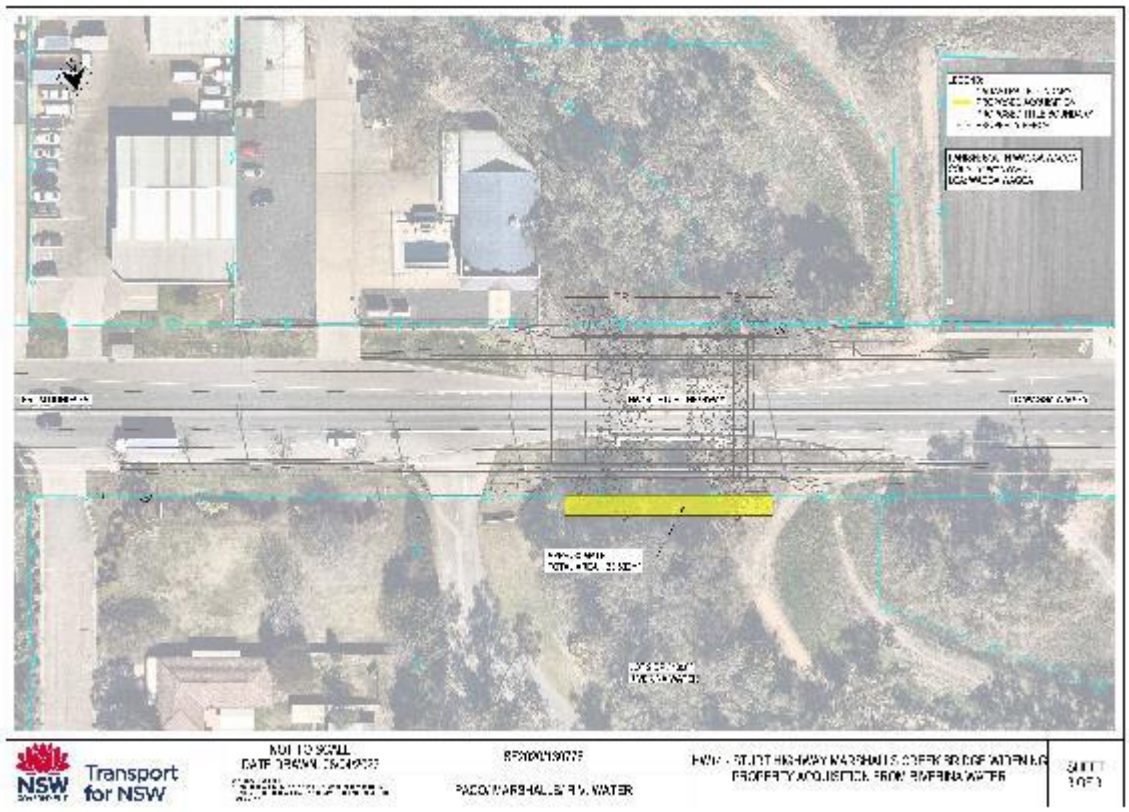

Figure 3-4 Proposed property acquisition – Lot 2 DP 540063

4 Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 Part 5, Division 5.1 of the Act

The proposed modification has been assessed under Part 5 Division 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act). A summary of the projects' compliance with the EP&A Act was included in section 4.1 of the project REF. The proposed modification is also compliant with the EP&A Act as described below.

Part 5 of the EP&A Act prescribes circumstances where an activity may be assessed and determined by or on behalf of a determining authority. The proposed modification is consistent with the assessment framework described in the project REF which addresses how the project should be assessed. The key triggers to confirm that all environmental impacts of the project have been properly assessed and that the activity meets the description of infrastructure not requiring approval includes:

- *EP&A Act Part 5.1 The proposed modification is the construction of road facilities and upgrades to a road (Transport are the Determining Authority).*
- *EP&A Act Part 5.7 The Determining Authority (Transport) has assessed if there are any significant impacts that would require an Environmental Impact Statement (EIS).*
- *EP&A Act Part 5.10 The assessment of the proposed modification (and project REF) has been undertaken in accordance with section 171 of the Environmental Planning & Assessment Regulations 2021 (with respect to considering the likely impact of the activity onto the environment).*

The proposed modification is not likely to have a significant impact on the environment and therefore an EIS is not required. The proposed modification addressed in this addendum REF has been assessed in accordance with Part 5 Division 5.1 of the EP&A Act.

4.1.2 Environmental Planning and Assessment Regulation 2021

The project REF was prepared in accordance with Clause 228 of the Environmental Planning and Assessment Regulation 2000. The regulation was repealed on March 1, 2022. A new regulation, the Environmental Planning and Assessment Regulation 2021 (EP&A Regs) came into force on March 1, 2022.

Section 171 of the EP&A Regs specifies the environmental factors to be considered by a determining authority when considering the likely impact of an activity on the environment (and effectively replaces the requirements of Clause 228 of the repealed regulations).

To ensure that the project REF is consistent with the requirements of the new regulations, a review against s171 of the EP&A Regs has considered the project REF as well as the proposed modification as part of this addendum REF. A copy of the s171 checklist has been attached to this addendum REF as an 0.

4.1.3 State Environmental Planning Policies

State Environmental Planning Policy (Transport and Infrastructure) 2021

State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Section 2.108 of TISEPP 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 Transport for NSW, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* (NSW) and does not require development consent or approval under State Environmental Planning Policy (Biodiversity and Conservation) 2021 (BC SEPP), or State Environmental Planning Policy (Planning Systems) 2021.

Part 2.2(1) of TISEPP 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 TISEPP (where applicable), is discussed in chapter 5 of this addendum REF.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

State Environmental Planning Policy (Biodiversity and Conservation) 2021 (BC SEPP) encourages the conservation and management of natural vegetation that provides habitat for Koalas. Koalas are listed under the BC Act as a vulnerable species. The BC SEPP applies to each local government area listed in Schedule 2. The study area is located within the Central West and Southern Tablelands Far West Koala Management Area, which is listed in Schedule 2.

Key to the application of the Koala Habitat Protection SEPP is determining “core Koala habitat”. Core Koala habitat means (a) an area of land where koalas are present, or (b) an area of land which has been assessed by a suitably qualified and experienced person in accordance with the Guideline as being highly suitable koala habitat, and where koalas have been recorded as being present in the previous 18 years.

As per schedule 3 of the BC SEPP, Koala Tree species are listed by regions (Koala Management Areas). Under the Central West and Southern Tablelands Far West Koala Management Area, two of the listed species were found within the study area.

The study area is identified on the Koala Development Application Map which forms part of the BC SEPP. This map identifies areas that have highly suitable Koala habitat.

Activities assessed under Part 5 of the EP&A Act are not subject to the BC SEPP. Koalas and their habitats are assessed under the BC Act.

4.1.4 Local Environmental Plans

Wagga Wagga Local Environmental Plan 2010

The Wagga Wagga Local Environmental Plan (Wagga Wagga LEP) 2010 aims to make local environmental planning provisions for land in Wagga Wagga in accordance with the relevant standard environmental planning instrument under Section 3.20 of the *Environmental Planning and Assessment* Act.

The objectives of the Wagga Wagga LEP are:

- To optimise the management and use of resources and ensure that choices and opportunities in relation to those resources remain for future generations,
- To promote development that is consistent with the principles of ecologically sustainable development and the management of climate change,

- To promote the sustainability of the natural attributes of Wagga Wagga, avoid or minimise impacts on environmental values and protect environmentally sensitive areas,
- To co-ordinate development with the provision of public infrastructure and services.

4.1.5 Other relevant NSW legislation as required

Roads Act 1993

The objectives of this Act are:

- to set out the rights of members of the public to pass along public roads, and
- to set out the rights of persons who own land adjoining a public road to have access to the public road, and
- to establish the procedures for the opening and closing of a public road, and
- to provide for the classification of roads, and
- to provide for the declaration of RMS and other public authorities as roads authorities for both classified and unclassified roads, and
- to confer certain functions (in particular, the function of carrying out road work) on RMS and on other roads authorities, and
- to provide for the distribution of the functions conferred by this Act between RMS and other roads authorities, and
- to regulate the carrying out of various activities on public roads.

Section 138 of the Roads Act prohibits work on or over a public roadway without approval from the roads authority.

The proposed work would occur on a state road. The roads authority is the determining authority.

The relevant Road Authority for the proposal is Transport for NSW which comprises and undertakes the functions of the former Roads and Maritime Services (RMS).

Biodiversity Conservation Act 2016

The purpose of this *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well–being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

This Act came into effect on 25 August 2017, replacing the Threatened Species Conservation Act 1995.

The BC Act regulates the clearing of native vegetation in NSW. Under Part 7 of the Act, an assessment of the potential impacts of the proposed activity on threatened species, populations, ecological communities and critical habitat listed in the BC Act must be undertaken. This includes assessment of the potential for a significant impact under Section 7.3 (5-part test) and whether an impact is likely on an area of Outstanding Biodiversity Value.

The Project REF has assessed impacts to threatened species and communities in Section and in Section 6.2. The modifications trigger the requirement for reassessment of the biodiversity of the Lower Murray Endangered Ecological Community and a noise assessment. Biodiversity reassessment includes a 7-part test under the FM Act for the aquatic ecological community in the natural drainage system of the Lower River Murray

Catchment (Appendix J). Background noise baseline data collection as a result of detour route amendment is described in Section 6.1.

National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NPW Act) promotes and regulates the management of national parks and historic sites or places of cultural value within the landscape and the conservation of certain fauna, native plants and Aboriginal objects and places.

The NPW Act provides the basis for legal protection and management of Aboriginal sites in NSW. All Aboriginal objects within the state of New South Wales are protected under Part 6 of the NPW Act. The implementation of the Aboriginal heritage provisions in the NPW Act is the responsibility of the Office of Environment and Heritage (OEH).

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Consent from the Director–General of the OEH is required under Section 87, for the investigation of Aboriginal sites, or Section 90, for the destruction to an Aboriginal object or Aboriginal place.

An assessment of potential impacts to Aboriginal cultural heritage is provided in Section 6 of the Project REF and 6.1 of this report.

Biosecurity Act 2015

The objects of this Act are the following:

- To promote biosecurity as a shared responsibility between government, industry and communities,
- To provide a framework for the timely and effective management of the following:
- Pests, disease, contaminants and other biosecurity matter that are economically significant for primary production industries.
- Threats to terrestrial and aquatic environments arising from pests, diseases, contaminants and other biosecurity matter,
- Public health and safety risks arising from contaminants, non–indigenous animals, bees, weeds and other biosecurity matter known to contribute to human health problems,
- Pests, diseases, contaminants and other biosecurity matter that may have an adverse effect on community activities and infrastructure,
- To provide a framework for risk–based decision–making in relation to biosecurity,
- To give effect to intergovernmental biosecurity agreements to which the State is a party,
- To provide the means by which biosecurity requirements in other jurisdictions can be met, to maintain market access for industry.

Any person who deals with biosecurity matter or a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, carrier or dealing has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.

Biosecurity risks are discussed in Section 6.1 of the Project REF and Section 6.1 of this report.

Heritage Act 1977

The objects of this Act are as follows:

- To promote an understanding of the State's heritage
- To encourage the conservation of the State's heritage
- To provide for the identification and registration of items of State Heritage Significance
- To provide for the interim protection of items of State Heritage Significance
- To encourage the adaptive reuse of items of State Heritage Significance
- To constitute the Heritage Council of New South Wales and confer on it functions relating to the State's heritage
- To assist owners with the conservation of items of State Heritage Significance.

Natural, cultural and built heritage is protected in NSW under the *Heritage Act 1977* (NSW). The Heritage Act allows for heritage items or places to be listed on the State Heritage Register, or for interim heritage orders to be made to protect heritage items or places. Approval must be obtained from the Heritage Council or local council before work can be done which might damage the item or place.

A person who wishes to demolish, move, alter or in some way develop a place, building or land covered by an interim heritage order or a State Heritage Register listing (called "environmental heritage") must first obtain approval from the Heritage Council. Any activity which might damage or destroy a tree or other vegetation on land or within a precinct relating to a heritage item also requires approval.

A person must not disturb or excavate land if they know or have reasonable cause to suspect that they might discover, expose, move or damage a relic, unless they have an excavation permit. A "relic" means any deposit, artefact, object or material evidence that relates to the non–Aboriginal settlement of NSW and that is of State of local heritage significance. Excavation permits are issued by the Heritage Council. All discoveries of relics must be notified to the Heritage Council, whether or not the person has been issued with a permit, and the location of the relic disclosed.

Heritage impacts are considered in Section 6.7 and Section 6.1 of this report.

Fisheries Management Act 1994

The *Fisheries Management Act 1994* (NSW) (FM Act) provides conservation for fish and fish habitats and outlines approval processes for the activities that may impact on threatened species and habitats.

Key fish habitat is defined as aquatic habitats that are important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish populations generally and the survival and recovery of threatened aquatic species.

Marshalls Creek is identified as key fish habitat and occurs within the construction footprint.

A request for consultation was submitted to the Department of Primary Industries (DPI) in relation to the Project REF. No response was provided as of 2 March 2021. Public authorities are exempt from obtaining a permit for dredging or reclamation work under Part 7 of the FM Act (refer Section 201(2)(b)). However, Section 199 of the FM Act requires that notification be given to the Minister before a public authority carries out or authorises the carrying out of dredging or reclamation work and any matters raised by the Minister be

considered within 21 days after the giving of the notice. In accordance with Section 199 of The FM Act notification will be given.

The Project REF has assessed impacts to key fish habitat and communities in Section 6.1. Additionally, this addendum REF includes a test of significance (or seven-part test) under the FM Act which characterises the significance of likely impacts associated with the proposed modification on the following:

Endangered Ecological Community

- Aquatic ecological community in the natural drainage system of the Lower Murray River Catchment

Water Management Act 2000 and Water Management Regulation 2018

The aim of the *Water Management Act 2000* (NSW) (WM Act) is to ensure that water resources are conserved and properly managed for sustainable use benefiting both present and future generations. It is also intended to provide formal means for the protection and enhancement of the environmental qualities of waterways and in-stream uses, as well as to provide for the protection of catchments.

Controlled activities are certain types of activities which are carried out on waterfront land and defined as a controlled activity in the WM Act. 'Waterfront land' means the bed of any river, lake or estuary, and the land within 40 metres of the riverbanks, lake shore or estuary mean high water mark.

Controlled activities include modifications to a watercourse, such as erosion control works and channel realignment, construction of bed control structures, construction of watercourse crossings such as bridges, causeways and bed level crossings, and ancillary works such as roads construction of stormwater outlets and spillways. Regulating controlled activities protects waterfront land and its important natural functions whilst supporting appropriate development.

In accordance with Clause 41 of the Water Management Regulation 2018, a public authority is exempt from Section 91E (1) of the WM Act in relation to all controlled activities that it carries out in, on or under waterfront land.

4.2 Commonwealth legislation

4.2.1 Environment Protection and Biodiversity Conservation Act 1999

Under the 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 or the environment of Commonwealth land. These are considered in Appendix B and chapter 6 of the addendum REF.

A referral is not required for proposed road actions that may affect nationally listed threatened species, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015.

Potential impacts to these biodiversity matters are also considered as part of chapter 6 of the addendum REF and Appendix B.

Findings – matters of national environmental significance (other than biodiversity matters)

The assessment of the proposed modification's impact on matters of national environmental significance and the environment of Commonwealth land found that there would be no

change to the findings of the determined activity and would be unlikely to cause a significant impact on matters of national environmental significance or the environment of Commonwealth land. A referral to the Australian Government Department of Agriculture, Water and the Environment is not required.

4.2.2 Other relevant Commonwealth legislation

Native Title Act 1993

The *Native Title Act 1993* (Commonwealth) recognises and protects native title. The Act covers actions affecting native title and the processes for determining whether native title exists and compensation for actions affective native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements, and the National Native Title Register. Under the Act a future act includes proposed public infrastructure on land or waters that affects native title rights or interest.

A search of the Native Title Tribunal Native Title Vision website was undertaken for the Project REF, with no Native Title holders/claimants identified.

4.3 Confirmation of statutory position

The proposed modification is categorised as development for the purpose of road and is being carried out by or on behalf of a public authority. Under Section 171 of TISEPP 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.

Transport for NSW is the determining authority for the proposal. This addendum REF fulfils Transport for NSW's obligation under Section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

5 Consultation

This chapter discusses the consultation undertaken to date for the proposal and the consultation proposed for the future.

5.1 Consultation strategy

Consultation with residents and local businesses, except for directly impacted businesses, has not been carried out to date for the proposal.

Under stage 1 of the Transport Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) guidelines, it is not a requirement to consult with the Aboriginal community about the Proposal.

5.2 Consultation outcomes

A consultation email was sent to Wagga Wagga City Council (WWCC) and Riverina Water County Council on 31 May 2022. The email included an invitation to provide comment on the proposal (pedestrian crossing design). A response was received from WWCC on 31 May 2022 (Appendix K).

Issues that have been raised as a result of this consultation are outlined below in Table 5-3.

Table 5-1: Issues raised through ISEPP consultation

Agency	Issue raised	Response / where addressed in addendum REF
Riverina Water	Nil	Riverian Water County Council supports the proposal.
Wagga Wagga City Council	Council asked to align proposed western ramp with existing Council's levee path.	Temporary Pedestrian crossing design has been updated to include connectivity from western ramp to Council's levee path.
Wagga Wagga City Council	What would be the effect of localised flooding on the design, as the flood event may dislodge the pipes and send them downstream?	A Floodplain Management Plan will be prepared accordingly. The contractor needs to be vigilant on local weather forecast and rainfall event.
Wagga Wagga City Council	Nil	Council supports the proposed local traffic detour routes.

Appendix C contains a Growth Centres SEPP consultation checklist that documents how the Growth Centres SEPP consultation requirements have been identified.

5.3 Ongoing or future consultation

Future consultation is proposed regarding altered traffic conditions during construction.

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 of the Marshalls Creek Bridge Replacement. All aspects of the environment potentially impacted upon by the proposed modification are considered. This includes consideration of the factors as required under clause 171 of the Environmental Planning and Assessment Regulation 2021. The factors specified in clause 171 of the Environmental Planning and Assessment Regulation 2021 are also considered in Appendix B.

Site-specific safeguards and management measures are provided to ameliorate the identified potential impacts.

6.1 Biodiversity

6.1.1 Approach

Threatened Species

Database searches were completed for records of Commonwealth and State listed threatened species, populations, and ecological communities. Searches were conducted on the 10 of March 2022 and included the following:

- NSW OEH threatened species subregion search
- EPBC Protected Matters Search tool records within 10 km of the study area
- NSW BioNet Atlas Search within 10 km of the study area
- NSW DPI Fisheries Fish Records.

Relevant literature was reviewed, which included OEH and EPBC Threatened Species Profiles.

No areas of declared outstanding biodiversity value as listed under the BC Act are present within the proposal area. The proposal area does not contain significant wetland communities. The proposal does not contain coastal wetland or littoral rainforests. There are no threatened fish records for any part of Marshalls Creek.

An evaluation of the potential for threatened species to occur and be impacted by the proposal is shown in Appendix I.

Site Inspection

An initial field survey was conducted from the 14 May 2020 by an ecologist from NGH. Floristic surveys were completed to determine the vegetation communities present. The study area was surveyed using the ‘random meander’ method, as documented by Cropper (1993). The survey included an assessment of the condition and composition of existing vegetation. Hollow bearing trees and potential threatened species habitat were assessed. Opportunistic fauna sightings were also recorded. Species were recorded progressively with abundance recorded within proposal area. Any priority weeds were recorded opportunistically. Based on existing vegetation mapping (OEH_VIS_ID 4469) and the field survey, vegetation within the proposal area was assigned to a Plant Community Type (PCT) in accordance with the Vegetation Information System Classification Database (OEH).

A later field survey conducted on 12 May 2021 assessed an expanded construction footprint. The survey methodology was the same as the initial field survey in 2020. During the 2021 field survey the original study area was reviewed to ensure data from the original survey remained relevant. Threatened Ecological Communities (TEC) are based on the relevant Scientific Committee – and their final determinations for each. Botanical nomenclature

follows Harden (1990–2002) and the PlantNet website, updated with recent changes recognised in Angiosperm Phylogeny Group (2016) and the Australian Plant Census.

An additional field survey was conducted on 31 March 2022 by an ecologist from NGH to assess the modified construction footprint (Figure 6-2).

The survey methodology was the same as the initial field survey in May 2020. During the 2022 field survey the original study area was reviewed to ensure data from the original survey remained relevant and updated accordingly.

6.1.2 Existing environment - Flora

The study area is comprised of Plant Community Type (PCT) 5, River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW Southwestern Slopes Bioregion and the eastern Riverina Bioregion (Table 6-2). Along the roadside and creek line the groundcover has been previously disturbed and contains a high number of exotics. A full flora species list is detailed in Appendix H. A total of 47 flora species were recorded within the study area, comprising 11 native species and 36 exotics.

Exotic grassland, planted vegetation, sealed roads and pedestrian pathways were also identified within the construction footprint. The composition of vegetation within the construction footprint is described below, Table 6-1.

Table 6-1: Vegetation composition

Vegetation / area	Project area (ha)	Construction footprint (ha)	Laydown area (ha) (temporary ground disturbance only)
River Red Gum (PCT 5)	0.81	0.27	0.003
Exotic Vegetation	0.98	0.25	0.087
Planted vegetation	0.20	0	0.16
Other (sealed road/driveway/path)	0.59	0.23	0.039
Total	**2.57**	**0.75**	**0.29**

PCT 5 was the only PCT identified within the project area and has been detailed below, Table 6-2.

Table 6-2: Plant Community Types within study area.

PCT 5 River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW Southwestern Slopes Bioregion and the eastern Riverina Bioregion	
Vegetation Formation	Forested Wetlands
Vegetation Class	Inland Riverine Forests
Description	This vegetation community within the study area is a tall open forest dominated by River Red Gum (*Eucalyptus camaldulensis subsp. camaldulensis*) with trees averaging about 25 m high and a canopy cover of about 60%. In the proposal area the shrub layer is sparse with Silver Wattle (*Acacia dealbata*) and Sweet Briar (*Rosa rubiginosa*).* The ground stratum is dominated by exotic species including Purpletop (*Verbena bonariensis**), Flaxleaf Fleabane (*Conyza bonariensis**), Lamb's Tongue (*Plantago lanceolate**), Patterson's Curse (*Echium plantagineum*),* Scotch Thistle (*Onopordum acanhium**) Phalaris (*Phalaris aquatica**.), Wild Oats (*Avena fatua**), Perennial Ryegrass (*Lolium perenne *)* and Paspalum (*Paspalum dilatatum **). Some native species were also scattered throughout the study area. These include Common Couch (*Cynodon dactylon*), Rhodes Grass (*Chloris gayana*), Windmill Grass (*Chloris truncata*) and *Oxalis* sp.
Impact area	0.27 ha of River Red Gum is identified within the construction footprint and is to be cleared as part of the proposal. An additional 0.003 ha of groundcover would be temporarily disturbed within the laydown area. 0.81 ha is identified within the broader Study area.
Condition	Moderate condition (Canopy intact, understory has a medium-high exotic component)
Conservation Status	This PCT does not form part of any Threatened Ecological Communities.
Fauna Habitat	The surrounding vegetation within the study area provides an over storey stratum for protection of several fauna species. Groundcover within the proposal area also provides foraging and nesting resources for native fauna. Riparian habitat is present within Marshalls Creek and includes emergent and sub-emergent vegetation.

Image	 Figure 6-1 Example of PCT 5 within the study area.

Material and plant laydown area

During construction, a laydown area would be required for plant and construction material. A suitable laydown area has been identified adjacent to the construction area, within the assessed project area (Figure 6-2). The laydown area has been subject to previous disturbance and is dominated by exotic vegetation (Table 6-1). No permanent vegetation removal would occur within the laydown area, only minor disturbance to groundcover from moving plant and equipment in and out of the area.

Threatened Flora Species

No threatened flora species were identified during the site survey, however due to the timing of the site survey not all flora species within the study area may have been present. The occurrence of threatened flora species may not be ruled out. A search of the NSW BioNet Atlas, EPBC Protected Matters Search Tool and OEH threatened species search (by habitat and region) identified 38 threatened flora species with the potential to occur within the study area. A habitat evaluation was completed for all of these species (Appendix I). Based on this assessment habitat within the construction footprint was considered suitable for the Small Scurf-pea (*Cullen parvum*). An assessment of significance for this species have been conducted **(**Appendix I).

Threatened Ecological Communities (TECs)

No TEC's occur within the study area. PCT 5 does not form part of a TEC listed under the BC Act or EPBC Act.

Endangered Ecological Community (EEC)

One Endangered Ecological Community (EEC) under the FM Act was identified including

- Aquatic ecological community in the natural drainage system of the Lower River Murray Catchment.

A 7-part test under the FM Act has been conducted in Appendix J.

Priority Weeds

Of the 47 flora species identified in the study area, 36 species were exotic. Seven of these exotic species are listed as priority weeds under the Biosecurity Act 2015:

- Briar Rose (Rosa rubiginosa*)
- Curse (Echium plantagineum*)
- Flaxleaf Fleabane (Conyza bonariensis*)
- Khaki Weed (Alternanthera pungens*)
- Bathurst Burr (Xanthium spinosum*)
- Scotch Thistle (Onopordum acanthium*)
- Spear Thistle (Cirsium vulgare*)

The *Biosecurity Act 2015* dictates that all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any land managers or authorities who deal with any plant has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Other exotic flora that was identified within the study area are common within the region and are often encountered within disturbed areas.

Figure 6-2 Biodiversity features within the Project Area

6.1.3 Existing Environment Fauna

During the field surveys two bird species and one mammal was recorded. No threatened fauna was observed during the site survey. A species list has been provided in Appendix F. Fauna habitat identified during the field survey is provided in Table 6-3 below.

Table 6-3 Fauna habitat and fauna resources identified within the study area.

Habitat features	Description
Woodland vegetation	The majority of the surrounding vegetation within the study area has been previously cleared due to urban development. The limited over storey stratum that remains provides protection of a number of fauna species. Groundcover within the proposal area also provides foraging and nesting resources for native fauna.  Figure 6-3 Woodland vegetation within the proposal area – looking north at upstream Section of Marshalls Creek Bridge

Habitat features	Description
Aquatic habitat	Marshalls Creek is an intermittent creek which receives flows from the Kooringal Sewerage Treatment Works and is identified by NSW DPI as key fish habitat (Appendix D). Riparian habitat within the study area includes emergent and sub-emergent vegetation and limited imported rocky substrate and concrete in some areas.  Figure 6-4 Riparian habitat within Marshalls Creek downstream of bridge.
Rocky outcrops and loose rock	There are no areas of rocky outcrops within the proposal area. Imported loose rock for scour protection is present at the bridge.
Fallen timber	Fallen timber is scarce within the proposal area. Any fallen timber adjacent to the creek is periodically inundated and unsuitable for ongoing habitat.
Hollow–bearing trees	Three hollow bearing trees (HBTs) area recorded within the construction footprint. These trees are mature River Red Gums (*Eucalyptus camaldulensis*) in good condition. A further 13 HBTs were identified within the broader project area during the site visit. All HBTs within the project area were mature trees in good condition. One tree with a hollow was harbouring a Common Brushtail Possum (*Trichosurus vulpecula*) at the time of the inspection (May 2021 site visit).

Habitat features	Description

Figure 6-5 Example of a HBT within the study area

6.1.4 Koala Habitat Assessment

Core Koala habitat has been assessed using the Koala Habitat Assessment Tool from the Commonwealth EPBC Act Referral Guidelines for the Vulnerable Koala (DOE 2014); refer to. Mature secondary food tree species are present within the proposal area: River Red Gum and Yellow Box.

The site qualifies as 'Koala Habitat' under the Guidelines; however, it is not considered habitat critical to the survival of the Koala, having scored three using the Habitat Assessment Tool (Table 6-4). The referral guidelines indicate that proposals involving less than two hectares of habitat clearing and a score of five or less are not recommended for referral to the Commonwealth. Therefore, an Assessment of Significance is not required.

Table 6-4 Koala habitat assessment tool

Attribute	Score	Inland	Applicable to the proposal?
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.	
	0 (low)	None of the above.	✓

Attribute	Score	Inland	Applicable to the proposal?
			No records within 10 km of the proposal area within the last 10 years
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, **OR** 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	✓ River Red Gum and Yellow Box feed tree species present.
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.	
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	
	+1 (medium)	Area is part of a **contiguous landscape** < 1000 ha, but ≥ 500 ha.	
	0 (low)	None of the above.	✓ Area is not part of a contiguous landscape
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, **OR** Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.	✓ Some vehicle threat may be present, several residential properties located adjacent to proposal area, some dog threat may be present.
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, **OR**	

Attribute	Score	Inland	Applicable to the proposal?
		Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	✓ Habitat within the proposal area is not considered a refuge, nor does it provide important connectivity to large areas surrounding a habitat refuge
Total	**3**	**Decision: Habitat not critical to the survival of the Koala— assessment of significance not required**	

Threatened species

No threatened fauna species were identified during the site survey. However, due to the timing of the site survey, not all fauna species within the study area may have been present. The occurrence of threatened fauna species may not be ruled out. A search of the NSW BioNet Atlas, EPBC Protected Matters Search Tool and OEH threatened species search (by habitat and region) identified 51 bird, 156 mammal, three amphibian, four reptile, three fish, one invertebrate and 11 migratory species that have the potential to occur within the study area. A habitat evaluation was completed for all of these species (Appendix H). Based on this assessment the following threatened species have suitable habitat within the proposal area and may occur. Assessments of significance have been conducted for the following birds and mammals (Appendix H).

- Black Falcon - BC - V
- Little Eagle - BC - V
- Little Lorikeet - BC - V
- Turquoise Parrot - BC -V
- Superb Parrot - BC - V; EPBC - V
- Diamond Firetail - BC - V
- Corben's Long-eared Bat - BC - V; EPBC - V
- Yellow-bellied Sheathtail Bat - BC - V
- Southern Myotis - BC - V
- Squirrel Glider - BC - E

6.1.5 Potential impacts

Construction

The proposed modifications would require the removal of 0.27 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.34 ha of exotic vegetation and 0.16 ha of planted native vegetation. Three hollow bearing trees would be removed. Fallen timber would be retained on site where safe to do so.

Minor removal of imported rock habitat, aquatic vegetation, and creek bed gravels along the banks and within the creek would occur. This would remove some minor habitat for amphibians and fish. The habitat directly surrounding the bridge and proposed pedestrian crossing is highly disturbed, however more suitable habitat of higher quality for amphibians and fish does exist further downstream of the bridge closer to the Murrumbidgee River. The drainage outlet would occur within a heavily disturbed area dominated by exotic vegetation. Aquatic habitat within this area is of very low quality.

Marshalls Creek is identified as key fish habitat (KFH) for Murray Cod, Macquarie Perch, Trout Cod, Flathead Galaxias and the Murray Crayfish. Completion of the habitat evaluation (Appendix I) found no threatened fish species are considered likely to occur or rely upon habitat within the stretch of Marshalls Creek that lies within the proposal area. The condition of the KFH within the development footprint was poor during the time of the site inspection, with limited flows, a dominance of exotic vegetation and presence of rubbish and rubble. This condition may be subject to change during periods of seasonal inundation.

The removal of habitat within the construction footprint would be temporary and rock scour protection work would be reinstated following construction of the bridge. The area directly impacted by the proposed pedestrian crossing and ramps would be rehabilitated post construction seeking to improve the quality of riparian vegetation and aquatic habitat in the long term.

Additionally, the adjustment of the land acquisition boundary on both sides of the bridge to accommodate bridge abutment scour protection and a new drainage outlet (easement) would create minimal impact. Any direct impact in this case by the proposed modification would be rehabilitated post construction seeking to improve the quality of riparian vegetation and aquatic habitat in the long term.

There would be no impact to the distribution of native vegetation locally or regionally. The existing vegetation provides good soil stability, which means that revegetation activities should occur quickly after construction is completed. It is likely that post construction, similar vegetation would recolonise the affected areas.

Birds

An assessment of significance (Appendix I) was completed for seven threatened bird species with the potential to occur within the construction footprint: Varied Sittella, Black Falcon, Little Eagle, Superb Parrot, Turquoise Parrot, Little Lorikeet, Diamond Firetail. The assessments concluded that there is unlikely to be a significant impact due to the following:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context
- Two of the eleven hollow bearing trees would be impacted
- No fragmentation or isolation of habitat would occur
- No substantial contribution to any key threatening process would be expected
- Mitigation measures would be implemented to prevent disruptions to the life cycle or harm to individual animals of these species
- The proposed modifications would not interfere with the recovery of these species.

Flora

An assessment of significance (Appendix I) was completed for the Small Scurf-pea. The assessment concluded that there is unlikely to be a significant impact due to the following:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context
- No fragmentation or isolation of habitat would occur
- No substantial contribution to any key threatening process would be expected
- Mitigation measures would be implemented to prevent disruptions to the life cycle or harm to individual plants of this species
- The proposal would not interfere with the recovery of this species.

Mammals

An assessment of significance (Appendix I) was completed for four threatened mammal species: Corben's Long-eared Bat, Yellow-bellied Sheathtail Bat, Squirrel Glider. The assessment concluded that there is unlikely to be a significant impact due to the following:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context
- Three hollow bearing trees would be impacted
- No fragmentation or isolation of habitat would occur
- No substantial contribution to any key threatening process would be expected
- Mitigation measures would be implemented to prevent disruptions to the life cycle or harm to individual animals of this species.
- The proposal would not interfere with the recovery of this species.

Operation

Operational impacts of the proposed modification are not expected to be additional in nature or extent from the assessment findings of the Project REF.

Conclusion on significance of impacts

The 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 modification is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act.

Where a significant impact is likely to threatened species, populations, ecological communities or migratory species within the meaning of the EPBC Act:

Is there a real chance that the activity threatens the long-term survival of nationally listed biodiversity matters?	No
Has the consistency of the activity with relevant recovery plans, threat abatement plans, conservation advices and guidelines provided by the Australian Government been considered?	Yes
Can suitable offsets be secured?	N/A

6.1.6 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	A Flora and Fauna Management Plan will be prepared in accordance with Transport for NSW's *Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects* (RTA, 2011) and implemented as part of the CEMP. It will include, but not be limited to: • Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • Requirements set out in the *landscape guideline* (rta, 2008) • Pre-clearing survey requirements • Procedures for unexpected threatened species finds and fauna handling • Procedures addressing relevant matters specified in the *policy and guidelines for fish habitat conservation and management* (dpi fisheries, 2013) • Protocols to manage weeds and pathogens. • Mitigation measures would be implemented to prevent disruptions to the life cycle or harm to the threatened species including birds, mammals and flora.	Contractor	Detailed design/pre-construction	Section 4.8 of QA *G36 Environment Protection*
Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible. This will include native vegetation within the identified laydown areas.	Contractor	Detailed design/pre-construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	An Environmental Work Method Statement for Clearing and Grubbing must be prepared and approved by the project Environmental Officer prior to starting work. The EWMS must include at least the following: • A description of the work activity, including any plant and equipment to be used • Identification of any environmentally sensitive areas • The sequence of tasks for the activity • Identification of potential environmental risks/impacts due to the activity • Mitigation measures to reduce the identified environmental risk, including assigned responsibilities to site personnel • A process for assessing the performance of the implemented mitigation measures (performance outcomes) • A detailed site diagram showing all work areas, controls, sensitive areas, and no-go-zones • A process for monitoring and managing wet weather events during works All site personnel must sign-on to the EWMS and be aware of their responsibilities within the EWMS.	Contractor	Detailed design/pre-construction	
Biodiversity	Prior to the commencement of any works, a physical clearing boundary is to be demarcated and implemented. The demarcation of the exclusion zone will be in accordance with Transport for NSW *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 2: exclusion zones (*RTA 2011*)*.	Contractor	Pre-construction	Roads and Maritime Service's *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 2: exclusion zones (*RTA 2011*)*.

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	Clearing of native vegetation should be carried out in accordance with *Biodiversity Guidelines 2011 – Guide 4 (Clearing of vegetation and removal of bushrock)* (RTA 2011).	Contractor	Pre-construction/ construction	*Biodiversity Guidelines 2011 – Guide 4 (Clearing of vegetation and removal of bushrock)* (RTA 2011).
Biodiversity	Clearing of hollow bearing trees is to be conducted in accordance with *Transport for NSW Biodiversity Guidelines - Guide 1 (Pre-clearing process).* A qualified ecologist must be present on site during the removal of hollow bearing trees to supervise the works.	Contractor	Pre-construction /construction	Transport for NSW *Biodiversity Guidelines - Guide 1 (Pre-clearing process).*
Biodiversity	Fauna handling must be carried out in accordance with the requirements of the Transport for NSW *Biodiversity Guidelines - Guide 9 (Fauna Handling).*	Contractor	Pre-construction /construction	Transport for NSW Biodiversity Guidelines - Guide 9 (Fauna Handling).
Biodiversity	All pathogens (e.g., Chytid, Myrtle Rust and Phytophthora) are to be managed in accordance with the Transport for NSW *Biodiversity Guidelines - Guide 7 (Pathogen Management)* and *DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).*	Contractor	Construction	Transport for NSW *Biodiversity Guidelines - Guide 7 (Pathogen Management). DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).*
Biodiversity	A Weed Management Plan will be developed to prevent/minimise the spread of weeds in accordance with *Guide 6 (Weed Management) in the Roads and Maritime Biodiversity Guidelines (RTA 2011).*	Contractor	Detailed design/pre-construction	Guide 6 (Weed Management) in the Transport for NSW Biodiversity Guidelines (RTA 2011).
Biodiversity	Priority weeds are to be managed according to requirements under the Biosecurity Act, 2015 and *Guide 6 (Weed Management) of the Transport for NSW Biodiversity Guidelines 2011*.	Contractor	Construction	Biosecurity Act (2015). Guide 6 (Weed Management) of the Transport for NSW Biodiversity Guidelines 2011.
Biodiversity	Any herbicide use will be undertaken according to *Environmental Fact Sheet 18 -*	Contractor	Construction	Environmental Fact Sheet 18 - Herbicide

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Herbicide application (RMS, 2013).			application (RMS, 2013).
Biodiversity	Pruning of mature trees is to be in accordance with Part 5 of the *Australian Standard 4373-2007 Pruning of amenity trees.*	Contractor	Construction	Part 5 of the *Australian Standard 4373-2007 Pruning of amenity trees.*
Biodiversity	All coarse woody debris is to be retained on site where possible in accordance with Transport for NSW *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 5: Re-use of woody debris and bush rock (RTA 2011).* Any vegetation too large to be mulched will be placed as course woody debris (CWD) along suitable areas of Marshalls Creek, in consultation with Transport environment officer or manager.	Contractor	Construction	*Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 5: Re-use of woody debris and bush rock (RTA 2011).*
Biodiversity	Works are not to create an ongoing barrier to the movement of wildlife.	Contractor	Construction	
Biodiversity	Aquatic habitat will be protected in accordance with *Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011) and Section 3.3.2 Standard precautions and mitigation measures of the *Policy and guidelines for fish habitat conservation and management Update 2013* (DPI (Fisheries NSW) 2013).	Contractor	Construction	
Biodiversity	Temporary instream creek crossings must be designed so that the passage of fish will not be blocked. Temporary instream creek crossings are to be designed in accordance with *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003), *Policy and Guidelines for Aquatic Habitat Management and Fish Conservation* (NSW DPI 1999), and *Policy and Guidelines for*	Contractor	Detailed design/pre-construction	*Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003), *Policy and Guidelines for Aquatic Habitat Management and Fish Conservation* (NSW DPI 1999), and *Policy and Guidelines for Fish*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Fish Friendly Waterway Crossings (NSW DPI)			*Friendly Waterway Crossings* (NSW DPI)
Biodiversity	Snags should not be realigned, relocated, or removed without prior consultation with and agreement from DPI Fisheries.	Transport Contractor	Construction	
Biodiversity	Temporary in-stream structures should not be constructed from unconsolidated, imported earth fill material. Dispersive material (e.g. clays and sands) used in the construction of temporary in-stream structures should be fully enclosed by geotextile, sheet piling, or similar means to limit erosion and sedimentation within the waterway. If using rock fill, the rock should be clean of fines and of suitable size to avoid erosion. Design will be in accordance with *Policy and Guidelines for Aquatic Habitat Management and Fish Conservation* (NSW DPI 1999).	Transport Contractor	Detailed design/pre-construction Construction	
Biodiversity	The timing of works should coincide with low flow periods within the respective catchment if practical.	Transport Contractor	Detailed design/pre-construction	
Biodiversity	Rehabilitation of the creek bank would use native endemic riparian species.	Contractor	Post-construction	
Aquatic impacts	Where possible, the timing of any works should be planned so as not to interfere with the possible migration of fish within the waterway.	Transport Contractor	Detailed design/pre-construction	

6.2 Hydrology, Flooding and Water Quality

6.2.1 Existing environment

The Marshalls Creek Bridge Replacement project is located within the Murrumbidgee Catchment managed by the Riverina Local Land Services (LLS). The climate is extremely diverse ranging from alpine conditions in the headwaters of the Snowy Mountains to the semi-arid conditions of the Riverina plains in the west (NSW DPI Water 2011).

Major rivers within the Murrumbidgee catchment area include the Yass River, the Murrumbidgee River and Goodradigbee River (Figure 6-6), which flow into Lake Burrinjuck and supply irrigation water for the Riverina (NSW DPI Water 2011).

The proposed modification involves construction within Marshalls Creek, which flows to the Murrumbidgee River. Marshalls Creek is classified as a 4th order stream under the Strahler (1952) method and is identified as key fish habitat (KFH) (Figure 6-7, Appendix D).

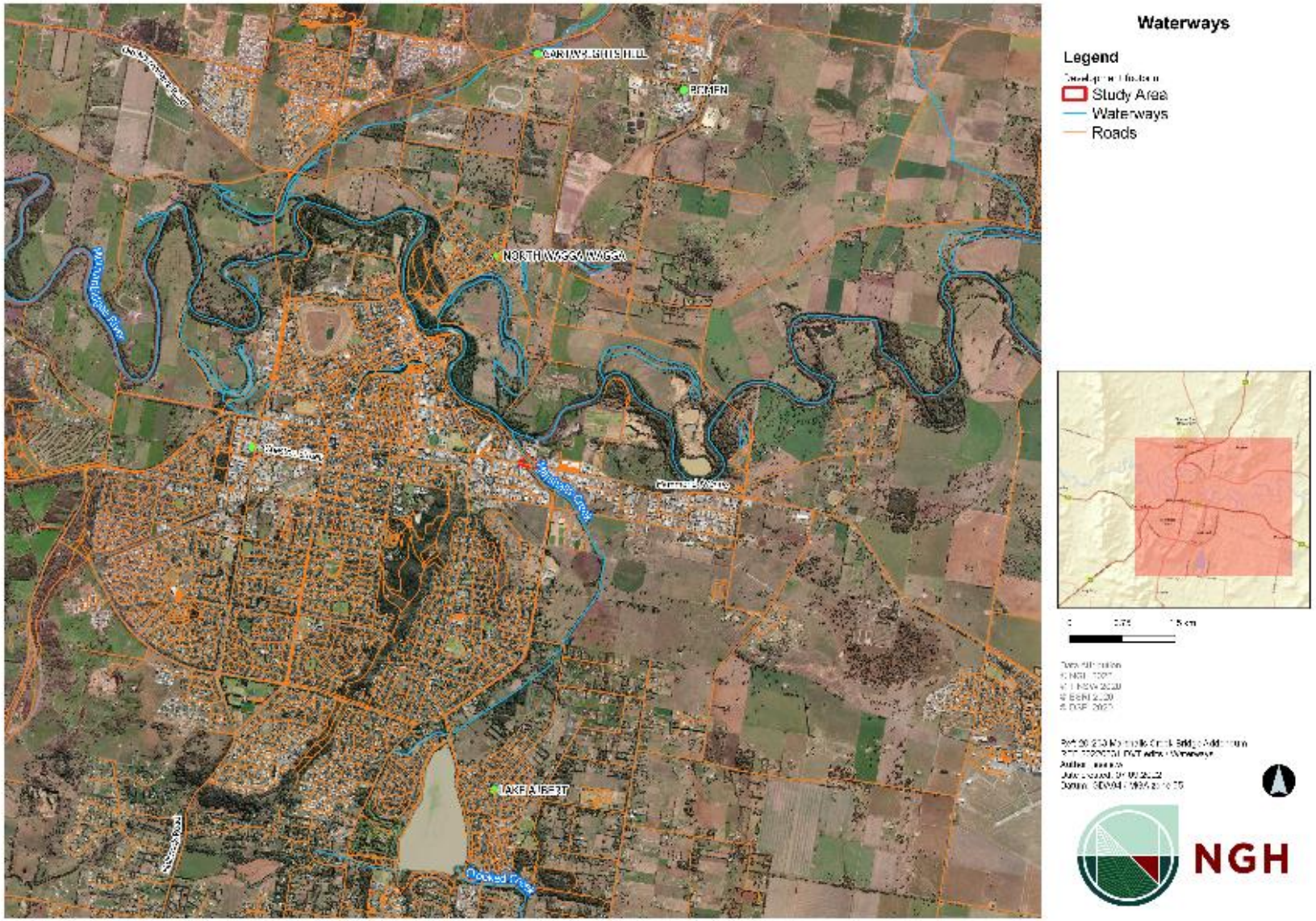

Figure 6-6 Major waterways within the study area

Figure 6-7 Example of the Marshalls Creek water feature within the construction footprint.

Potential impacts

6.2.1.1 Groundwater Vulnerability

The construction footprint is land mapped as Groundwater Vulnerability by the Wagga Wagga Local Environmental Plan (LEP) 2010. The clause 7.6 of the Wagga Wagga LEP for areas mapped as Groundwater Vulnerability states:

Development consent must not be granted for development specified for the purposes of this clause on land to which this clause applies unless the consent authority is satisfied that the development—

(a) is unlikely to adversely impact on existing groundwater sources, and

(b) is unlikely to adversely impact on future extraction from groundwater sources for domestic and stock water supplies, and

(c) is designed to prevent adverse environmental impacts, including the risk of contamination of groundwater sources from on-site storage or disposal facilities.

The proposal is not listed as specified development subject to clause 7.6.

Groundwater Dependent Ecosystems (GDEs)

Groundwater plays an important role in sustaining aquatic and terrestrial ecosystems, such as springs, wetlands and vegetation. Ecosystems that rely on groundwater for some or all of their water requirements are classed as Groundwater Dependent Ecosystems (GDEs). Marshalls Creek, within the study area, is mapped as having high potential for aquatic GDEs and moderate to high potential for terrestrial GDEs (Project REF Appendix E).

Flooding

The study area is flat to gently sloping located adjacent to the Murrumbidgee Floodplains, with an elevation of 185 m ASL. A search of the Wagga Wagga LEP (2010) found the construction footprint is located within a flood prone area. Some short-term localised flooding may occur on site following extreme rainfall events or from flooding in the adjacent Murrumbidgee River. The last large flood event in Marshalls Creek occurred on 4th March 2012 (Figure 6-8). The flood required the levee adjacent the western bridge abutment to be erected.

Figure 6-8 Marshalls Creek Bridge March 2012.

6.2.1.2 Contamination/Water quality

A Detailed Site Investigation (DSI) was completed by Jacobs Group (Australia) Pty Ltd for a comprehensive investigation of per- and polyfluoroalkyl substances (PFAS) at the RAAF Base Wagga, 2018. The investigation included Marshalls Creek and observed the extent of PFAS contamination was above the adopted guideline values in surface water and sediment along Marshalls Creek drainage pathway and groundwater in the Gumly Gumly wetland and surrounding properties. Marshalls Creek is a main surface water drainage pathway from the RAAF Base, where PFAS impacts are significant.

6.2.2 Potential impacts

Construction

Impacts to surface and groundwater water quality during construction would mostly occur during proposed temporary pedestrian crossing and ramp work. During this stage there is potential for construction material, chemicals (from construction work, refuelling activities, or plant failure), and sediment-laden runoff from the work site to enter the creeks. To minimise the risk of sediment-laden runoff, stockpiles will be located outside of the waterway west of the levy bank. Installation of pipe culvert for the proposed temporary pedestrian crossing (Section 3.3.1) will disturb the creek bed gravels disrupting sediment in the waterway. The likelihood of displacement of the concrete pipes (1200mm RCP) in the event of flooding is low given that the pipe are about 2.4metre length and 2 tonnes. This will be addressed further in the Flood Plain Management plan. In addition, should flooding in the Marshalls Creek catchment and or the Murrumbidgee River be predicted, measures in the Flood Management Plan for the project would be activated. The Flood Management Plan would minimise the potential impacts of the work during floods.

The removal of vegetation within the construction footprint may destabilise the banks and potentially result in exposure of soils to erosion hazards, causing sedimentation of the waterway. Disturbance of the channel banks during the removal of vegetation is likely to result in temporary minor increases in turbidity. The risk of impact to water is likely to be short term, localised, and not lead to a noticeable deterioration in water quality either locally or downstream. The risks are also readily minimised or avoidable and manageable through the implementation of standard construction environmental controls. Considerations with regards to the known PFAS contamination in the sediment and water of Marshalls Creek will require further management, as outlined below in the mitigation measures.

A DSI was completed by Jones Environmental Consulting for potential contamination within the development footprint. PFAS was detected within the footprint, however it was found to be limited to shallow soil locations likely deposited by past flood events. The concentration of PFAS detected is below the NEMP criteria for both ecological and human health, however exposure to these chemicals should be limited. Exposure pathways to human receptors are through dermal contact (contact with the skin) or through incidental ingestion. Human exposure and disturbance of sediments and water from the creek will need to be managed with the mitigation measures outlined below.

The proposal may result in a number of potential contamination sources being identified on the site during construction. Fuel and oil for construction plant and equipment are potential sources of contamination. Due to the work occurring adjacent to a water course, there is potential for water contamination to occur as a result of accidental spills. Fuels and oils for refuelling would be stored in doubled bunded areas in the site compound, and refuelling activities would occur in doubled bunded areas within the designated compound site. Plant and equipment would be routinely inspected and maintained during the work. Sewage levels from toilets and ablutions would be monitored and removed from site regularly.

Flooding of the site during the work is possible. In the event of a flood, the temporary pedestrian crossing allows for inundation and the passing of floodwaters above the 2-year ARI which would minimise damage to the temporary structure. In the instance of a flood in the Murrumbidgee River, a warning would be issued by the NSW State Emergency Service (SES). The warning would include the expected impacts of flooding in the Wagga Wagga LGA (NSW SES 2019). The Bureau of Meteorology would also issue a severe weather warning for flash flooding when those conditions are expected (NSW SES 2013). Flash flooding warnings are issued within 6 to 24 hours of potential flooding. This time would allow sufficient time to move

plant and equipment to areas above the Predicted flood height (NSW SES 2019). These procedures will be detailed in a Flood Management Plan for the site.

Rehabilitation of disturbed areas would be staged to occur during and post construction. Operational risks to water quality would remain unchanged from the current conditions once stabilisation has been achieved.

Operation

Operational impacts of the proposed modification are not expected to be additional in nature or extent from the assessment findings of the Project REF.

6.2.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil and water	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Detailed design/pre-construction	Section 2.1 of QA *G38 Soil and Water Management*
Soil and water	A site-specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the Soil and Water Management Plan The Plan will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.	Contractor	Detailed design/Pre-construction	Section 2.2 of QA *G38 Soil and Water Management*
Soil and water	Erosion and sediment control measures will be implemented to mitigate any impacts. Erosion and sediment control measures are to be erected and managed in accordance with all applicable requirements of the Blue Book: "Managing Urban Stormwater: Soils and Construction" (4th Edition Landcom, 2004).	Contractor	Detailed design/Pre-construction, Construction	Managing Urban Stormwater: Soils & Construction Guidelines (the Blue Book) (Landcom 2004), Section 3.1 of QA *G38 Soil and Water Management*
Soil and water	Establish erosion control and sediment capture measures, and maintain them regularly, to divert offsite stormwater, manage onsite stormwater runoff and stabilise stockpiles.	Contractor	Construction	Section 3.5 of QA *G38 Soil and Water Management,* RMS Technical Guideline EMS-TG-010:

Impact	Environmental safeguards	Responsibility	Timing	Reference
				Stockpile Site Management, the Blue Book.
Soil and water	Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.	Contractor	Construction	ESCP
Soil and water	Prepare an Environmental Work Method Statement (EWMS) for the work.	Contractor	Detailed design/Pre-construction	Section 3.7 of QA *G38 Soil and Water Management*, Section 3.2.4 of QA G36 *Environmental Protection*
Water	Work in waterways A detailed Environmental Work Method Statement (EWMS) will be prepared and implemented for all works undertaken within waterways. The EWMS will detail measures to avoid or minimise risks from erosion and sedimentation to water quality and biodiversity. A floating boom and attached silt curtain to be used and maintained to isolate the work site and minimise the impacts of turbidity and mobilised sediment during construction. It will be prepared in accordance with relevant guidelines including, but not limited to: *- Roads and Maritime Biodiversity Guidelines – Protecting and managing biodiversity on RTA projects* *- NSW DPI (Fisheries) guidelines Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings.*	Transport Contractor	Construction	
Water	A Dewatering Environmental Work Method Statement (EWMS) is to be prepared and implemented for all dewatering activities. Any dewatering activities will be undertaken in accordance with the RTA Technical Guideline:	Contractor	Pre-construction Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Environmental management of construction site dewatering in a manner that prevents pollution of waters.			
Water flow	The check dam should be designed such that afflux minimally affects upstream creek levels.	Contractor	Construction	
Soil and water	There is to be no release of dirty, impacted or otherwise, water into drainage lines and/or waterways.	Contractor	Construction	SWMP
Soil and water	The creek bed gravels, creek bank and adjacent riparian vegetation will be stabilised and rehabilitated similar to pre-construction condition upon the completion of construction.	Contractor	Construction/ operation	Section 4.16 of QA G36 *Environmental* Protection
Soil and water	Temporary containment measures and the use of dewatering processes during the curing of concrete will minimise the risk of contaminants entering the creeks	Contractor	Construction	SWMP
Soil and water	Vehicle wash down and/or cement truck washout is to occur in a designated concrete washout area as approved on a site specific ESCP.	Contractor	Construction	ESCP
Soil and water	A site-specific emergency spill plan will be developed and include spill management measures in accordance with the Transport for NSW Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities.	Contractor	Construction	Section 4.3 of QA G36 *Environmental* Protection, SWMP, Transport for NSW Code of Practice for Water Management (RTA, 1999), EPA Bunding and Spill management Guidelines
Soil and water	An emergency spill kit is to be kept on site at all times. All staff are to be made aware of the location of the spill kit and trained in its use.	Contractor	Construction	SWMP
Soil and water	All fuels, chemicals and lubricants are to be stored in an impervious doubled bunded area either:	Contractor	Construction	Section 4.3 of QA G36 *Environmental* Protection,

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• 50 m away from any aquatic habitat, flood prone areas, or on slopes steeper than 1:10 • Behind effective flood levy bank.			
Soil and water	Refuelling of plant and equipment is to occur in impervious double bunded areas in accordance with a site-specific refuelling control plan.	Contractor	Construction	SWMP
Soil and water	Adequate incident management procedures will be incorporated into the Construction and Operation Environmental Management Plans, including requirement to notify EPA for incidents that cause material harm to the environment.	Contractor	Construction	CEMP, OEMP, Section 147 – 153 POEO Act.
Soil and water	A Flood Management Plan (FMP) will be prepared and implemented as part of the CEMP. The FMP will identify all reasonably foreseeable risks relating to the event of a flood and describe how these risks will be addressed during construction.	Contractor	Detailed design/pre-construction	
PFAS contaminated water and sediment	A PFAS Management Plan will be prepared and implemented as part of the CEMP. Water and sediment within Marshalls Creek will be managed in accordance with the PFAS National Environmental Management Plan (NEMP) 2.0, Department of Agriculture, Water and the Environment 2020.	Contractor	Detailed design/Pre-construction, Construction	PFAS NEMP 2.0
Flooding	Materials would not be stockpiled for long periods of time to reduce the likelihood of flooding impacts and to avoid contamination of the waterways. The risk from flooding would be managed by timing the construction activity in the dry season where possible and limiting the duration of the works to less than 12 weeks	Contractor	Construction	

6.3 Traffic and Transport

6.3.1 Existing environment

Access to the proposal area would be via a network of sealed public roads. Major roads near the proposed work would be used as transport routes, and include:

- Hammond Avenue
- Edward Street
- Sturt Highway
- Kooringal Road
- Copland Street
- Lake Albert Road
- Eunony Bridge Road
- Byrnes Road
- Bomen Road
- Olympic Highway.

The NSW Roads and Traffic Authority (RTA) developed a set of road hierarchy classifications (Table 6.31), indicating typical nominal volumes in terms of average annual daily traffic (AADT) serviced by various classes of road.

Table 6-5 Functional classification of roads.

Type of Road	Traffic Volume (AADT)	Peak Hour Volume (vph)
Arterial	>15,000	1,500 – 5,5600
Sub-Arterial	5,000 – 20,000	500 – 1,000
Collector	2,000 – 10, 000	200 – 1,000
Local	<2,000	0 - 200

Hammond Avenue, Edward Street, Eunony Bridge Road, Byrnes Road, Bomen Road, Olympic Highway and the Sturt Highway are arterial roads and are likely to experience traffic volumes of greater than 15,000 vehicles daily. Kooringal Road, Copland Street and Lake Albert Road are sub-arterial roads and are likely to experience traffic volumes of 5,000 to 20,000 daily.

6.3.2 Potential impacts

Construction

During the early phase of construction, the Marshalls Creek Bridge Replacement project as outlined in Section 6.3 of the Project REF requires partial lane closure of the Sturt Highway. During night works (10-15 nights), closure of both lanes in both directions would be required. Where this occurs a detour route for Heavy Vehicles would be established utilising the Sturt Highway, Eunony Bridge Road, Byrnes Road, Merino Road and the Olympic Highway. For light vehicles and local traffic (including local heavy traffic) Kooringal Road, Copland Street, Sutton Street and Nagle Street (Detour Traffic Route) would be utilised. Sutton Street and Nagle Street are surrounded by industrial precinct. Detour roads are assessed to be able to handle the increased detour traffic load in accordance with their functional classification.

Potential impacts to noise and vibration of the amendment to the detour route proposed in this addendum REF are covered in the following Section (6.4).

Additional to the Project REF, the proposed modification would require some heavy vehicle movements for the movement of plant and materials, as well as light vehicle movements for staff needs involved in the construction of the proposed temporary pedestrian crossing. These movements are considered very minor in relation to existing conditions and those covered in the Project REF.

Operation

Operational impacts of the proposed modification are not expected to be additional in nature or extent from the assessment findings of the Project REF. When detours are in place, traffic volumes would increase on the detour routes. No impacts would occur to traffic volumes on the local roads following the completion of the work. The work would result in improved traffic flow and reduced congestion.

6.3.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual* (RMS, 2018) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). The TMP will include: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local community of impacts on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic	Contractor	Detailed design/Pre-construction	Section 2.2 of QA *G10 Traffic Management,* Roads and Maritime *Traffic Control at Work Sites Manual* (RMS, 2018)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• Monitoring, review and amendment mechanisms.			
Traffic and transport	Existing access for nearby and adjoining properties, businesses and roads is to be maintained at all times during the works unless otherwise agreed to by the affected property owner.	Contractor	Construction	TMP
Traffic and transport	Local and regional road users will be informed of any expected traffic or access changes and delays prior to construction commencing.	Contractor	Pre-construction, construction	TMP
Traffic and transport	WWCC, SES, adjoining properties and businesses will be notified 4 weeks prior to the closure of both lanes in both directions along Hammond Avenue/Sturt Highway.	Contractor	Pre-construction, construction	TMP
Traffic and transport	All complaints are to be recorded on a Complaints Register and attended to promptly.	Contractor	Construction	TMP

6.4 Noise and Vibration

6.4.1 Methodology

The Marshalls Creek Bridge Replacement Project is likely to only generate noise impacts during construction as outlined in Section 6.4 of the Project REF. The Marshalls Creek Bridge Replacement Project will result in the outside lane of the bridge and abutments moving slightly (3.5 m) closer to the caravan park on the north-eastern side of the road. Any traffic that would move closer to one receiver must, by definition, move further away from the other receiver. Thus, traffic relocation would be largely balanced and of no consequence to the noise profile. Traffic volumes and speed would not increase due to the proposal. Traffic acceleration, deceleration and lane changes would likely decrease due to the proposal. As such, any change in traffic noise impact at the caravan park and adjacent dwelling is expected to be minor. No additional operational noise is expected, as outlined in the Project REF, or as a result of the proposed modification. Hence, no operational noise assessment was considered necessary in the Project REF.

The construction noise and vibration assessment in the Project REF was prepared in accordance with the policies and guidance administered by the Environment Protection Authority (EPA), including:

- NSW Interim Construction Noise Guideline (ICNG) 2009
- NSW Noise Policy for Industry (NPfI) NSW EPA 2017

The NSW Interim Construction Noise Guideline (ICNG) 2009 provides guidance on the measurement and management of construction noise impacts. The guideline requires a quantitative assessment of noise impacts when works are likely to impact an individual or sensitive land use for more than three weeks in total.

A quantitative noise impact assessment was conducted for the Marshall Bridge Replacement Project the results of which are presented in Section 6.4 and Appendix H of the Project REF. The potential project impacts from construction of the proposed temporary pedestrian crossing in this addendum REF, are not expected to be significantly different in nature or extent to the assessment carried out in the Project REF.

The ICNG describes the ‘noise management levels’ (NML’s), for residences and other sensitive receivers. For work during standard working hours, residences are considered noise affected when construction noise is 10 dB(A) above the rating background level (RBL) and ‘highly noise affected’ when construction noise is above 75 dB(A). Work outside standard working hours affect sensitive receivers when construction noise is 5 dB(A) above the RBL (ICNG 2009).

A noise assessment of the nearest sensitive noise receivers was undertaken by SLR, based on unattended noise monitoring completed in the study area during May 2022. The unattended noise monitoring followed attended noise monitoring on the 13 May 2022 using a RION NA-28. The measured noise levels were used to determine the existing noise environment and to set the criteria used to assess the potential impacts from the amendment to light vehicle and local traffic detour route. Monitoring results are reported in the following Sections and in Appendix G.

Monitoring equipment was position to measure existing noise levels that are representative of receivers potentially most affected by the project (Figure 1-2), within constraints such as accessibility, security and landowner permission. The noise monitoring equipment continuously measured existing noise levels in 15-minute periods during the daytime, evening, and night-time. All equipment carried current National Association of Testing Authorities (NATA) or manufacturer calibration certificates and equipment calibration was confirmed before and after each measurement.

The measured data has been processed to exclude noise from extraneous events and periods affected by adverse weather conditions, such as strong wind or rain (measured at Wagga Wagga Airport), to establish representative existing noise levels in the study area.

Table 6-6 Surrounding Sensitive Receivers

Receiver ID	Address	Type
R01	45 Kooringal Road	Residential
R02	93 Hammond Avenue	Holiday Accommodation/ Caravan Park
R03	26 Hammond Avenue	Residential
R04	38 Copland Streat	Residential

6.4.2 Existing environment

The existing noise environment of the sites are generally influenced by road traffic from the surrounding road network with the nearest major road being Sturt Highway and Copland Street. Existing noise sources are typical of this built environment. Dominant noise sources originate from light and other local vehicle traffic, industrial and residential origins Figure 1-2.

Within 1km of the construction boundary there are over 200 sensitive receivers (mainly residential dwellings). The closest receiver is a caravan park located 30 m north-east of the construction boundary. The closest residential dwelling is located about 350 m north-west of the construction boundary. Sensitive receivers identified as potentially noise affected are shown in Figure 1-2.

The results from the unattended noise logging results are displayed in the following Table 6-7. Attended noise measurements

Table 6-7 Summary of Unattended Noise Logging Results

Receiver ID	Address	Measured Noise Levels (dBA)							
		Background Noise (RBL)			Average Noise (LAeq)				
		Day	Evening Night	Night	Day	Evening Night	Night	Day LAeq,15 hr[2]	Night LAeq,9 hr[2]
R01	45 Kooringal Road	37	38	33	50	44	43	50	43
R02	93 Hammond Avenue	60	37	36	69	66	63	68	63
R03	26 Hammond Avenue	59	51	36	67	65	61	61	59
R04	38 Copland Streat	44	40	32	59	54	49	58	49

Note 1: The assessment periods are the daytime which is 7 am to 6 pm Monday to Saturday and 8 am to 6 pm on Sundays and public holidays, the evening which is 6 pm to 10 pm, and the night-time which is 10 pm to 7 am on Monday to Saturday and 10 pm to 8 am on Sunday and; public holidays. See the NSW EPA *Noise Policy for Industry*.

Note 2: As per the NSW *Road Noise Policy*, traffic noise Daytime LAeq,15 hr is from 7am to 10pm and Night LAeq,9 hr is 10pm to 7am.

The results from the attended noise monitoring are displayed in Table 6-8. attended noise measurements. The attended measurements were generally found to be consistent with the results of the unattended noise monitoring and show that existing noise levels are typically dominated by road traffic noise from the surrounding road network.

Table 6-8 Summary of Operator Attended Noise Monitoring Results

Receiver ID	Location	Date/ Start Time/ Weather	Primary Noise Descriptor (dBA re 20 mPa)				
			Lamax	LA1	LA10	LA90	LAeq
R01	45 Kooringal Road	13/5/2022 15:54 21°C 1.0 m/s NE	65	48	45	37	45
R02	93 Hammond Avenue	13/5/2022 15:27 21°C 1.0 m/s NE	76	73	70	63	67
R03	26 Hammond Avenue	13/5/2022 14:23 21°C 1.0 m/s NE	79	75	70	61	67
R04	38 Copland Streat	13/5/2022 14:51 21°C 1.0 m/s NE	76	68	63	46	59

The existing traffic data on Hammond Avenue has been used to calculate the expected increase in noise levels at the nearby noise sensitive receivers to the Detour Traffic Route. The results are summarised in the Following Table

Table 6-9 Predicted traffic noise levels of detour route at nearby receivers

Receiver Id	Address	Period	Measured Existing Traffic Noise	Predicted Traffic Noise from Detour Route[1]	Resulting Traffic Noise Levels with construction detour	Predicted increase in Road Traffic noise
R01	45 Kooringal Road	Day LAeq,15 hr	50	50	50	0dB
		Night LAeq,9 hr	43	43	43	0dB
R02	93 Hammond Avenue	Day LAeq,15 hr	68[2]	54	54	-14dB
		Night LAeq,9 hr	63[2]	47	47	-16dB

R03	26 Hammond Avenue	Day LAeq,15 hr	61	-[3]	61	0dB
		Night LAeq,9 hr	59	-[3]	59	0dB
R04	38 Copland Streat	Day LAeq,15 hr	58	5[3]	59[4]	+1dB
		Night LAeq,9 hr	49	47	51[4]	+2dB

Note 1: Predicted road traffic noise levels only consider the distance from the nearest point on the route and does not consider building attenuation.

Note 2: Due to the nature of the detour traffic route, traffic on Hammond Avenue during construction would not flow past this noise sensitive receiver.

Note 3: Due to the nature of the detour traffic route, traffic on Hammond Avenue during construction would not change at this noise sensitive receiver.

Note 4: Calculated noise level includes both the existing LAeq(period) noise level and the predicted noise level as a result of the detour.

6.4.3 Potential impacts

Construction Traffic

The potential impacts from construction traffic associated with the proposal when travelling on public roads are assessed under the NSW EPA *Road Noise Policy* (RNP) and Roads and Maritime (now Transport for NSW) *Construction Noise and Vibration Guideline* (CNVG).

An initial screening test was applied to evaluate if the existing road traffic noise levels are expected to increase by more than 2.0 dB as a result of construction traffic. Where this is considered likely, further assessment is required using the RNP and Roads and Maritime (now Transport for NSW) *Noise Criteria Guideline* (NCG) base criteria shown in the following table.

Table 6-10 RNP/NCG Criteria for Assessing Construction Traffic on Public Roads

Road Category	Type of Project/ Land Use	Assessment Criteria(dBA)	
		Day-time (7 am - 10 pm)	Night-time (10 pm - 7 am)
Freeway/ arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq(15hour) 60 (external)	LAeq(9hour) 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq(1hour) 55 (external)	LAeq(1hour) 50 (external)

In relation to the predicted traffic noise levels calculated from the noise monitoring (Table 6-9) the following was found:

- R01: The traffic noise level at R01 is not predicted to change during the construction of the bridge as the flow along Hammond Avenue does not change east of the intersection with Kooringal Road.
- R02: The traffic noise level at R02 is predicted to decrease, as traffic is being diverted away from R02. The assessment shows that as the traffic is being diverted to no long pass this property, the noise level is predicted to decrease by 14dB during the daytime and 16 dB during the night-time.
- R03: The traffic noise level at R03 is not predicted to change during construction of the bridge as traffic flow does not change at R03. Therefore, is it expected that the traffic noise level would remain the same.
- R04: The traffic noise level at R04 is predicted to increase by 1dB during the daytime and 2dB during the night-time period as the detour route is closer in proximity to R04 than Hammond Avenue. The assessment shows that traffic noise levels at R04 is predicted to be compliant with the criteria noting that the prediction doesn't include shielding from neighbouring industrial buildings that would result in a lower traffic noise level.

Based on these results:

- No change in road traffic noise is predicted at R01 and R03.

- A decrease in road traffic noise is predicted at R02 as no traffic was pass by this property.
- An increase of 1dB during the daytime and 2dB during the night-time at R04, noting that the calculation doesn't consider attenuation from buildings and may result in a lower traffic noise level.

Operation

Operational impacts of the proposed modification are not expected to be additional in nature or extent from the assessment findings of the Project REF.

6.4.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim *Construction Noise Guideline* (ICNG) (DECC, 2009) and identify: • All potential significant noise and vibration generating activities associated with the activity • Feasible and reasonable mitigation measures to be implemented, taking into account *beyond the pavement: urban design policy, process and principles* (roads and maritime, 2014) • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • Contingency measures to be implemented in the event of non-compliance	Contractor	Detailed design/pre-construction	Section 4.6 of QA *G36 Environment Protection*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	with noise and vibration criteria.			
Noise and vibration	Work hours during construction will generally be limited to Standard Working Hours, except for when night work is necessary for activities such as girder installation and stitch pouring. Standard working hours: • Monday – Friday 7:00 am to 6:00 pm • Saturday - 8:00 am to 1:00 pm • Sunday and Public Holidays - No work	Contractor	Construction	
Noise and vibration	All sensitive receivers (e.g. schools, local residents) likely to be affected will be notified at least 5 days prior to commencement of any work associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of: • The project • The construction period and construction hours • Contact information for project management staff • Complaint and incident reporting • How to obtain further information.	Contractor	Pre-construction	
Noise and vibration	For construction during standard working hours, the Caravan Park should: • Receive a written notification letter. • Receive a phone call at least 5 days prior to commencement of any work. Phone calls may provide the affected	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).

Impact	Environmental safeguards	Responsibility	Timing	Reference
	residence with a contact telephone number for noise complaints, provide advice and the opportunity for the residence to provide any comments. • Verification of noise and vibration levels as part of routine checks of noise levels should be undertaken within a period of 14 days from the commencement of construction activities or following reasonable complaints. • Noise measurements will be consistent with the procedures documented in AS1055.1-1997 Acoustics-Description and Measurement of Environmental Noise-General Procedures. • Vibration measurements will be undertaken in accordance with the procedures documented in the OEH's Assessing Vibration-a technical guideline (2006) and BS7385 Part 2-1993 Evaluation and measurement for vibration in buildings.			
Noise and vibration	For construction during OOHW, the Caravan Park should: • Receive a written notification letter. • Receive a phone call at least 5 days prior to commencement of any work. • Verification of noise and vibration levels as part of	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).

Impact	Environmental safeguards	Responsibility	Timing	Reference
	routine checks of noise levels or following reasonable complaints should be undertaken within a period of 14 days from the commencement of construction activities. • Receive individual briefings about the impacts of high noise activities and mitigation measures that will be implemented. Project representatives will visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Where the resident cannot be met with individually then an alternative form of engagement should be used. • Receive duration respite.			
Noise and vibration	For construction during OOHW period 2, Residential Receivers located within 350 m should: • Receive a written notification letter. • Verification of noise and vibration levels as part of routine checks of noise levels or following reasonable complaints should be undertaken within a period of 14 days from the commencement of construction activities. • Receive duration respite.	Contractor	Pre-construction	
Noise and vibration	For construction during OOHW period 2, Residential Receivers located within 500 m should: Receive a written notification letter.	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).

Impact	Environmental safeguards	Responsibility	Timing	Reference

Noise and vibration	• Where possible avoid operating plant concurrently.
	• The dominant noise sources (piling rig, jackhammer, mobile crane) will be:
	  ○ Switched off when not required.
	  ○ Used only when necessary.
		Contractor	Construction	

Noise and vibration	• Notification of residents within 318 m of Eunony Road and 175 m of Kooringal Road of night-time detours, date of commencement, duration of the detours and contact number for complaints regarding traffic noise.	Contractor and Project manager.	Pre-construction	

6.5 Topography, Geology and Soils

6.5.1 Existing environment

The subject land occurs within the floodplains of the Murrumbidgee River and Marshalls Creek. Geological mapping reveals that the bridge is built on unconsolidated sediments deposited in the quaternary, composed of alluvial sand, silt, clay, and pebble to cobble sized gravel (Geological Survey of NSW, 2020).

Urban salinity is a key cause of land degradation in Wagga Wagga and is monitored through a network of over 200 piezometers (WWCC, 2018a). For the 2017/2018 reporting period, the piezometers showed a decrease in the overall standing water levels (SWL) when compared to 2010/2011 reporting period (WWCC, 2018b).

In addition to the natural setting, Marshalls Creek and associated lands have been extensively reworked by human activities. The construction of the flood levee, the industrial subdivision of East Wagga Wagga, historic filling of the floodplain and drainage of East Wagga Wagga has substantially altered the hydrological and topographical features of the project area. Topography, geology and soil summaries for the proposal area in the context of the Bioregion are provided in

Table 6-11 below.

Table 6-11 Summary of topographic, soil and landscape features in the study area.

Category	Study area
Topography	The proposal is located on the floodplain of the Murrumbidgee River. Slope gradients are less than 1%, local relief is generally less than 2 m within the elevation range of 185 m ASL.
Geology	Marshalls Creek Bridge is built on unconsolidated sediments deposited in the quaternary, composed of alluvial pebble to cobble sized gravel, sand silt and clay (Geological Survey of NSW, 2020).
Soils	The E-spade website (https://www.environment.nsw.gov.au/) notes the area is part of the Kurrajong Plain Soil Landscape with; moderately deep alluvial soils that are subject to occasional flooding, localised waterlogging and streambank erosion (Appendix D).
Acid Sulphate Soils	There is a low probability for acid sulphate soils (ASS) to occur throughout the development site (Appendix D).

6.5.1.1 Contaminated Land

A search of the NSW EPA's Contaminated Land Record and List of Contaminated Sites Notified to the EPA was carried out on 18 May 2020 and 10 March 2022. On both occasions of accessing the records no identified contaminated lands within or adjacent to the proposed work were listed.

Transport have identified that previous road works nearby encountered road materials that were impacted by coal tar. There may be some potential for the proposed road and abutment works to disturb coal tar contaminated road materials. Any contaminated soils encountered during works would be managed in accordance with Transport Guideline for the Management of Contamination (Transport, 2013) and in accordance with the NSW EPA

Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the POEO (Waste) Regulation, the reclaimed asphalt pavement exemption 2014.

A DSI was completed by Jacobs Group (Australia) Pty Ltd for a comprehensive investigation of polyfluoroalkyl substances (PFAS) at the RAAF Base Wagga, 2018. The investigation included Marshalls Creek. It observed the extent of PFAS contamination above the adopted guideline values. PFAS was recorded in surface water and sediment along Marshalls Creek and groundwater in the Gumly Gumly wetland and surrounding properties. Marshalls Creek provides a surface water drainage pathway from low lying areas west of the RAAF Base, where PFAS impacts are significant. This has been addressed in the Hydrology, Flooding and Water Quality impacts in Section 6.2 of the project REF, importantly it is relevant for both water and soil environmental concerns.

Potential impacts

Construction

Potential impacts to soils and water during construction include:

- Soil erosion during construction and until landforms have been stabilised
- Sediment laden run off into waterways
- Disturbance of soils in the road verge and around vehicle and plant access points
- Disturbance of soils using under boring to relocate underground services
- Tracking of soils onto surrounding roads causing potential hazards for road users
- Groundwater and surface water contamination from potential spills and PFAS
- Potential for soil and sediment contamination.

The proposed modification would involve earthworks during construction of the temporary pedestrian crossing. Excavation of soil and vegetation along the creek banks for the crossing and associated ramps would be required. This would potentially result in soil erosion and sedimentation of the waterway.

Plant and machinery undertaking work activities along the bank of the creek line would disturb vegetation and the soil surface. This may result in sedimentation of the waterway. Erosion and sediment controls would be implemented for the work during construction. Work would be revegetated and stabilised progressively.

The proposal may result in several potential contamination sources being introduced to the site and surrounds during construction. Fuel and oil for construction plant and equipment are potential sources of pollution. Due to the work occurring within proximity to a waterway there is potential for contamination to occur as a result of accidental spills. Fuels and oils for refueling would be stored in doubled bunded areas in the site compound and refueling activities would occur in doubled bunded areas within the designated compound site. Under-boring spoil has the potential for contamination from solvents added to the drilling matrix and PFAS from the RAAF base.

There is potential for human exposure and disturbance of sediments and water from the creek during construction works, this will need to be managed with the mitigation measures outlined below. The concentration of PFAS in Marshalls creek has a potential risk to human health and the environment. The concentrations of PFAS in the creek exceeded human health guidelines for recreational water use and the guidelines for ecological protection. Exposure pathways to human receptors are through dermal contact (contact with the skin) or incidental ingestion.

Operation

Operational impacts of the proposed modification are not expected to be additional in nature or extent from the assessment findings of the Project REF.

6.5.2 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport for NSW Environment Manager and/or EPA.	Contractor	Detailed design/Pre-construction, Construction	Section 4.2 of QA *G36 Environment Protection.* Guideline for the Management of Contamination (2013).
Accidental spill	A site-specific emergency spill plan will be developed and include spill management measures in accordance with the Transport for NSW *Code of Practice for Water Management* (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport for NSW and EPA officers).	Contractor	Detailed design/Pre-construction	Section 4.3 of QA *G36 Environment Protection*
PFAS contaminated water and sediment	A PFAS Management Plan will be prepared and implemented as part of the CEMP. Water and sediment	Contractor	Detailed design/Pre-construction, Construction	PFAS NEMP 2.0

Impact	Environmental safeguards	Responsibility	Timing	Reference
	within Marshalls Creek will be managed in accordance with the PFAS National Environmental Management Plan (NEMP) 2.0, Department of Agriculture, Water and the Environment 2020.			

Other safeguards and management measures that will address soil impacts are identified in Section 6.2.3.

6.6 Aboriginal Cultural Heritage

6.6.1 Methodology

A Stage 1 Procedure for Aboriginal Cultural Heritage Consultations and Investigation (PACHCI) was completed by Transport Aboriginal Cultural Heritage Officer Andrew Whitton (Appendix E). The PACHCI was completed in accordance with Roads and Maritime Services (RMS) procedure for Aboriginal cultural heritage consultation and investigation (2011).

The Stage 1 assessment included a desktop risk assessment to determine whether the proposal is likely to harm Aboriginal cultural heritage or not, and whether further assessment or investigation is required (RMS, 2011). The risk assessment included an AHIMS search and review of the landscape features within the study area.

6.6.2 Potential impacts

Construction

The proposal was assessed as being unlikely to have an impact on Aboriginal cultural heritage due to the following findings:

- The project is unlikely to harm known Aboriginal objects or places
- The AHIMS search did not indicate Aboriginal objects in the study area
- 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 Transport for NSW procedure. However, 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.

Operation

Operational impacts of the proposed modification are not expected to be additional in nature or extent from the assessment findings of the Project REF.

6.6.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage	*The Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place.	Contractor	Detailed design/pre-construction	Section 4.9 of QA *G36 Environment Protection*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Work will only re-commence once the requirements of that Procedure have been satisfied.			
Aboriginal heritage	If the scope of the proposal changes, no further work is to occur until any potential impacts on Aboriginal cultural heritage are re-assessed.	Contractor	Detailed design/pre-construction	

6.7 Non-Aboriginal Heritage

6.7.1 Methodology

A search of the Australian Heritage Database, NSW Heritage Register and local heritage listings under the Wagga Wagga LEP 2010 were undertaken to determine the location of any nearby listed heritage items (refer to Appendix D).

6.7.2 Existing environment

6.7.3 Australian Heritage Database

A search of the National Heritage database was undertaken again on 25 June 2020 and again on 28 March 2022. No change in the listings between retrieval dates was observed. A total of 20 items/places are registered on the Register of the National Estate (RNE) a non–statutory list within the Wagga Wagga LGA. No items listed under the register of the National Estate (Non-statutory archive) occur within the construction footprint.

6.7.4 State Heritage Register

The NSW Heritage Act 1977 is a statutory tool designed to conserve the cultural heritage of NSW and used to regulate development impacts on the state's heritage assets. NSW Heritage Division (OEH) administers the Act. The Act details the statutory requirements for protecting historic buildings and places. This includes any place, building, work, relic, movable object, which may be of historic, scientific, cultural, social, archaeological, natural or aesthetic value.

A search of the NSW Heritage register was undertaken on the 7th July 2020 and again on 28 March 2022. Five records of Aboriginal Places listed under the National Parks and Wildlife Act were identified within the Wagga Wagga LGA, none of these are located adjacent or within the construction footprint. Four items listed under the NSW Heritage Act were identified within the Wagga Wagga LGA, none of these are located adjacent or within the construction footprint. No change in the listings between retrieval dates was observed.

6.7.5 State Agency Heritage Register

State agencies in NSW such as Transport are required to keep a register of heritage places managed under Section 170 of the Heritage Act. The s.170 registers are also held in the Heritage Division's State Heritage Inventory (SHI); an electronic database of statutory listed heritage items in NSW protected by heritage schedules of LEP's and State agencies. The inventory can include historical archaeological sites, maritime archaeological, industrial sites, urban landscapes including parks and gardens, private and civic buildings, and heritage items owned by State government agencies.

A search of the State Agencies Heritage register was undertaken on 7 July 2020 and 28 March 2022. The search initially returned 337 and on the second later search 312 items listed by Local Government and State Agencies. Wagga Waterworks building listed by Local Government is located adjacent to the construction footprint within the Riverina Water depot (370 m NW).

6.7.6 Local Heritage

A search of the Wagga Wagga LEP was undertaken on 7 July 2020 and 28 March 2022. The Wagga Waterworks (I273) building is listed on the Wagga Wagga LEP and is located adjacent to the construction footprint.

Marshalls Creek Bridge is a concrete bridge constructed by Department of Main Roads (DMR) in 1963. The Bridge is not listed on the Australian Heritage Database, State Heritage Register, State Agency Heritage Register or the Wagga Wagga LEP. See the Project REF for the historical context of concrete bridges in relation to the Marshalls Creek Bridge in Section 6.7.

6.7.7 Potential impacts

Construction

No items of non–indigenous heritage occur within the construction footprint. The proposed work would not impact the Wagga Waterworks building located adjacent to the construction footprint.

Operation

Operational impacts of the proposed modification are not expected to be additional in nature or extent from the assessment findings of the Project REF.

6.7.8 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal heritage	*The Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/pre-construction	Section 4.10 of QA *G36 Environment Protection*

6.8 Landscape Character and Visual impacts

6.8.1 Approach

Visual amenity is subjective to the extent that landscape features can be perceived differently by different people. What some people may deem to be visually attractive, others may perceive as visually intrusive.

6.8.2 Existing environment

The dominant visual characteristic of the region is the Murrumbidgee River, wineries, and agricultural land used for cropping and grazing. Within the study area, the dominant visual features consist of suburban residences, industrial premises, levee bank, parks and sporting fields. Adjacent to the proposal the area is a mix of industrial premises, creek line and arterial road.

6.8.3 Potential impacts

Construction

Minor changes to the immediate visual amenity of the construction footprint may occur during the construction of the proposed temporary pedestrian crossing. Construction of the proposed modification would disturb groundcover, remove vegetation, involve minor ramp and path work and the placement of stockpile areas. These are short term and minor in relation to the scope of work activities.

Operation

Operational impacts of the proposed modification are not expected to be additional in nature or extent from the assessment findings of the Project REF.

6.8.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Landscape character and visual impact	A Landscaping Plan will be prepared to support the final detailed project design and implemented as part of the CEMP.	Contractor	Detailed design/pre-construction	Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014), Landscape Guideline (RTA, 2008), *Bridge Aesthetics* (Roads and Maritime 2012), Noise Wall Design

Impact	Environmental safeguards	Responsibility	Timing	Reference
				Guidelines (RTA, 2006), Shotcrete Design Guideline (RTA, 2005).
	The Landscaping Plan will include design treatments for: • Location and identification of existing vegetation and proposed landscaped areas, including species to be used • Built elements including retaining walls, bridges and noise walls • Pedestrian and cyclist elements including footpath • location, paving types and pedestrian crossings • Fixtures such as seating, lighting, fencing and signs • Details of the staging of landscape work taking account of related environmental controls such as erosion and sedimentation controls and drainage • Procedures for monitoring and maintaining landscaped or rehabilitated areas.			
	The Landscaping Plan will be prepared in accordance with relevant guidelines, including: • Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014) • Landscape Guideline (RTA, 2008)			

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• *Bridge Aesthetics* (Roads and Maritime 2012) • Noise Wall Design Guidelines (RTA, 2006) Shotcrete Design Guideline (RTA, 2005).			

6.9 Land-use

6.9.1 Existing environment

The construction footprint is located on land zoned SP2 Infrastructure and B6 Enterprise Corridor under the Wagga Wagga LEP (2010). Land use activities surrounding the construction footprint are predominantly IN1 General Industrial and IN2 Light industrial. Other land uses are shown in Figure **6-9** and include:

- RU1 Primary Production.
- RE1 Public Recreation.
- R1 General Residential
- R3 Medium Density Residential
- Public road network.
- Electricity connection and transmission infrastructure.

6.9.2 Potential impacts

Construction

During construction there would be a temporary reduction in public access and use of the Sturt Highway/Hammond Avenue, and the Wiradjuri Walking Track within the vicinity of the construction footprint. Pedestrian movement would be safely directed to the North of the bridge works and across the proposed temporary pedestrian crossing. There would be property acquisition for the relocation of services and a drainage outlet along the southern side of the bridge. No permanent change to the existing land use would occur as a result of the proposal.

Operation

During operation of the proposed modification, the existing land uses would return to pre-construction use.

6.9.3 Safeguards and management measures

No additional safeguards are considered necessary.

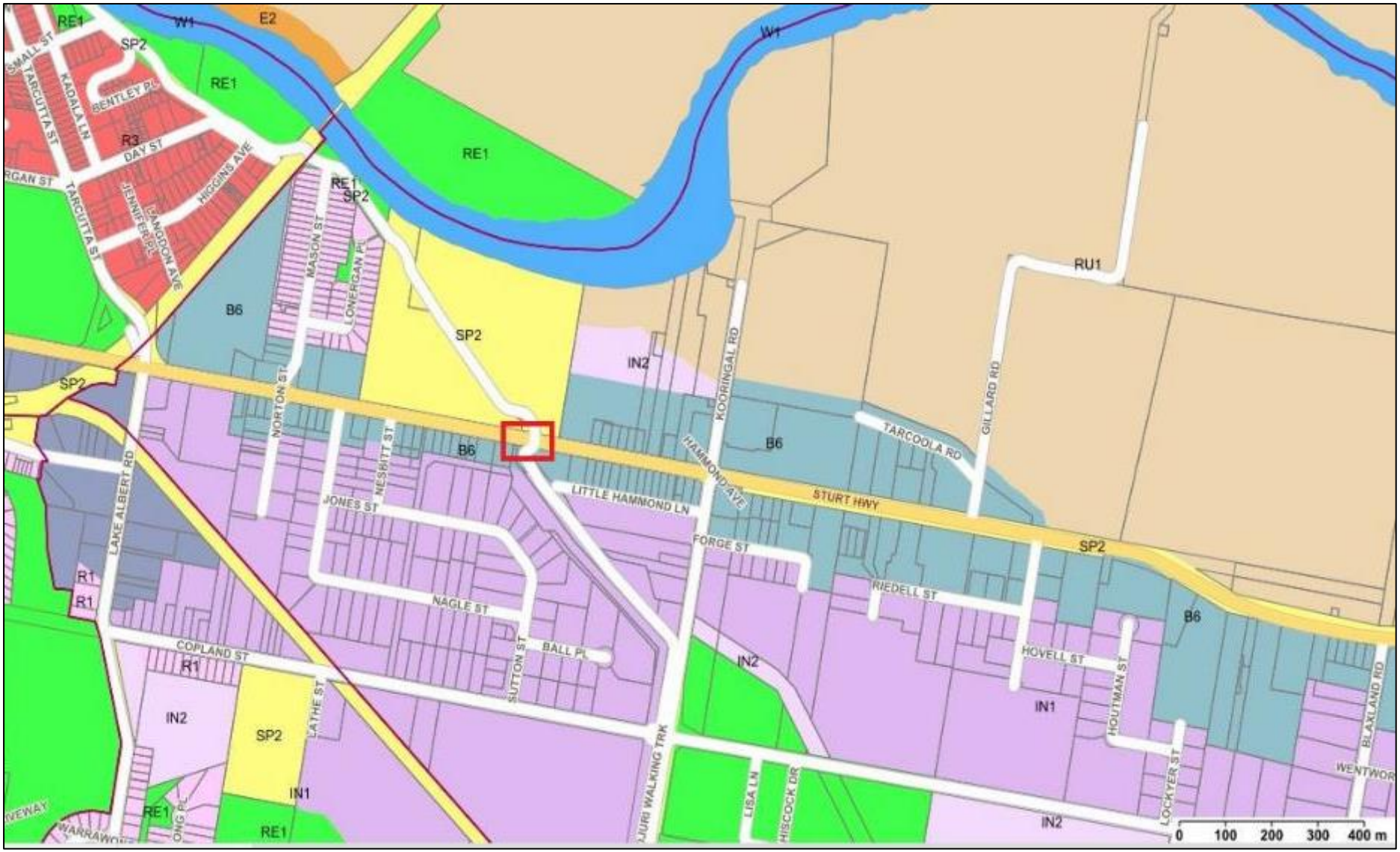

Figure 6-9 Wagga Wagga LEP (2010) land-use zones surrounding the proposed modification

6.10 Socio Economic

6.10.1 Existing environment

The Proposal is located in the Riverina, recognised for its long agricultural history. Wagga Wagga is the fifth largest inland city in Australia with a population of 62,400 (ABS 2016). Wagga Wagga has become the economic hub for regional New South Wales with a fast growing and diverse economy (WWCC 2020). The city's gross regional product in the year ending June 2019 was $3.85 billion, with the strongest growth sectors occurring in healthcare and social assistance, wholesale trade and manufacturing (WWCC 2020).

Potential impacts

Construction

The proposed modification has the potential to impact local road users, pedestrians and cyclists, access to public recreation, and access to surrounding businesses as a result of the following:

- Access (refer to Section 6.3 for assessment)
- Noise (refer to Section 6.4 for assessment)
- Given the pedestrian path on the existing bridge will be closed during construction, temporary access across Marshalls Creek will be provided.

These impacts would be temporary and minor with the implementation of the recommended mitigation measures.

The proposal would have an overall positive socio-economic impact on Wagga Wagga LGA, with an improved road network that reduces traffic congestion and meets the needs of a growing community.

Operation

6.10.2 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Socio-economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): • Mechanisms to provide details and timing of proposed activities, including changed traffic and access conditions, to affected residents, businesses, Council and shared path user groups • Contact name and number for complaints.	Contractor	Detailed design/pre-construction	Community Involvement and Communications Resource Manual (RTA, 2008).

Impact	Environmental safeguards	Responsibility	Timing	Reference
	The CP will be prepared in accordance with the *Community Involvement and Communications Resource Manual* (RTA, 2008).			

6.11 Other impacts

Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts
Air Quality	Air quality in the study area is typical of the surrounding rural region. In general, air quality is high. However, raised dust during the dryer months contributes to sporadic reductions in air quality. During autumn, the level of particulate matter in the air increases due to the burning of agricultural residues and soil cultivation for cropping. In winter, the burning of wood in solid fuel fires contributes to elevated levels of particulate matter in the atmosphere. There are no residencies or agriculture paddocks within 100 m of the proposal area.	Generation of dust and exhaust fumes.
Waste and Resources	Waste management would occur in accordance with the *Waste Avoidance and Resource Recovery Act 2001*. The objectives of this Act are: *a) To encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development.* *b) To ensure that resource management options are considered against a hierarchy of the following order:* *i. Avoidance of unnecessary resource consumption.* *ii. Resource recovery (including reuse, reprocessing, recycling, and energy recovery).* *iii. Disposal.*	Generation of small quantities of waste including: • General construction waste. • Excavated road material. • Domestic rubbish. • Spoil. • Concrete. • Metal. • Vegetation. • Bitumen. • Sewerage. • Fuels, oils and lubricants.

	c) *To provide for the continual reduction in waste generation.* d) *To minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste.* e) *To ensure that industry shares with the community the responsibility for reducing and dealing with waste.* f) *To ensure the efficient funding of waste and resource management planning, programs, and service delivery.* g) *To achieve integrated waste and resource management planning, programs, and service delivery on a State–wide basis.* To assist in the achievement of the objectives of the *Protection of the Environment Operations Act 1997*	As mentioned in Section (Topography, Geology and Soils6.5) Transport have identified that previous road works nearby encountered road materials that were impacted by coal tar. There may be some potential for the proposed modification works to disturb coal tar contaminated road materials.
Public Utilities	Public utilities including gas pipelines, water mains, electrical poles and streetlights occur within the construction footprint. The gas pipeline and water mains would be relocated by under boring beneath Marshalls Creek. The electrical power poles and streetlights would be relocated within the road reserve.	Damage to public utilities during construction or relocation.

6.11.1 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Air quality	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to: • Potential sources of air pollution	Contractor	Detailed design/pre-construction	Section 4.4 of QA *G36 Environment Protection*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• Air quality management objectives consistent with any relevant published EPA and/or EES/DPIE guidelines • Mitigation and suppression measures to be implemented • Methods to manage work during strong winds or other adverse weather conditions • A progressive rehabilitation strategy for exposed surfaces.			
Air quality	All plant and equipment will be ensured to comply with Part 4 of the Protection of the Environment Operations (Clean Air) Regulation 2002.	Contractor	Construction	POEO Act (1997)
Air quality	Smoky emissions will be kept within the standards and regulations under the Protection of the Environment Operations Act 1997.	Contractor	Construction	POEO Act (1997)
Air quality	All delivery vehicles will be covered during transportation.	Contractor	Construction	N/A
Air quality	Vegetation or other materials will not be burnt on site.	Contractor	Construction	N/A
Air quality	Dust suppression techniques will be utilised in response to visible dust, such as watering dusty work areas and stockpile sites (using non-potable water where available).	Contractor	Construction	N/A
Waste	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: • Measures to avoid and minimise waste associated with the project • Classification of wastes and management options (re-use, recycle, stockpile, disposal) • Statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions • Procedures for storage, transport and disposal • Monitoring, record keeping and reporting.	Contractor	Detailed design/pre-construction	Section 4.11 of QA *G36 Environment Protection, Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	The WMP will be prepared in taking into account the *Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014) and relevant Transport for NSW Waste Fact Sheets.			
Waste	All waste generated by the proposed work to be classified in accordance with the NSW Waste Classification Guidelines Part 1: Classifying Wastes (DECCW 2008).	Contractor	Construction	DECCW 2008
Waste	Resource management hierarchy principles are to be followed: • Avoid unnecessary resource consumption as a priority. • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery). • Disposal is undertaken as a last resort (in accordance with the Waste Avoidance & Resource Recovery Act 2001).	Contractor	Construction	Waste Avoidance & Resource Recovery Act (2001)
Waste	All waste generated on site is to be transported off site and disposed of at landfill site licenced and able to accept General Solid Waste (non–putrescible). When transporting or depositing the waste the contractor is to comply with Section 143 of the POEO Act.	Contractor	Construction	Section 4.11.4 of QA *G36 Environment Protection*
Waste	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.	Contractor	Construction	N/A
Waste	Once the work has been completed, all waste material is to be removed from site and disposed of at a licenced facility. Waste is not to be buried on site.	Contractor	Construction	N/A
Waste	Any contaminated soils encountered during works will be managed in accordance with Transport Guideline for the Management of Contamination (Transport, 2013).	Contractor	Construction	Guideline for the Management of Contamination (Transport, 2013).
Utilities	Prior to the commencement of work:	Contractor	Detailed design/pre-construction	QA G7 Utility Adjustment

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• The location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners • If the scope or location of proposed utility relocation work falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.			

6.12 Cumulative impacts

6.12.1 Approach

Cumulative impacts are incremental environmental impacts caused by the combination of past, present, and reasonably foreseeable future actions. Cumulative impacts accumulate over time, from one or more sources. While impacts may be insignificant in isolation, significant impacts may occur when individual effects are considered in combination.

The assessment of cumulative impacts focused on the interaction of the proposed modification activity with other projects in the vicinity of the activity within the Wagga Wagga LGA, and where construction and/or operational timeframes are likely to be concurrent.

6.12.2 Existing environment

A review of the NSW Department of Planning and Environment's (DP&E) Major Project Register conducted on 25th June 2020 identified 15 major development applications within the Wagga Wagga LGA. The closest development application is the Wagga Wagga Water Treatment Plant Modification, located about 180 m north of the Proposal. The modification received approval on 25th October 2017 and construction is now complete.

A recent review undertaken in June 2022 identified 5 major projects, all of which will not contribute to any cumulative impact for the Project or environmental aspects of the project. As of August 2022 Project Energy Connect (NSW - Eastern Section SSI 9172452) and Gregadoo Solar Farm (SSD-8825) are expected to start in later 2022 and will utilise sections of the Sturt Highway and Hammond street which are in the vicinity of Marshalls Creek Bridge Replacement project and the proposed modifications.

6.12.3 Potential impacts

Given the major projects within the Wagga Wagga LGA are not within the vicinity of the Proposal, cumulative impact is considered to be minimal given the small scale of the proposed activity. Further, in consideration of Project Energy Connect (NSW - Eastern Section SSI 9172452) and Gregadoo Solar Farm (SSD-8825), it is possible that the proposed timelines of these two projects overlap with the Marshalls Creek Bridge Replacement project. As a result, some minor increases in daily traffic volumes being detoured may occur.

6.12.4 Safeguards and management measures

No additional safeguards are required for cumulative impacts.

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 management measures would be addressed if required during detailed design and incorporated into the Contractors Environmental Management Plan (CEMP) and applied during the construction and operation of the proposed modification.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures for the Marshalls Creek Bridge Replacement project are summarised in Table 7-1. Additional safeguards and management measures identified in this addendum REF are included in bold and italicised font. The safeguards and management measures will be incorporated into the detailed design phase and environmental management system (EMS) for the proposed modification. The EMS documentation will be prepared 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 environment.

Table 7-1: Summary of safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
GEN1	General - minimise environmental impacts during construction	A CEMP will be prepared and submitted for review and endorsement of the Transport for NSW Environment Manager prior to commencement of the activity. As a minimum, the CEMP will address the following: • Any requirements associated with statutory approvals • Details of how the project will implement the identified safeguards outlined in the REF • Issue-specific environmental management plans • Roles and responsibilities • Communication requirements • Induction and training requirements • Procedures for monitoring and evaluating environmental performance, and for corrective action	Contractor/Transport for NSW project manager	Pre-construction/detailed design	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Reporting requirements and record-keeping • Procedures for emergency and incident management • Procedures for audit and review. The endorsed CEMP will be implemented during the undertaking of the activity.			
GEN2	General - notification	All businesses, residential properties and other key stakeholders (e.g. schools, local councils) affected by the activity will be notified at least five days prior to commencement of the activity.	Contractor/Transport for NSW project manager	Pre-construction	
GEN3	General – environmental awareness	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular 'toolbox' style briefings. Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include adjoining residential areas requiring particular noise management measures	Contractor/Transport for NSW project manager	Pre-construction/detailed design	
BIO1	Biodiversity	A Flora and Fauna Management Plan will be prepared in accordance with Transport for NSW's *Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects* (RTA, 2011) and implemented as part of the CEMP. It will include, but not be limited to: • Plans showing areas to be cleared and areas to be protected, including exclusion zones,	Contractor	Pre-construction	Section 4.8 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		protected habitat features and revegetation areas • Requirements set out in the *landscape guideline* (rta, 2008) • Pre-clearing survey requirements • Procedures for unexpected threatened species finds and fauna handling • Procedures addressing relevant matters specified in the *policy and guidelines for fish habitat conservation and management* (dpi fisheries, 2013) • Protocols to manage weeds and pathogens. • Mitigation measures would be implemented to prevent disruptions to the life cycle or harm to the threatened species including birds, mammals and flora.			
BIO2	Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Contractor	Detailed design/pre-construction	
BIO3	Biodiversity	An Environmental Work Method Statement for Clearing and Grubbing must be prepared and approved by the project Environmental Officer prior to starting work. The EWMS must include at least the following: • A description of the work activity, including any plant and equipment to be used • Identification of any environmentally sensitive areas	Contractor	Detailed design/pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• The sequence of tasks for the activity • Identification of potential environmental risks/impacts due to the activity • Mitigation measures to reduce the identified environmental risk, including assigned responsibilities to site personnel • A process for assessing the performance of the implemented mitigation measures (performance outcomes) • A detailed site diagram showing all work areas, controls, sensitive areas, and no-go-zones • A process for monitoring and managing wet weather events during works All site personnel must sign-on to the EWMS and be aware of their responsibilities within the EWMS.			
BIO4	Biodiversity	Prior to the commencement of any works, a physical clearing boundary is to be demarcated and implemented. The demarcation of the exclusion zone will be in accordance with Transport for NSW *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 2: exclusion zones (RMS 2011)*.	Contractor	Pre-construction	Transport for NSW *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 2: exclusion zones (RMS 2011)*.
BIO5	Biodiversity	Clearing of native vegetation should be carried out in accordance with *Biodiversity Guidelines 2011 – Guide 4 (Clearing of vegetation and removal of bushrock)* (RTA 2011).	Contractor	Pre-construction /construction	*Biodiversity Guidelines 2011 – Guide 4 (Clearing of vegetation and removal of*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
					bushrock) (RTA 2011).
BIO6	Biodiversity	Clearing of hollow bearing trees is to be conducted in accordance with Transport for NSW *Biodiversity Guidelines - Guide 1 (Pre-clearing process).* A qualified ecologist must be present on site during the removal of hollow bearing trees to supervise the works.	Contractor	Pre-construction /construction	Transport for NSW *Biodiversity Guidelines - Guide 1 (Pre-clearing process).*
BIO7	Biodiversity	Fauna handling must be carried out in accordance with the requirements of the Transport for NSW *Biodiversity Guidelines - Guide 9 (Fauna Handling).*	Contractor	Pre-construction /construction	Transport for NSW Biodiversity Guidelines - Guide 9 (Fauna Handling).
BIO8	Biodiversity	All pathogens (e.g., Chytid, Myrtle Rust and Phytophthora) are to be managed in accordance with the Transport for NSW *Biodiversity Guidelines - Guide 7 (Pathogen Management)* and *DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).*	Contractor	Construction	Transport for NSW *Biodiversity Guidelines - Guide 7 (Pathogen Management). DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).*
BIO9	Biodiversity	A Weed Management Plan will be developed to prevent/minimise the spread of weeds in accordance with *Guide 6 (Weed Management) in the Transport for NSW Biodiversity Guidelines (RTA 2011).*	Contractor	Detailed design/pre-construction	Guide 6 (Weed Management) in the Transport for NSW Biodiversity

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
					Guidelines (RTA 2011).
BIO10	Biodiversity	Priority weeds are to be managed according to requirements under the Biosecurity Act, 2015 and *Guide 6 (Weed Management) of the Transport for NSW Biodiversity Guidelines RTA 2011*.	Contractor	Construction	Biosecurity Act (2015). Guide 6 (Weed Management) of the Transport for NSW Biodiversity Guidelines RTA 2011.
BIO11	Biodiversity	Any herbicide use will be undertaken according to *Environmental Fact Sheet 18 - Herbicide application (RMS, 2013).*	Contractor	Construction	Environmental Fact Sheet 18 - Herbicide application (RMS, 2013).
BIO12	Biodiversity	Pruning of mature trees is to be in accordance with Part 5 of the *Australian Standard 4373-2007 Pruning of amenity trees.*	Contractor	Construction	Part 5 of the *Australian Standard 4373-2007 Pruning of amenity trees.*
BIO13	Biodiversity	All coarse woody debris is to be retained on site where possible in accordance with Transport for NSW *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 5: Re-use of woody debris and bush rock (RMS 2011).* Any vegetation too large to be mulched will be placed as course woody debris (CWD) along suitable areas of Marshalls Creek, in consultation with Transport environment officer or manager.	Contractor	Construction	*Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects: Guide 5: Re-use of woody debris and bush rock (RTA 2011).*
BIO14	Biodiversity	Works are not to create an ongoing barrier to the movement of wildlife.	Contractor	Construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
BIO15	Biodiversity	Temporary instream creek crossings must be designed so that the passage of fish will not be blocked. Temporary instream creek crossings are to be designed in accordance with *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003), *Policy and Guidelines for Aquatic Habitat Management and Fish Conservation* (NSW DPI 1999), and *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW DPI)	Contractor	Detailed design/pre-construction	*Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003), *Policy and Guidelines for Aquatic Habitat Management and Fish Conservation* (NSW DPI 1999), and *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW DPI)
BIO16	Biodiversity	Rehabilitation of the creek bank would use native endemic riparian species.	Contractor	Post-construction	
BIO17	Biodiversity	Aquatic habitat will be protected in accordance with *Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011) and Section 3.3.2 Standard precautions and mitigation measures of the *Policy and guidelines for fish habitat conservation and management Update 2013* (DPI (Fisheries NSW) 2013).	Contractor	Construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
BIO18	Biodiversity	Snags should not be realigned, relocated, or removed without prior consultation with and agreement from DPI Fisheries.	Transport Contractor	Construction	
BIO19	Biodiversity	Temporary in-stream structures should not be constructed from unconsolidated, imported earth fill material. Dispersive material (e.g. clays and sands) used in the construction of temporary in-stream structures should be fully enclosed by geotextile, sheet piling, or similar means to limit erosion and sedimentation within the waterway. If using rock fill, the rock should be clean of fines and of suitable size to avoid erosion	Transport Contractor	Detailed design/pre-construction Construction	
BIO20	Biodiversity	The timing of works should coincide with low flow periods within the respective catchment.	Transport Contractor	Detailed design/pre-construction	
BIO21	Aquatic impacts	The timing of any works should be planned so as not to interfere with the possible migration of fish within the waterway. Temporary blockages should not be placed within a waterway during the months of September to March, which are the key months when the majority of native fish are moving to spawn or recruit within NSW waters.	Transport Contractor	Detailed design/pre-construction	
SW1	Soil and water	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Detailed design/pre-construction	Section 2.1 of QA *G38 Soil and Water Management*
SW2	Soil and water	A site-specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the Soil and Water Management Plan	Contractor	Detailed design/Pre-construction	Section 2.2 of QA *G38 Soil and*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		The Plan will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.			*Water Management*
SW3	Soil and water	Erosion and sediment control measures will be implemented to mitigate any impacts. Erosion and sediment control measures are to be erected and managed in accordance with all applicable requirements of the Blue Book: "Managing Urban Stormwater: Soils and Construction" (4th Edition Landcom, 2004).	Contractor	Detailed design/Pre-construction, Construction	Managing Urban Stormwater: Soils & Construction Guidelines (the Blue Book) (Landcom 2004), Section 3.1 of QA *G38 Soil and Water Management*
SW4	Soil and water	Establish erosion control and sediment capture measures, and maintain them regularly, to divert offsite stormwater, manage onsite stormwater runoff and stabilise stockpiles.	Contractor	Construction	Section 3.5 of QA *G38 Soil and Water Management,* RMS Technical Guideline EMS-TG-010: Stockpile Site Management, the Blue Book.
SW5	Soil and water	Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.	Contractor	Construction	ESCP
SW6	Soil and water	Prepare an Environmental Work Method Statement (EWMS) for the work.	Contractor	Detailed design/Pre-construction	Section 3.7 of QA *G38 Soil and*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
					Water Management, Section 3.2.4 of QA G36 *Environmental Protection*
SW7	Soil and water	There is to be no release of dirty, impacted or otherwise, water into drainage lines and/or waterways.	Contractor	Construction	SWMP
SW8	Soil and water	The creek bed gravels, creek bank and adjacent riparian vegetation will be stabilised and rehabilitated similar to pre-construction condition upon the completion of construction.	Contractor	Construction/ operation	Section 4.16 of QA G36 *Environmental* Protection
SW9	Soil and water	Temporary containment measures and the use of dewatering processes during the curing of concrete will minimise the risk of contaminants entering the creeks	Contractor	Construction	SWMP
SW10	Soil and water	Vehicle wash down and/or cement truck washout is to occur in a designated concrete washout area as approved on a site specific ESCP.	Contractor	Construction	ESCP
SW11	Soil and water	A site-specific emergency spill plan will be developed and include spill management measures in accordance with the Transport for NSW Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities.	Contractor	Construction	Section 4.3 of QA G36 *Environmental* Protection, SWMP, Transport for NSW Code of Practice for Water Management (1999), EPA Bunding and Spill management Guidelines

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW12	Soil and water	An emergency spill kit is to be kept on site at all times. All staff are to be made aware of the location of the spill kit and trained in its use.	Contractor	Construction	SWMP
SW13	Soil and water	All fuels, chemicals and lubricants are to be stored in an impervious doubled bunded area 50 m away from any aquatic habitat, flood prone areas, or on slopes steeper than 1:10.	Contractor	Construction	Section 4.3 of QA G36 *Environmental* Protection,
SW14	Soil and water	Refuelling of plant and equipment is to occur in impervious double bunded areas in accordance with a site-specific refuelling control plan.	Contractor	Construction	SWMP
SW15	Soil and water	Adequate incident management procedures will be incorporated into the Construction and Operation Environmental Management Plans, including requirement to notify EPA for incidents that cause material harm to the environment.	Contractor	Construction	CEMP, OEMP, Section 147 – 153 POEO Act.
SW16	Soil and water	A Flood Management Plan (FMP) will be prepared and implemented as part of the CEMP. The FMP will identify all reasonably foreseeable risks relating to the event of a flood and describe how these risks will be addressed during construction.	Contractor	Detailed design/pre-construction	
SW17	Soil and water	The design of the temporary creek crossing will ensure fish passage, stability, and flow of Marshalls Creek	Contractor	Detailed design/pre-construction	
SW18	PFAS contaminated water and sediment	A PFAS Management Plan will be prepared and implemented as part of the CEMP. Water and sediment within Marshalls Creek will be managed in accordance with the PFAS National Environmental Management Plan (NEMP) 2.0, Department of Agriculture, Water and the Environment 2020.	Contractor	Detailed design/Pre-construction, Construction	PFAS NEMP 2.0

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW19	Water	Work in waterways A detailed Environmental Work Method Statement (EWMS) will be prepared and implemented for all works undertaken within waterways. The EWMS will detail measures to avoid or minimise risks from erosion and sedimentation to water quality and biodiversity. A floating boom and attached silt curtain to be used and maintained to isolate the work site and minimise the impacts of turbidity and mobilised sediment during construction. It will be prepared in accordance with relevant guidelines including, but not limited to: *- Roads and Maritime Biodiversity Guidelines – Protecting and managing biodiversity on RTA projects* *- NSW DPI (Fisheries) guidelines Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings.*	TfNSW Contractor	Construction	
SW20	Water	A Dewatering Environmental Work Method Statement (EWMS) is to be prepared and implemented for all dewatering activities. Any dewatering activities will be undertaken in accordance with the RTA Technical Guideline: Environmental management of construction site dewatering in a manner that prevents pollution of waters.	Contractor	Pre-construction Construction	
SW21	Water flow	The check dam should be designed such that afflux minimally affects upstream creek levels.	Contractor	Construction	
SW22	Flooding	Materials would not be stockpiled for long periods of time to reduce the likelihood of flooding impacts and to avoid contamination of	Contractor	Construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		the waterways. The risk from flooding would be managed by timing the construction activity in the dry season and limiting the duration of the works to less than 12 weeks			
T1	Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual* (RMS, 2018) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). The TMP will include: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local community of impacts on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. • A response plan for any construction traffic incident	Contractor	Detailed design/Pre-construction	Section 2.2 of QA *G10 Traffic Management,* Roads and Maritime *Traffic Control at Work Sites Manual* (RTA, 2010)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms.			
T2	Traffic and transport	Existing access for nearby and adjoining properties, businesses and roads is to be maintained at all times during the works unless otherwise agreed to by the affected property owner.	Contractor	Construction	TMP
T3	Traffic and transport	Local and regional road users will be informed of any expected traffic or access changes and delays prior to construction commencing.	Contractor	Pre-construction, construction	TMP
T4	Traffic and transport	WWCC, adjoining properties, businesses will be notified 4 weeks prior to the closure of both lanes in both directions along Hammond Avenue/Sturt Highway.	Contractor	Pre-construction, construction	TMP
T5	Traffic and transport	All complaints are to be recorded on a Complaints Register and attended to promptly.	Contractor	Construction	TMP
NV1	Noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim *Construction Noise Guideline* (ICNG) (DECC, 2009) and identify: • All potential significant noise and vibration generating activities associated with the activity	Contractor	Detailed design/pre-construction	Section 4.6 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Feasible and reasonable mitigation measures to be implemented, taking into account *beyond the pavement: urban design policy, process and principles* (roads and maritime, 2014) • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.			
NV2	Noise and vibration	Work hours during construction will generally be limited to Standard Working Hours, except for when night work is necessary for activities such as girder installation and stitch pouring. Standard working hours: • Monday – Friday 7:00 am to 6:00 pm • Saturday - 8:00 am to 1:00 pm • Sunday and Public Holidays - No work	Contractor	Construction	
NV3	Noise and vibration	All sensitive receivers (e.g. schools, local residents) likely to be affected will be notified at least 5 prior to commencement of any work associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of:	Contractor	Pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• The project • The construction period and construction hours • Contact information for project management staff • Complaint and incident reporting • How to obtain further information.			
NV4	Noise and vibration	For construction during standard working hours, the Caravan Park should: • Receive a written notification letter. • Receive a phone call at least 5 prior to commencement of any work. Phone calls may provide the affected residence with a contact telephone number for noise complaints, provide advice and the opportunity for the residence to provide any comments. • Verification of noise and vibration levels as part of routine checks of noise levels or following reasonable complaints should be undertaken within a period of 14 days from the commencement of construction activities. • Noise measurements will be consistent with the procedures documented in AS1055.1-1997 Acoustics-Description and	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		Measurement of Environmental Noise-General Procedures. • Vibration measurements will be undertaken in accordance with the procedures documented in the OEH's Assessing Vibration-a technical guideline (2006) and BS7385 Part 2-1993 Evaluation and measurement for vibration in buildings.			
NV5	Noise and vibration	For construction during OOHW, the Caravan Park should: • Receive a written notification letter. • Receive a phone call at least 5 prior to commencement of any work. • Verification of noise and vibration levels as part of routine checks of noise levels or following reasonable complaints should be undertaken within a period of 14 days from the commencement of construction activities. • Receive individual briefings about the impacts of high noise activities and mitigation measures that will be implemented. Project representatives will visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Where the resident cannot be met with individually then an alternative form of engagement should be used.	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Receive duration respite.			
NV6	Noise and vibration	For construction during OOHW period 2, Residential Receivers located within 350 m should: • Receive a written notification letter. • Verification of noise and vibration levels as part of routine checks of noise levels or following reasonable complaints should be undertaken within a period of 14 days from the commencement of construction activities. • Receive duration respite.	Contractor	Pre-construction	
NV7	Noise and vibration	For construction during OOHW period 2, Residential Receivers located within 500 m should: • Receive a written notification letter.	Contractor	Pre-construction	Transport Construction Noise and Vibration Guideline (2016).
NV8	Noise and vibration	Where possible avoid operating plant concurrently. The dominant noise sources (piling rig, jackhammer, mobile crane) will be: • Switched off when not required. • Used only when necessary.	Contractor	Construction	
NV9	Noise and vibration	Notification of residents within 318 m of Eunony Road and 175 m of Kooringal Road of night-time detours, date of commencement, duration of the detours and contact number for complaints regarding traffic noise.	Contractor and Project manager.	Pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
C1	Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport for NSW Environment Manager and/or EPA.	Contractor	Detailed design/Pre-construction, Construction	Section 4.2 of QA *G36 Environment Protection.* Guideline for the Management of Contamination (2013).
C2	Accidental spill	A site-specific emergency spill plan will be developed and include spill management measures in accordance with the Transport for NSW *Code of Practice for Water Management* (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport for NSW and EPA officers).	Contractor	Detailed design/Pre-construction	Section 4.3 of QA *G36 Environment Protection*
C3	PFAS contaminated water and sediment	A PFAS Management Plan will be prepared and implemented as part of the CEMP. Water and sediment within Marshalls Creek will be managed in accordance with the PFAS National Environmental Management Plan (NEMP) 2.0, Department of Agriculture, Water and the Environment 2020.	Contractor	Detailed design/Pre-construction, Construction	PFAS NEMP 2.0

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
AH1	Aboriginal heritage	*The Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/pre-construction	Section 4.9 of QA *G36 Environment Protection*
AH2	Aboriginal heritage	If the scope of the proposal changes no further work is to occur until any potential impacts on Aboriginal cultural heritage is re-assessed.	Contractor	Detailed design/pre-construction	
NH1	Non-Aboriginal heritage	*The Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered. • Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/pre-construction	Section 4.10 of QA *G36 Environment Protection*
LC1	Landscape character and visual impact	A Landscaping Plan will be prepared to support the final detailed project design and implemented as part of the CEMP.	Contractor	Detailed design/pre-construction	Beyond the Pavement urban design policy, process and principles (Roads

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		The Landscaping Plan will include design treatments for: • Location and identification of existing vegetation and proposed landscaped areas, including species to be used • Built elements including retaining walls, bridges and noise walls • Pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings • Fixtures such as seating, lighting, fencing and signs • Details of the staging of landscape work taking account of related environmental controls such as erosion and sedimentation controls and drainage • Procedures for monitoring and maintaining landscaped or rehabilitated areas. The Landscaping Plan will be prepared in accordance with relevant guidelines, including: • Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014) • Landscape Guideline (RTA, 2008) • *Bridge Aesthetics* (Roads and Maritime 2012)			and Maritime, 2014), Landscape Guideline (RTA, 2008), *Bridge Aesthetics* (Roads and Maritime 2012), Noise Wall Design Guidelines (RTA, 2006), Shotcrete Design Guideline (RTA, 2005).

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Noise Wall Design Guidelines (RTA, 2006) • Shotcrete Design Guideline (RTA, 2005).			
S1	Socio-economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): • Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • Contact name and number for complaints. The CP will be prepared in accordance with the *Community Involvement and Communications Resource Manual* (RTA, 2008).	Contractor	Detailed design/pre-construction	Community Involvement and Communications Resource Manual (RTA, 2008).
AQ1	Air quality	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to: • Potential sources of air pollution • Air quality management objectives consistent with any relevant published EPA and/or EES/DPIE guidelines • Mitigation and suppression measures to be implemented • Methods to manage work during strong winds or other adverse weather conditions	Contractor	Detailed design/pre-construction	Section 4.4 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• A progressive rehabilitation strategy for exposed surfaces.			
AQ2	Air quality	All plant and equipment will be ensured to comply with Part 4 of the Protection of the Environment Operations (Clean Air) Regulation 2002.	Contractor	Construction	POEO Act (1997)
AQ3	Air quality	Smoky emissions will be kept within the standards and regulations under the Protection of the Environment Operations Act 1997.	Contractor	Construction	POEO Act (1997)
AQ4	Air quality	All delivery vehicles will be covered during transportation.	Contractor	Construction	N/A
AQ5	Air quality	Vegetation or other materials will not be burnt on site.	Contractor	Construction	N/A
AQ6	Air quality	Dust suppression techniques will be utilised in response to visible dust, such as watering dusty work areas and stockpile sites (using non-potable water where available).	Contractor	Construction	N/A
W1	Waste	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: • Measures to avoid and minimise waste associated with the project • Classification of wastes and management options (re-use, recycle, stockpile, disposal) • Statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions	Contractor	Detailed design/pre-construction	Section 4.11 of QA *G36 Environment Protection, Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Procedures for storage, transport and disposal • Monitoring, record keeping and reporting. The WMP will be prepared taking into account the *Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014) and relevant Transport for NSW Waste Fact Sheets.			
W2	Waste	All waste generated by the proposed work to be classified in accordance with the NSW Waste Classification Guidelines Part 1: Classifying Wastes (DECCW 2008).	Contractor	Construction	NSW Waste Classification Guidelines Part 1: Classifying Wastes (DECCW 2008)
W3	Waste	Resource management hierarchy principles are to be followed: • Avoid unnecessary resource consumption as a priority. • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery). • Disposal is undertaken as a last resort (in accordance with the Waste Avoidance & Resource Recovery Act 2001).	Contractor	Construction	Waste Avoidance & Resource Recovery Act (2001)
W4	Waste	All waste generated on site is to be transported off site and disposed of at landfill site approved to accept General Solid Waste (non–putrescible). When transporting or depositing	Contractor	Construction	Section 4.11.4 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		the waste the contractor is to comply with Section 143 of the POEO Act.			
W5	Waste	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.	Contractor	Construction	N/A
W6	Waste	Once the works have been completed, all waste material is to be removed from site and disposed of at a licenced facility. Waste is not to be buried on site.	Contractor	Construction	N/A
W7	Waste	Any contaminated soils encountered during works will be managed in accordance with Transport Guideline for the Management of Contamination (Transport, 2013).	Contractor	Construction	Guideline for the Management of Contamination (Transport, 2013).
U1	Utilities	Prior to the commencement of work: • The location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners • If the scope or location of proposed utility relocation work falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.	Contractor	Detailed design/pre-construction	QA G7 Utility Adjustment

7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for the Marshalls Creek Bridge Replacement project and when they need to be obtained are listed in Table 7-2. Additional or changed licenses and approval requirements identified in this addendum REF are indicated by underlined and/or struck out font.

Table 7-2: Summary of licensing and approval required

Instrument	Requirement	Timing
Fisheries Management Act 1994 (s199)	*Notification to the Minister for Agriculture and Western NSW prior to any dredging or reclamation work.* *[Note exemption under s263A of the Fisheries Management (General) Regulation 2010]*	*A minimum of 28 days prior to the start of work.*
Fisheries Management Act 1994 (s219)	*Permit to obstruct the free passage of fish (temporary or permanent) from the Minister for Agriculture and Western NSW*	*Prior to start of the activity.*

8 Conclusion

8.1 Justification

The modified proposal is considered justified as the proposed changes have been implemented to provide better results for the overall Marshalls Creek Bridge Replacement project.

While there would be some environmental impacts from the proposal, they have been avoided or minimised where possible through design and the relevant safeguards summarised in Section 7.2.

The benefits of the proposal are considered to outweigh the adverse impacts that may be generated by the proposal, which are mostly temporary and local in nature.

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 proposed modification would result in improved road user safety and increased freight transport efficiency. Socio-economic impacts and benefits are discussed in Section 6.10.
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 has been designed to mitigate and/or avoid economic, environmental, and social impacts. These are discussed in Section 6.
1.3(c) To promote the orderly and economic use and development of land.	The proposed modification would not conflict with the existing land use within the construction footprint or result in a change of the existing land use (refer to Section 6.9).
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the project.
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.	No significant impact on state or federally listed threatened biota is considered likely (refer to Section 6.1).

Object	Comment
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposed modification would not impact upon Indigenous and Non-Indigenous heritage (refer to Section 6.6 and Section 6.7).
1.3(g) To promote good design and amenity of the built environment.	Not relevant to the proposal.
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 proposal.
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 project.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Not relevant to the proposal.

8.3 Ecologically sustainable development

8.3.1 The precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage. The absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

This principle was considered during planning for the replacement of the bridge and the proposed footbridge alignment. The Preferred alignment that minimises vegetation clearance, with particular consideration of sensitive areas, was selected. The precautionary principle has guided the assessment of environmental impacts for this addendum REF and the development of mitigation measures.

8.3.2 Intergenerational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The proposal design would result in economic benefits in the form of reduced traffic congestion and improved road user safety for current and future generations in the surrounding area (refer to Section 6.10).

8.3.3 Conservation of biological diversity and ecological integrity

The proposed modification would disturb a small area of habitat. Site selection for construction phase facilities including compound and stockpile sites are located in areas requiring minimal native vegetation clearance. The assessment has identified that the work would not impact significantly on the biological diversity and ecological integrity of the locality. Furthermore, safeguards have been developed that would assist in protecting aquatic habitats.

8.3.4 Improved valuation, pricing, and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by the carrying out of a project including air, water, land and living things.

Environmental issues were considered as key matters in the detour route selection process and in the economic and financial feasibility assessments for the project proposal.

Mitigation measures for the avoidance, reuse, recycling, and management of waste during construction and operation are to be implemented (refer to Section 6.12).

8.4 Conclusion

This addendum REF has examined and considered to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

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.

Several 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, and only results in minor impacts. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed amended detour route is predicted to result in minimal change to road traffic noise and maintain levels below the 2dB threshold at sensitive receiver sites. Further, the modification would not likely lead to any significant impact to threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act. 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 Project REF 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 and Public Spaces 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

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.

Django Van Tholen

Senior Consultant - Environmental Management

NGH Consulting

Date:12/09/2022

I have examined this addendum review of environmental factors and accept it on behalf of Transport for NSW.

Prafulla KC

Project Manager / Engineer

Infrastructure and Place, Southern and Western Project Office

Date: 14/08/2023

10 References

Australian Soil Resource Centre (ASRIS) (2014). Acid Sulphate Soils http://www.asris.csiro.au/mapping/viewer.htm [accessed]

Department of Agriculture, Water and the Environment (2020a). Australian Heritage Database. http://www.environment.gov.au/cgi–bin/ahdb/search.pl [accessed]

Department of Agriculture, Water and the Environment (2020b). Protected Matters Search Tool https://www.environment.gov.au/epbc/protected–matters–search–tool [accessed]

Environment Protection Authority (EPA) (2020). Contaminated Land Record http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx [Accessed]

NSW Department of Primary Industries (2007). Prime Facts. Endangered ecological communities in NSW Lower Murray River aquatic ecological community https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/634495/Lower-Murray-River-aquatic-ecological-community.pdf [accessed]

NSW Geology Plus (2020), *Geological Survey of NSW* https://api.tiles.mapbox.com/v4/tybion.a0n6d2t9/page.html?access_token=pk.eyJ1IjoidHliaW9uIiwiYSI6IkJPWkFIRGMifQ.X8c8fyJg11-BDWz3KcOQBw#7/-32.810/147.830 [accessed]

NSW Government (2020a), *Major Projects* https://www.planningportal.nsw.gov.au/major-projects [accessed]

NSW Government (2020b) Search for NSW heritage http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx [accessed]

Office of Environment and Heritage (OEH) (2016). South Western Slopes Bioregion. https://www.environment.nsw.gov.au/bioregions/NSWSouthWesternSlopesBioregion.htm [accessed]

Office of Environment and Heritage (OEH) (2020), Threatened Biodiversity Search, accessed online July 2020 at: https://www.environment.nsw.gov.au/threatenedspeciesapp/

Roads and Maritime Services (RMS) (2011). Procedure for Aboriginal cultural heritage consultation and investigation. Accessed online July 2020 at: https://www.rms.nsw.gov.au/documents/about/environment/protecting-heritage/managing-development/roads-and-maritime-services-procedure-for-aboriginal-cultural-heritage-consultation-and-investigation.pdf

Wagga Wagga City Council (WWCC) (2020). Economic Snapshot Wagga Wagga. Accessed online June 2020 at: https://wagga.nsw.gov.au/city-of-wagga-wagga/business/economic-snapshot

Wagga Wagga City Council (WWCC) (2018a). State of the Environment Report 2017/2018. Accessed online November 2020 at: https://wagga.nsw.gov.au/the-council/planning-and-reporting/community-reporting/environmental-reports

Wagga Wagga City Council (WWCC) (2018b). Wagga Wagga Urban Salinity Technical Report 2017/2018. Accessed online November 2020 at: https://wagga.nsw.gov.au/the-council/planning-and-reporting/community-reporting/environmental-reports

Terms and acronyms used in this addendum REF

Term/ Acronym	Description
AHIMS	Aboriginal Heritage Information Management Systems
BC Act	*Biodiversity Conservation Act 2016* (NSW).
BCD	Biodiversity Conservation Division
CEMP	Construction environmental management plan
EIA	Environmental impact assessment
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Ground Dependent Ecosystems
Heritage Act	*Heritage Act 1977* (NSW)
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	NSW Interim Construction Noise Guideline (2009)
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.
LLS	Local Land Services
MNES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
NML	Noise Management Level
NPI	the NSW Noise Policy for Industry (2017)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
OEH	Office of Environmental and Heritage (now BCD)
OOHW	Out of hours work
PACHCI	Procedure for Aboriginal cultural heritage consultations and investigation
PCT	Plant Community Type
RBL	Rating Background Level
RMS	NSW Roads and Maritime Services, now known as Transport for NSW
RWCC	Riverina Water County Council
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
TEC	Threatened Ecological Community
Transport	Transport for New South Wales

Term/ Acronym	Description
QA Specifications	Specifications developed by Transport for NSW for use with road work and bridge work contracts let by Transport for NSW.
WWCC	Wagga Wagga City Council

Appendix A

Detailed Design Plans

Appendix B

Consideration of Section 171 factors and matters of national environmental significance and Commonwealth land

Section 171 Checklist

In addition to the requirements of the *Is an EIS required?* guideline (DUAP 1995/1996) and the *Roads and Related Facilities EIS Guideline* (DUAP 1996) as detailed in the REF, the following factors, listed in Section 171 of the *Environmental Planning & Assessment Regulation 2021,* which includes 2 additional factors q and r, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

Factor	Impact
a) Any environmental impact on a community? The proposal would have minor impacts on the community during construction, including temporary air quality, noise, and traffic impacts. These impacts can be managed with the mitigation measures recommended in Section 6.3, Section 6.4 and Section 6.10 of the addendum REF.	Negative short term
b) Any transformation of a locality? Minor changes to the immediate visual amenity within the construction footprint would occur during construction due to the removal of vegetation. The proposal is consistent with the existing character and land use of the locality (refer to Section 6.8 and Section 6.9 of the REF)	Negative short term
c) Any environmental impact on the ecosystems of the locality? The proposal would have minor impacts through the disturbance of 0.81 ha of vegetation, 0.27 ha of this is native vegetation (PCT 5). This vegetation is common and widespread in the locality and offers limited habitat value to the local ecosystems.	Negative long term
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? There would be no impact on the locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations with implementation of identified mitigation measures.	Nil
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? No items of cultural, social or scientific significance would be impacted by the proposed work (refer to Section 6.6 and Section 6.7 of the addendum REF).	Nil
f) Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974)?* The proposed work would not significantly impact the habitat of protected fauna.	
g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposal would not endanger any species of animal, plant or other form of life, whether living on land, in water or in the air (refer to Section 6.1 of the addendum REF).	Nil
h) Any long-term effects on the environment?	Nil

With the implementation of the recommended mitigation measures in Section 6 of the addendum REF, the proposal would not have any long–term effects on the environment.	
i) Any degradation of the quality of the environment? The proposal would cause minor biodiversity, soil and water, air, and noise impacts to the environment during construction. The mitigation measures listed in Section 6 would ensure that these impacts are limited.	Negative short term
j) Any risk to the safety of the environment? There is a potential risk of establishment and spread of weeds and pathogens during construction and maintenance of the proposal. The mitigation measures listed in Section 6.1 of the addendum REF would ensure that the risk is limited.	Negative short term
k) Any reduction in the range of beneficial uses of the environment? No reduction in the range of beneficial uses of the environment is anticipated as a result of the proposal.	Nil
l) Any pollution of the environment? The equipment and plant used for construction are potential sources of pollution, which may impact water and air quality and the environment. The mitigation measures listed in Section 7.2 of the addendum REF would ensure that the risk of these impacts is limited.	Negative short term
m) Any environmental problems associated with the disposal of waste? The proposal would result in the production of general construction waste and cleared vegetation, including weeds. The mitigation measures listed in Section 6.12 of the addendum REF would ensure that the risk of environmental impacts associated with waste disposal is limited.	Negative short term
n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposal is not expected to increase demands on resources in short supply. Resources required for the proposal are readily available.	Nil
o) Any cumulative environmental effect with other existing or likely future activities? Cumulative environmental effects of the proposal include the existing agricultural infrastructure within the surrounding locality and future growth within this area. The proposed works are minor, and therefore this small scale of works is not expected to contribute to any cumulative environmental effects.	Nil
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal is not in a coastal area, so there would be no impact on coastal processes and hazards.	Nil
q) Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1 *Local Strategic Planning*	All positive long term

• To optimise the management and use of resources and ensure that choices and opportunities in relation to those resources remain for future generations, • to promote development that is consistent with the principles of ecologically sustainable development and the management of climate change, • to promote the sustainability of the natural attributes of Wagga Wagga, avoid or minimise impacts on environmental values and protect environmentally sensitive areas, • to co-ordinate development with the provision of public infrastructure and services. *Riverina Murray Regional Plan 2036* • A growing and diverse economy • A healthy environment with pristine waterways • Efficient transport and infrastructure networks • Strong, connected and healthy communities. *Project Alignment* Energy Management - to use Transport's energy sources more efficiently and reduce greenhouse gas emissions Pollution control - to minimise air, noise, water and pollution from Transport's operations and construction Climate change resilience - to plan and deliver transport infrastructure and operations that are resilient to the effects of climate change Resource management - to reduce water consumption in operations, maintenance, construction and management Biodiversity - to mitigate transport impacts on biodiversity Heritage - to mitigate transport impacts on heritage r) Liveable communities - to improve community experience through the delivery of transport which is integrated with surrounding land use activities	
s) Other relevant environmental factors	In considering the potential impacts of this proposal all relevant environmental factors have been considered, refer to Chapter 6 of the REF and this addendum REF.

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 Water, Agriculture and 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?	No impact
b) Any impact on a National Heritage place?	No impact
c) Any impact on a wetland of international importance?	No impact
d) Any impact on a listed threatened species or communities?	No impact
e) Any impacts on listed migratory species?	No impact
f) Any impact on a Commonwealth marine area?	No impact
g) Does the proposal involve a nuclear action (including uranium mining)?	No impact
h) Additionally, any impact (direct or indirect) on the environment of Commonwealth land?	No impact

Appendix C

Statutory consultation checklists

Infrastructure SEPP

Certain development types

Development type	Description	Yes / No	If 'yes' consult with	ISEPP clause
Car Park	Does the project include a car park intended for the use by commuters using regular bus services?	No	N/A	ISEPP cl. 95A
Bus Depots	Does the project propose a bus depot?	No	N/A	ISEPP cl. 95A
Permanent road maintenance depot and associated infrastructure	Does the project propose a permanent road maintenance depot or associated infrastructure such as garages, sheds, tool houses, storage yards, training facilities and workers' amenities?	No	N/A	ISEPP cl. 95A

Development within the Coastal Zone

Issue	Description	Yes / No / NA	If 'yes' consult with	ISEPP clause
Development with impacts on certain land within the coastal zone	Is the proposal within a coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	No	N/A	ISEPP cl. 15A

Note: See interactive map here: https://www.planning.nsw.gov.au/policy-and-legislation/coastal-management. Note the coastal vulnerability area has not yet been mapped.

Note: a certified coastal zone management plan is taken to be a certified coastal management program

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 substantial impact on the	Yes	WWCC	ISEPP cl.13(1)(a)

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	ISEPP clause
	stormwater management services which are provided by council?			
Traffic	Are the works likely to generate traffic to an extent that will strain the capacity of the existing road system in a local government area?	Yes	WWCC	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 substantial impact on the capacity of any part of the system?	No	N/A	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 substantial volume of water?	No	N/A	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 minor or inconsequential disruption to pedestrian or vehicular flow?	No	N/A	ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Yes	WWCC	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 minor or inconsequential?	No	N/A	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 minor extent?	No	N/A	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	No	N/A	ISEPP cl.15AA

Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled Floodplain Development Manual: the management of flood liable land published by the New South Wales Government.

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 *National Parks and Wildlife Act 1974*, or on land acquired under that Act?	No	N/A	ISEPP cl.16(2)(a)

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
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	N/A	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 *Marine Estate Management Act 2014*?	No	N/A	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998*?	No	N/A	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	N/A	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	N/A	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	N/A	ISEPP cl. 16(2)(h)
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*?	No	N/A	ISEPP cl. 16(2)(i)

Growth Centres SEPP

Issue	Potential impact	Yes / No	If 'yes' consult with	SEPP clause
Clearing native vegetation	Do the works involve clearing native vegetation (as defined in the Local Land Services Act 2013) on land that is not subject land (as defined in cl 17 of schedule 7 of the *Threatened Species Conservation Act 1995*)?	No	N/A	SEPP 18A

Appendix D

Background Searches

Appendix E

Stage 1 PACHCI

Appendix F

Flora

Scientific Name	Common Name
Trees	
Eucalyptus camaldulensis	River Red Gum
Fraxinus angustifolia subsp. Angustifolia *	Desert Ash
Schinus molle subsp. Areira *	Pepper Tree
Casuarina cunninghamiana subsp. cunninghamiana	River Oak
*Platanus hispanica 'Acerifolia'**	Plane Tree
Shrubs	
*Rosa rubiginosa**	Sweet Briar
Acacia dealbata	Silver Wattle
Acacia linearifolia	Narrow-leaved Wattle
Callistemon sieberi	River Bottlebrush
Acacia deanei	Green Wattle
Forbs	
*Polygonum aviculare**	Wireweed
*Lepidium africanum**	Common Peppercress
*Echium plantagineum**	Patterson's Curse
*Arctotheca calendula**	Capeweed
*Heliotropium europaeum**	Potato Weed
*Sanguisorba minor**	Sheep's Burnet
*Plantago lanceolate**	Lamb's Tongues
*Trifolium spp.**	A Clover
*Malva parviflora**	Small-flowered Mallow
*Sonchus oleraceus**	Common Sowthistle
*Rumex crispus**	Curled Dock
*Verbena bonariensis**	Purpletop
*Phalaris aquatica**	Phalaris
*Conyza bonariensis**	Flaxleaf Fleabane
*Silybum marianum**	Variegated Thistle
*Onopordum acanthium subsp. Acanthium**	Scotch Thistle

Oxalis spp.	
Enchyleanea tomentosa	Ruby Saltbush
*Galium spp.**	
*Alternanthera pungens**	Khaki Weed
*Xanthium spinosum**	Bathurst Burr
*Fumaria capreolata**	White Fumitory
Cirsium vulgare	Spear Thistle
Grasses	
Cynodon dactylon	Common Couch
*Paspalum dilatatum**	Paspalum
*Lolium perenne**	Perennial Ryegrass
*Panicum capillare**	Witchgrass
*Avena fatua**	Wild Oats
*Chloris gayana**	Rhodes Grass
Chloris truncata	Windmill Grass
*Eragrostis cilianensis**	Stinkgrass
*Cenchrus clandestinus**	Kikuyu Grass
*Bromus diandrus**	Great Brome
Phalaris sp.	Phalaris
Bromus catharticus	Praire Grass
Graminoids	
Cyperus sp.	

Fauna

Scientific Name	Common Name
Cracticus tibicen	Australian Magpie
Eolophus roseicapilla	Galah
Trichosurus vulpecula	Common Brushtail Possum

Appendix G

Noise assessment

Appendix H

Threatened Species Evaluations

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations listed for Wagga Wagga in the *Atlas of NSW Wildlife*[1] and those identified as potentially occurring in the area according to the Commonwealth EPBC *Protected Matters Search Tool*[2].

The likelihood of occurrence is based on presence of habitat, proximity of nearest records and mobility of the species (where relevant). The assessment of potential impact is based on the nature of the proposal, the ecology of the species and its likelihood of occurrence. The following classifications are used:

Presence of habitat:

Present: Potential or known habitat is present within the study area

Absent: No potential or known habitat is present within the study area

Likelihood of occurrence

Unlikely: Species known or predicted within the locality but unlikely to occur in the study area

Possible: Species could occur in the study area

Present: Species was recorded during the field investigations

Possible to be impacted

No: The proposal would not impact this species or its habitats. No Assessment of Significance (AoS) is necessary for this species

Yes: The proposal could impact this species or its habitats. An AoS has been applied to these entities.

[1] The *Atlas of NSW Wildlife* is administered by the NSW Department of Environment & Heritage (OEH) and is an online database of fauna and flora records that contains over four million recorded sightings.

[2] This online tool is designed for the public to search for matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is managed by the Commonwealth Department of the Environment and Energy.

Evaluation of the likelihood and extent of impact on threatened flora species

Species	Description of habitat[3]	Presence of habitat	Bionet records	Likelihood of occurrence	Possible impact?
Grasses					
Austrostipa wakoolica **A spear-grass** **BC- E, EPBC-E**	Confined to the floodplains of the Murray River tributaries of central-western and south-western NSW, with localities including Manna State Forest, Matong, Lake Tooim, Merran Creek, Tulla, Cunninyeuk and Mairjimmy State Forest. Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils. Habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise. Associated species include Callitris glaucophylla, Eucalyptus microcarpa, E. populnea and Austrostipa eremophila.	**Present** Silty creek banks in study area.	**0**	**Unlikely** Proposal does not occur along the Murray River tributaries, no Speargrasses were identified during the site survey.	**No** Species unlikely to occur in study area
Amphibromus fluitans **Floating Swamp Wallaby-grass** **BC-V, EPBC - V**	There are many historic collections in the City of Greater Albury. It has been recorded recently in lagoons beside the Murray River near Cooks Lagoon (Shire of Greater Hume), Mungabarina Reserve, East Albury, at Ettamogah, Thurgoona, near Narranderra, and also further west along the Murray River (near Mathoura) and in Victoria. Amphibromus fluitans grows mostly in permanent swamps. The species needs wetlands which are at least moderately fertile, and which have some bare ground, conditions which are produced by seasonally-fluctuating water levels. Habitats in south-western NSW include swamp margins in mud, dam and tank beds in hard clay and in semi-dry mud of lagoons with Potamogeton and Chamaeraphis species. Wetlands inhabited by this species that are converted to deep, permanent dams are unsuitable for continued habitation by this species.	**Absent** No suitable swamps/wetlands or wetland margins in study area	**0**	**Unlikely** Suitable habitat not present	**No** Species unlikely to occur in study area
Austrostipa metatoris **A spear-grass** **BC-V, EPBC-V**	This species grows in sandy areas of the Murray Valley. It occurs on sandhills, sandridges, undulating plains and flat open mallee country. It grows on red to re-brown clay-loam to sandy-loam soils. Associated species include *Eucalyptus populnea, E. intertexta, Callitris glaucophylla, Casuarina cristata, Santalum acuminatum* and *Dodonaea viscosa*.	**Absent** Proposal does not occur in the Murray Valley region. Associated species not present.	**0**	**Unlikely** Suitable habitat not present	**No** Species unlikely to occur in study area
Herbs & Forbs					
Ammobium craspedioides **Yass Daisy** **BC-V, EPBC- V**	This species is found from near Crookwell on the Southern Tablelands to near Wagga Wagga on the South Western Slopes. It is primarily found in the Yass region. Mostly found in moist or dry forests, Box-Gum Woodland and secondary grassland created from clearing these communities. Appears to be resistant to grazing.	**Absent** Not Box-Gum woodland or secondary grassland communities in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Brachyscome muelleroides **Claypan Daisy, Mueller Daisy** **BC-V, EPBC-V**	Occurs in the Wagga Wagga, Narranderra, Tocumwal and Walbundrie areas. Also occurs in north-central Victoria (only along the Murray from Tocumwal to the Ovens River). Only five sites have precise locality details, and four of these are on Morundah Station in NSW. Occurs in seasonally damp situations such as shallow depressions and around the margins of swamps, lagoons and claypans, on heavy grey cracking clays to lighter clay loam soils, in grassland, grassy woodland and open forest habitats, growing in association with various grasses and seasonal aquatic plants such as *Marsilea* species. Associated species include *Pycnosorus globosus, Agrostis avenacea, Austrodanthonia duttoniana*, and *Calotis anthemoides*. Victorian collections have generally come from open positions on the Murray River floodplain, swampy River Red Gum (*Eucalyptus camaldulensis*) Forest and damp depressions.	**Present** Swampy River Red Gum creek in study area.	**1**	**Unlikely** Habitat is present, however it is highly disturbed and dominated by a thick groundcover of exotic species. This species has been recorded within 10 km of the proposal area however the record is over 20 years old	**No** Species unlikely to occur in study area
Caesia parviflora var. minor **Small Pale Grass-lily** **BC-E**	Known occurrences of this species in NSW are in Barcoongere State Forest, between Grafton and Coffs Harbour. It may be more common than currently thought because grass lillies are rarely identified on a variety scale. This species is found in dry sclerophyll forests, grassy woodlands, heathlands and wet sclerophyll forests. It is found in damp habitat, on sandstone.	**Absent** Damp woodland is present in the study area, however there is no sandstone.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area

[3] Information sourced from species profiles on NSW OEH's threatened species database or the Australian Government's Species Profiles and Threats database (SPRAT) unless otherwise stated.
OEH threatened species database: http://www.threatenedspecies.environment.nsw.gov.au/index.aspx
SPRAT: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Species	Description of habitat[3]	Presence of habitat	Bionet records	Likelihood of occurrence	Possible impact?
Carex raleighii **Raleigh Sedge** **BC-E**	Raleigh Sedge is confined to areas of over 1000 metres on the Southern Tablelands. It is primarily found in Kosciuzko National Park, the Snowy Plain and on the headwaters of Tantawangalo creek (South East Forests National Park). This species grows in sphagnum bogs, high mountain wetlands and damp grasslands. It is also found along stream-edges in the sub-alpine plains.	**Absent** Proposal area is below 1000 m in elevation.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Cullen Parvum **Small Scurf-pea** **BC- E**	Known NSW populations of the Small Scurf-pea (*Cullen parvum*) are in Jindera, Galong and Young and in and south-west of Wagga Wagga. In Victoria, it has been found in the Red Gum Woodlands in Barmah State Park. This species is found primarily in grassland, River Red Gum Woodland and Box-Gum Woodland. It has also been found on grazed land and next to drainage lines and watercourses. Plants are more easily found in winter or spring because they die back in dry seasons, surviving underground.	**Present** River Red Gum Woodland along a watercourse occurs within the study area.	**1**	**Possible** Suitable habitat present	**Yes** AoS completed
Dichanthium setosum **Bluegrass** **BC-V, EPBC- V**	Bluegrass is known to the New England Tablelands, North West Slopes and Plains and the Central Western Slopes in NSW. It frequently occurs on private property. The soils it prefers are basaltic black soils and red-brown loams with clay subsoil. It is associated with disturbed woodland, pasture and grassy roadside vegetation. It is unclear whether this is because it prefers disturbed habitat, or because the habitat type is frequently disturbed. It appears to have a tolerance for a wide range of habitat types.	**Absent** Grassy woodland not present in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Euphrasia arguta **Euphrasia arguta** **BC-CE, EPBC-CE**	This species is predicted in the Inland Slopes. It grows in open forest with grassy and shrubby understoreys and grassland. It has also been found on roadsides. It was thought to be extinct but was rediscovered in 2008 at Nundle State Forest in eucalypt forest. Historical records indicate it occurs mostly in grassy areas near rivers at elevations of up to 700m above sea level.	**Absent** Grassy woodland not present in study area. Study area is below 700m.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Euphrasia collina subsp. Meulleri **Mueller's Eyebright** **BC- E, EPBC-E**	This species has not been recorded in NSW in over 100 years. Now, it is now only known in the Mornington Peninsula, near Melbourne. Habitat is in heathy and grassy woodland and in sandy open forests.	**Absent** Grassy woodland not present in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Senecio garlandii **Woolly Ragwort** **BC- V**	It is found between Temora, Bethungra, Albury and Chiltern (Victoria). It may also occur at Burrinjuck. It grows on sheltered slopes of rocky outcrops. It occurs in dry sclerophyll forests, grassy woodlands, semi-arid woodlands and on rocky cliffs.	**Absent** No sheltered slopes or rocky outcrops in study area.	**2**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Swainsona murrayana **Slender Darling Pea** **BC-V, EPBC-V**	Occurs from South Australia through south-west Victoria and central NSW to south-east Queensland. Found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. Found in grassland, herbland, and open Black-box woodland, often in depressions. Has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with Maireana species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated. Plants produce winter-spring growth, flower in spring to early summer and then die back after flowering. They re-shoot readily and often carpet the landscape after good cool-season rains.	**Absent** Characteristic vegetation communities not present.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Swainsona recta **Small Purple-pea** **BC-E, EPBC- E**	It has been recorded previously at Carcoar, Culcairn and Wagga Wagga but is thought to be extinct from these areas. Populations are still present in Queenbeyan, the ACT and Wellington-Mudgee areas. Plants are commonly found on railway easements. It occurs in the grassy understory of woodlands, and open-forests dominated by Blakely's Red Gum *Eucalyptus blakelyi*, Yellow Box *E. melliodora*, Candlebark Gum *E. rubida* and Long-leaf Box *E. goniocalyx. They are found in dry sclerophyll forests, grasslands, and grassy woodlands.*	**Absent** No dry sclerophyll forests, grasslands, or grassy woodlands in study area.	**2**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species	Description of habitat[3]	Presence of habitat	Bionet records	Likelihood of occurrence	Possible impact?
Swainsona sericea **Silky Swainson-pea** **BC-V**	This species has been found from the Northern Tablelands to the Southern Tablelands and further inland. It is found in Natural Temperate Grassland and Snow Gum *Eucalyptus pauciflora* Woodland, as well as in Box-Gum Woodland and with cypress-pines. It is also found in arid shrublands, Riverine Chenopod Shrublands, dry and wet sclerophyll forests, woodlands and grasslands.	**Absent** Characteristic vegetation communities not present.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Epiphytes and Climbers					
Tylophora linearis **Tylophora linearis** **BS- V, EPBC-E**	Tylophora linearis grows in dry scrub and open forest. It is found in both grassy and shrubby dry sclerophyll forests. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla* and *Allocasuarina luehmannii*. Also grows in association with *Acacia hakeoides, Acacia lineata, Melaleuca uncinata, Myoporum* species and *Casuarina* species	**Absent** No grassy or dry shrubby forest in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Ferns and cyads					
Pilularia novae-hollandiae **Austral Pillwort** **BC-E, EPBC- not listed**	The Austril Pillwort (*Pilularia novae-hollandiae*) has been found in Sydney, Oolambeyan National Park, Canberra, at Lake Cowal and in parts of Victoria. It is also found in the Riverina between Albury and Urana. It is found in shallow swamps and waterways. It is commonly found in table drains and on the side of the road. It can be difficult to find, given it is most likely ephemeral.	**Present** Vegetated waterway in study area.	**0**	**Unlikely** Study area is outside species known distribution and there are no records within 10 km.	**No** Species unlikely to occur in study area
Shrubs					
Acacia meiantha **Acacia meiantha** **BC-E, EPBC-E**	It is found in the Central Tablelands. Specifically, they have been found in Clarence, Mullions Range and Aarons Pass. They are predicted in the Inland Slopes to occur in dry sclerophyll forests or woodland with shrubby understorey. They grow on sandy to clayey soil.	**Absent** No woodland with shrubby understorey in study area.	**0**	**Unlikely** Suitable habitat not present. Species not detected during site survey	**No** Species unlikely to occur in study area
Acacia phasmoides **Phantom Wattle** **BC-V, EPBC-V**	The only known location in NSW is the Woomagarma National Park in Greater Hume Shire. It is also found at Burrowa-Pine Mountain National Park in Victoria. It grows in shrubby woodland on sandy, granitic soil near creeks or in rocky crevices.	**Absent** No woodland with shrubby understorey and granitic soil in study area.	**0**	**Unlikely** Suitable habitat not present. Species not detected during site survey	**No** Species unlikely to occur in study area
Grevillea wilkinsonii **Tumut Grevillea** **BC-E, EPBC-E**	The main location this species is found is in a 6km stretch of Goobarrangandra River, east of Tumut. The only other place it is known is between two private properties at Gundagai. At Goobarrangandra River, plants are found close to the water in open, sunny areas and in rocky, loamy soils. The associated native vegetation in the Goobarragandra sites are typically remnant riverine shrub communities adjacent to open-forest, with the most common tree species being Blakely's Red Gum (*Eucalyptus blakelyi*), Apple Box (*E. bridgesiana*), Yellow Box (*E. melliodora*), and Red Stringybark (*E. macrorhyncha*) and with Kurrajongs (*Brachychiton populneus*) sometimes growing in nearby paddocks.	**Absent** Associated species not present. No riverine scrub communities in study area.	**0**	**Unlikely** Suitable habitat not present. Study area is outside species known distribution.	**No** Species unlikely to occur in study area
Homoranthus darwinioides **Homoranthus darwinioides** **BC-V, EPBC- V**	Occurs in the central tablelands and western slopes of NSW, from Putty to the Dubbo district. It is also found west of Muswellbrook between Merriwa and Bylong and north of Muswellbrook to Goonoo SCA. It grows in woodland habitat with shrubby understoreys, typically in gravely sandy soils. They have been recorded on flat sunny ridge tops with scrubby woodland, sloping ridges, gentle south-facing slopes and on roadsides.	**Absent** No woodland with shrubby understory in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Indigofera efoliata **Leafless Indigo** **BC-E, EPBC- E**	This species is extremely rare and may be extinct. It was found near to Dubbo. It can be difficult to identify because it dies back in adverse conditions. It has been found in dry sclerophyll forests and grassy woodlands. It grows on slight rises in stony red-brown sandy loam.	**Absent** No dry sclerophyll forest or grassy woodland in study area.	**0**	**Unlikely** Suitable habitat not present. Study area is outside species known distribution.	**No** Species unlikely to occur in study area
Persoonia marginata **Clandulla Geebung** **BC-V, EPBC-V**	This species is found in dry sclerophyll forest and woodland. It grows in sandstone and clayey soil and is only found in the Capertee district in central-eastern NSW.	**Absent** No dry sclerophyll forest or open woodland in study area.	**0**	**Unlikely** Suitable habitat not present. Study area is outside species known distribution.	**No** Species unlikely to occur in study area

Species	Description of habitat[3]	Presence of habitat	Bionet records	Likelihood of occurrence	Possible impact?
Pomaderris cotoneaster **Cotoneaster Pomaderris** **BC-E, EPBC-E**	This species is known from the Nungatta area, northern Kosciusko National Park, the Tantawangalo area (South-East Forests National Park), Badgery's Lookout (Tallong), Bungonia State Conservational Area, Yerranderie, Kanangra- Boyd National Park, Canyonleigh and Ettrema Gorge (Morton National Park). The Cotoneaster Pomaderris is primarily found in forested areas and prefer friable soils. They generally grow amongst rocks adjacent to streams and at the bottom of steep slopes.	**Absent** No forested communities with rocky outcrops in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Pomaderris queenslandica **Scant Pomaderris** **BC-E**	This species is widely scattered in north-east NSW. It is known on many locations on the north coast and on the New England Tablelands and North West Slopes in NSW. It is mostly found in eucalypt forest and sheltered woodlands with a shrubby understorey, and occasionally along creeks.	**Absent** No sheltered woodlands with a shrubby understory in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Ziera ingramii **Keith's Ziera** **BC-E, EPBC-E**	It is primarily found in Goonoo SCA, north-east of Dubbo. It is found in dry sclerophyll forests in light sandy soils. It is mostly found in woodland or open forests with a shrubby to heathy understorey on red-brown and yellow-brown sandy loams. It occurs on gentle rocky slopes or near the crests of low rises in undulating terrain, above 390m altitude.	**Absent** No woodlands with a shrubby understory or rocky slopes in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Zieria obcordate **Aieria obcordate** **BC-E, EPBC-E**	This species only occurs in Wuuluman area near Wellington and Crackerjack Rock. It grows in eucalypt woodland or shrubland dominated by species of *Acacia.* It is also found in *Eucalypt* and *Callitris* dominated woodland. It occurs on sites with an altitude of 500-830 metres. This species prefers areas that are shaded and have well-draining soil. It is primarily found in sandy soil and occasionally between granite boulders.	**Absent** No woodland dominated by Acacia's or areas of sandy soil with granite boulders in study area.	**0**	**Unlikely** Suitable habitat not present. Study area is outside species known distribution.	**No** Species unlikely to occur in study area
Orchids					
Diuris tricolor **Pine Donkey Orchid** **BC-V**	It is sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the far north of NSW. Localities include the Condobolin-Nymagee road, Wattamondara towards Cowra, Cooyal, Adelong, Red Hill north of Narrandera, Coolamon, near Darlington Point, Eugowra, Girilambone, Dubbo, Muswellbrook, and several sites west of Wagga Wagga. Associated species include *Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta*, Ironbark and *Acacia* shrubland. The understorey is often grassy with herbaceous plants such as *Bulbine* species. It is found in sandy soils, either on flats or small rises. Also recorded from a red earth soil in a Bimble Box community in western NSW.	**Absent** Characteristic species not present in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Caladenia arenaria **Sand-hill Spider Orchid** **BC-E, EPBC- E**	The Sand-hill Spider Orchid occurs in the south west planes and western south west slopes of NSW. It has been recorded from Nangus and Adelong and may have been sighted near Cootamundra. It is currently thought to occur only in the Riverina between Urana and Narranderra. This species grows in sandy soil within woodlands and is associated with White Cypress Pine (*Callitris glaucophylla*). It may be difficult to identify because it becomes dormant and survives underground during hot summers.	**Absent** Characteristic species not present in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Caladenia concolor **Crimson Spider Orchid** **BC-E, EPBC-V**	The only known South-Western Slopes Inland location of this species is to the west of Jingellic, NSW. It is found in dry sclerophyll forests and grassy woodlands. It is commonly amongst low heathy shrubs and within Box-Ironbark ecosystems. They typically grow in gravelly or stony sand and clay loam, and always in well-draining soil.	**Absent** No dry forests, grassy woodland or heathy shrubs in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Caladenia tessellate **Thick Lip Spider Orchid** **BC-E, EPBC-V**	The Thick Lip Spider Orchid (*Caladenia tessellate*) has been found in Sydney, Wyong, Ulladulla and Braidwood. It is also found on the east coast of Victoria, from east Melbourne, up to near the NSW boarder. It is primarily found in grassy sclerophyll woodland, but has been found in low woodland, in stony soil. In Victoria, it is found in healthlands, grassy or heathy woodlands and grassy or sedgy open forests. Typically, this species occurs on clay loam or sandy soils.	**Absent** No grassy or heathy woodland with stony soils in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Diuris pedunculata **Small Snake Orchid** **BC-E, EPBC-E**	This species is found in north east NSW. It grows on grassy slopes or flats, in peaty or clayey or stony loam soils in moist areas. It is also found on shale and trap soils, fine granite and among boulders. It has been found in open areas of dry sclerophyll forests with grassy understories, in riparian forests, swap forests, sub-alpine grasslands and herbfields.	**Absent** No grassy slopes or flats in peaty, clayey or stony loam soils in study area.	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area

Species	Description of habitat[3]	Presence of habitat	Bionet records	Likelihood of occurrence	Possible impact?
Prasophyllum petilum **Tarengo Leek Orchid** **BC-E. EPBC-E**	The Tarengo Leek Orchid is known to occur in Boorowa, Queanbeyan, Ilford, Delegate and west of Muswellbrook. This species has been found in open grassy woodland and grassland and prefers moist environments. It is found primarily in loam, clay or sandy soils.	**Absent** No grassy woodland or grasslands in study area.	**0**	**Unlikely** Suitable habitat not present. Study area is outside species known distribution.	**No** Species unlikely to occur in study area
Aladenia tensa **Greencomb Spider-orchid** **EPBC - E**	Grows on red-brown sandy loams on rises in open woodland dominated by Yellow Gum (Eucalyptus leucoxylon sens. lat.) and Rottnest Island Pine (Callitris preissii). Its habitat, between the Little Desert and Big Desert, was formerly expansive and extended into SA (Carr 1991). This species has also been recorded from Black Box (Eucalyptus largiflorens)/Yellow Gum woodland and mallee/heathland	**Absent** Characteristic species not present	**0**	**Unlikely** Suitable habitat not present. No records of this species occur within 10km of the proposal area	**No** Species unlikely to occur in study area
Trees					
Eucalyptus aggregate **Black Gum** **BC-V, EPBC-V**	This species is found in the NSW Central and Southern Tablelands, and small numbers occur in Victoria and the ACT. It typically occurs in the cooler, higher, wetter areas of the tablelands. They grow on alluvial soils on cold, poorly-drained flats and hollows next to creeks and rivers. Often found in open, grassy woodland with other Eucalypt species and few shrubs.	**Absent** No open grassy woodlands in study area.	**0**	**Unlikely** Suitable habitat not present. Species not detected during site survey	**No** Species unlikely to occur in study area
Eucalyptus alligatrix subsp. Alligatrix **BC-V, EPBC- V**	Only known at a single location south-west of Rylston. It grows in dry sclerophyll woodland on shallow relatively infertile soils (grey brown loam with ironstone). It may have been part of a more-extensive open woodland community prior to the commencement of clearing and grazing.	**Absent** No dry woodland in study area.	**0**	**Unlikely** Suitable habitat not present. Species not detected during site survey	**No** Species unlikely to occur in study area
Eucalyptus cannonii **Capertree Stringybark** **BC-V**	The Capertee Stringybark is predominantly restricted to the central tablelands and slopes of NSW between the Golden Highway and the Mitchell Highway. The species' distribution is bounded from east of Bathurst, to Wallerwang near Lithgow, north along the western edge of Wollemi National Park and north-west to Mudgee; isolated occurrences are known from a short way north of Goulburn River National Park between Dunedoo and Merriwa.	**Absent** Study area is outside species known distribution	**0**	**Unlikely** Species not detected during site survey	**No** Species unlikely to occur in study area
Eucalyptus robertsonii subsp. Hemisphaerica **Robertson's Peppermint** **BC-V, EPBC- V**	It is only known in the central tablelands in NSW, from Orange to Burraga. This species occurs in grassy or dry sclerophyll forest or woodland, in sheltered locations. It grows on quartzite ridges, upper slopes and on shallow clay.	**Absent** No grassy or dry woodland in study area.	**0**	**Unlikely** Suitable habitat not present. Species not detected during site survey	**No** Species unlikely to occur in study area
EECs					
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions **BC – E**	Tall woodland or open forest dominated by Fuzzy Box Eucalyptus conica, often with Grey Box Eucalyptus microcarpa, Yellow Box Eucalyptus melliodora, or Kurrajong Brachychiton populneus. Buloke Allocasuarina luehmannii is common in places. Shrubs are generally sparse, and the groundcover moderately dense, but varies with season. Found on alluvial soils of the South West Slopes, Brigalow Belt South and Darling Riverine Plains Bioregions. Mainly found in the Dubbo-Narromine-Parkes-Forbes area. Community occurs on brown loam or clay, alluvial or colluvial soils on prior streams and abandoned channels or slight depressions on undulating plains or flats of the western slopes. Community often occurs upslope from River Red Gum communities above frequently inundated areas of the floodplain. It also occurs on colluvium soils on lower slopes and valley flats. Shrubs include Wilga, Deane's Wattle, Hop Bush, Cassia, Water Bush and Sifton Bush.	**Absent** Characteristic species not present.		**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.

Species	Description of habitat[3]	Presence of habitat	Bionet records	Likelihood of occurrence	Possible impact?
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia **EPBC- E**	Predominantly occurs on the drier edge of the temperate grassy eucalypt woodland belt and ranges from central New South Wales through northern and central Victoria into South Australia. In NSW it can be transitional between the temperate lower slopes and tablelands occupied by, e.g. the EPBC Act-listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community, and the semi-arid floodplain communities. Generally occurs in landscapes of low-relief such as flat to undulating plains, low slopes and rises and, to a lesser extent, drainage depressions and flats. The ecological community may extend to more elevated hillslopes on the fringes of its range where it intergrades with other woodland or dry sclerophyll forest communities. Often occurs on productive soils derived from alluvial or colluvial materials but may occur on a range of substrates. Soils include: duplex soils; red-brown earths; gradational soils; non-calceric and calceric browns with variable textures including sandy clay loam, clay loam, sandy loam, loam, heavy clay; and loams with quartzite surface stones and rocky outcroppings in the Mount Lofty Ranges. Gilgai topography may be present. The ecological community tends to occupy drier sites within the belt of grassy woodlands in south-eastern Australia (Prober and Thiele, 1993). The mean annual rainfall associated with the distribution of the ecological community lies in the range 375-700 mm/year. The typical structure of ecological community is a woodland to open forest with a canopy dominated by eucalypts and an understorey with a moderately dense to sparse shrub layer and a ground layer of perennial and annual native forbs and graminoids. Tussock grasses dominate the ground layer vegetation, though other graminoids or forbs may be common. Chenopods also may be present in the ground layer. The tree canopy is dominated (≥ 50% canopy crown cover) by Eucalyptus microcarpa (Grey Box). Widespread associated tree species that may be present include: Allocasuarina luehmannii (Buloke), Brachychiton populneus (Kurrajong), Callitris glaucophylla (White Cypress Pine), Eucalyptus albens (White Box), E. camaldulensis (River Red Gum), E. conica (Fuzzy Box), E. leucoxylon (Yellow Gum, SA Blue Gum), E. melliodora (Yellow Box) and E. populnea (Bimble Box, Poplar Box). The ground layer also is highly variable in development and composition, ranging from almost absent to mostly grassy to forb-rich. Ground layer flora commonly present include one or more of the graminoid genera: Austrodanthonia, Austrostipa, Elymus, Enteropogon, Dianella and Lomandra; and one or more of the chenopod genera: Atriplex, Chenopodium, Einadia, Enchylaena, Maireana, Salsola and Sclerolaena. Derived grasslands are a special state of the ecological community, whereby the canopy and mid layers have been mostly removed to <10% crown cover but the native ground layer remains largely intact, with 50% or more of the total vegetation cover being native.	**Absent** Characteristic species not present.		**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.
Mallee and Mallee-Broombush dominated Woodland and Shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion **BC-CEEC**	A low woodland that occurs in the West Wyalong area. The trees are *Eucalyptus polybractea* (Blue Mallee), *Eucalyptus behriana* (Bull Mallee), *Eucalyptus viridis* (Green Mallee), *Eucalyptus dumosa* (White Mallee) which may occur in varying proportions and not necessarily together. Understorey shrubs and groundcovers can be present in varying densities, from sparse to dense depending on site management history and substrate. *Melaleuca uncinata* (Broombush) may or may not occur. Mainly occurs on red loamy soils. Has been recorded from the local government areas of Bland and Temora, within the NSW South Western Slopes Bioregion, but may occur elsewhere in the Bioregion. Has a very highly restricted distribution, with known occurrences falling within a region of less than 4000 km2 bounded by Lake Cowal - Temora - Ardlethan - Ungarie. Occurs mainly on private lands and roadside easements.	**Absent** Characteristic species not present.		**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.

Species	Description of habitat[3]	Presence of habitat	Bionet records	Likelihood of occurrence	Possible impact?
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions **BC-EEC, EPBC-EEC**	Scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes Acacia pendula (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs. The structure and composition of the community varies, particularly with latitude, as chenopod shrubs are more prominent south of the Lachlan River district, while other woody species and summer grasses are more common further north. In some areas the shrub and canopy stratum may have been reduced or eliminated by clearing or heavy grazing, leaving derived grassland that may still constitute this community. This EEC is known from parts of the Local Government Areas of Berrigan, Bland, Bogan, Carrathool, Conargo, Coolamon, Coonamble, Corowa, Forbes, Gilgandra, Griffith, Gwydir, Inverell, Jerilderee, Lachlan, Leeton, Lockhart, Moree Plains, Murray, Murrumbidgee, Narrabri, Narranderra, Narromine, Parkes, Urana, Wagga Wagga and Warren, and but may occur elsewhere in these bioregions.	**Absent** Characteristic species not present.		**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions **BC - EEC**	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions is the name given to the ecological community dominated by White Cypress Pine (*Callitris glaucophylla*). Sandhill Pine Woodland is characterised by an open tree stratum, which may be reduced to isolated individuals or may be absent as a result of past clearing. The tree layer is dominated by *C. glaucophylla*, either in pure stands or with a range of other less abundant trees or tall shrubs. In the Riverina bioregion and the far south-western portion of the NSW South Western Slopes bioregion, the community is typically associated with prior streams and aeolian source-bordering dunes, which are scattered within an extensive alluvial clay plain dominated by chenopod shrublands. Sandhill Pine Woodland typically occupies red-brown loamy sands with alkaline sub-soils on the alluvial plain of the Murray River and its tributaries, and on parts of the sandplain in south-western NSW. The structure of the community varies depending on past and current disturbances, particularly clearing, logging, grazing and soil erosion, with species composition of sites being influenced by their size, recent rainfall or drought conditions and by their disturbance history, including grazing, land clearing and fire.	**Absent** Characteristic species not present.		**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland **BC – E** **EPBC - CE**	Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. The trees may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles. Commonly co-occurring eucalypts include Apple Box (E. bridgesiana), Red Box (E. polyanthemos), Candlebark (E. rubida), Snow Gum (E. pauciflora), Argyle Apple (E. cinerea), Brittle Gum (E. mannifera), Red Stringybark (E. macrorhyncha), Grey Box (E. microcarpa), Cabbage Gum (E. amplifolia) and others. The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include Kangaroo Grass (Themeda australis), Poa Tussock (Poa sieberiana), wallaby grasses (Austrodanthonia spp.), spear-grasses (Austrostipa spp.), Common Everlasting (Chrysocephalum apiculatum), Scrambled Eggs (Goodenia pinnatifida), Small St John's Wort (Hypericum gramineum), Narrow-leafed New Holland Daisy (Vittadinia muelleri) and blue-bells (Wahlenbergia spp.). Shrubs are generally sparse or absent, though they may be locally common. Remnants generally occur on fertile lower parts of the landscape where resources such as water and nutrients are abundant. Some of the component species (e.g. wattles, she-oaks, native legumes) fix nitrogen that is made available to other species in the community, while fallen timber and leaves recycle their nutrients. Disturbed remnants are considered to form part of the community, including where the vegetation would respond to assisted natural regeneration.	**Absent** Characteristic species not present.		**Unlikely** Characteristic species not detected during site survey	**No** EEC not present in study area.

Evaluation of the likelihood and extent of impact on threatened fauna species

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Aves					
Anseranas semipalmata **Magpie Goose** **BC-V**	Typically found in shallow wetlands (less than 1m deep) with dense growth of rushes or sedges. Occupies both aquatic and terrestrial habitats. Found in arid and riverine shrublands (Chenopod formation), forested wetlands, freshwater wetlands, dry ephemeral swamps, floodplains, grasslands and semi-arid woodlands. Wetlands are important habitat, particularly those on floodplains and large shallow wetlands created by runoff. Nests are formed in trees over deep water. Breeding can occur in summer and winter, and is dependent on rain and water levels.	**Absent** No large shallow wetlands with dense growth of rushes or sedges in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Anthochaera phrygia **Regent Honeyeater** **BC - CE** **EPBC – CE**	A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests (NPWS, 1999 177 /id) (Pizzey, 1997). A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests (NPWS, 1999 177 /id) (Pizzey, 1997).	**Absent** No box-ironbark woodlands in study area.	**1**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Ardeotis australis **Australian Bustard** **BC-E**	This species primarily inhabits inland Australia. Breeding now only occurs in the north-west region of NSW. It mainly occurs in tussock and hummock grasslands (with a preference for tussock). Occasionally they occur on pastoral and cropping land and near dams. They breed on bare ground on low sandy ridges or stony rises between grassland and shrubland cover.	**Absent** No tussock and hummock grasslands or bare ground on low sandy ridges in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Artamus cyanopterus cyanopterus **Dusky Woodswallow** **BC – V**	The dusky woodswallow are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. The species primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. Most breeding activity occurs on the western slopes of the Great Dividing Range.	**Absent** No dry open forest or woodlands in study area.	**57**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Botaurus poiciloptilus **Australasian Bittern** **EPBC – E** **BC - E**	In NSW, this species occurs along the coast and is frequently recorded in the Murray-Darling Basin, notably in floodplain wetlands of the Murrumbidgee, Lachlan, Macquarie and Gwydir Rivers. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.). Nests are built in secluded places in densely-vegetated wetlands on a platform of reeds.	**Absent** No permanent freshwater wetlands with tall dense vegetation in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Burhinus grallarius **Bush Stone-curlew** **BC - E**	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer.	**Absent** No open woodlands with fallen timber in study area.	**5**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

[4] Information sourced from species profiles on NSW OEH's threatened species database or the Australian Government's *Species Profiles and Threats* database (SPRAT) unless otherwise stated.
OEH threatened species database: http://www.threatenedspecies.environment.nsw.gov.au/index.aspx SPRAT: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Calidris ferruginea **Curlew Sandpiper** **EPBC - CE**	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh.	**Absent** No mudflats, coastal areas, lakes, dams or waterholes with bare edges of mud or sand in study area.	**3**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Callocephalon fimbriatum **Gang-gang Cockatoo** **BC-V**	In NSW, this species is found from the south-eastern coast to the Hunter region, and west to the Central tablelands and south-west slopes. It is common in the ACT. During spring and summer, it is found in tall mountain forests and woodlands. There is a preference for heavily timbered and mature wet sclerophyll forests. During autumn and winter, species move to lower altitudes and occupy drier, more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas. It may also occur in sub-alpine Snow Gum woodland and temperate rainforests. Prefers old growth forest and woodlands that have eucalypt hollows (10cm in diameter or larger and 9m above the ground).	**Absent** Moist woodland is present, however the site lacks suitable hollows.	**3**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Calyptorhynchus lathami **Glossy Black-Cockatoo** **BC-V**	This species is widespread throughout eastern to central NSW. They occur in open forest and woodlands on the coast and the Great Dividing Range. Clack Sheoak and Forest Sheoak are important food sources. Inland birds feed on other Sheoaks including Drooping Sheoak, Allocasuaraina diminuta, A. gymnathera and Belah. They are dependent on large hollow-bearing eucalpyts for nesting. Where food sources are appropriate, they inhabit dry and wet sclerophyll, forests, forested wetlands, grassy woodlands, freshwater wetlands, heathlands, rainforests and semi-arid woodlands.	**Absent** Moist woodland is present, however the site lacks suitable hollows and Sheoaks.	**4**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Certhionyx variegatrus **Pied Honeyeater** **BC - V**	Inhabits wattle shrub, primarily Mulga (Acacia aneura), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (Eremophila spp.); also from mistletoes and various other shrubs (e.g. Grevillea spp.); also eats saltbush fruit, berries, seed, flowers and insects.	**Absent** The study area has almost no shrub layer and characteristic species are not present	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Chthonicola sagittate **Speckled Warbler** **BC - V**	Lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	**Absent** No rocky ridges or gullies with scattered native tussock grasses in study area.	**2**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Circus assimilis **Spotted Harrier** **BC – V**	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.	**Absent** No native grassland in study area.	**5**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Climacteris picumnus victoriae **Brown Tree Creeper (Eastern Species)** **BC – V**	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. Hollows in standing dead or live trees and tree stumps are essential for nesting.	**Absent** River Red Gums are present in the study area, however the site lacks shrubs and fallen timber.	**37**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Daphoenositta chrysoptera **Varied Sittella** **BC - V**	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	**Present** Eucalypt forest in study area.	**2**	**Possible** Suitable habitat present.	**Yes** AoS completed

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Ephippiorhynchus asiaticus **Black -necked Stork** **BC - E**	Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries.	**Present** Watercourses in study area.	**0**	**Unlikely** Study area outside species known distribution	**No** Species unlikely to occur in study area
Epthianura albifrons **White-fronted Chat** **BC-V**	This species is widespread throughout NSW, mostly in the southern end of the state. Typically found in temperate to arid climates and occasionally sub-tropical areas. Occurs in foothills and lowlands up to 1000m above sea level. It is found in saltmarsh vegetation, open grasslands and sometimes in low shrubs adjacent to wetland areas. Nests are open cut and built-in low vegetation (23cm-2.5m above the ground).	**Absent** No saltmarsh vegetation, open grasslands or low shrubs in study area.	**8**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Falco hypoleucos **Grey Falcon** **BC - E**	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW.	**Absent** Wooded watercourse in study area, however the locality has more than 500 mm in rainfall.	**0**	**Unlikely** Suitable habitat not present. Species may be a vagrant visitor	**No** Species unlikely to occur in study area
Falco subniger **Black Falcon** **BC-V**	The black falcon is widely distributed in NSW, mostly occurring inland. They occur in woodland, shrubland and grassland in the arid and semi-arid zones. They use wetlands and streams for hunting. They also use remnant vegetation occasionally.	**Present** Wooded watercourse in study area.	**13**	**Possible** Suitable habitat present, species has been recorded within 10 km .	**Yes** AoS completed
Glossopsitta porphyrocephala **Purple-crowned Lorikeet** **BC - V**	Found in open forests and woodlands, particularly where there are large flowering eucalypts. Also recorded from mallee habitats. Breeds away from feeding areas, utilising hollow branches or holes in trees. Also roosts in dense vegetation up to several kilometres away from feeding areas.	**Present** Flowering eucalypts with hollows in study area, however the site is highly disturbed.	**0**	**Unlikely** Suitable habitat present, however, there are no records within 10 km.	**No** Species unlikely to occur in study area
Glossopsitta pusilla **Little Lorikeet** **BC-V**	This species is found along the coast and Great Divide regions of eastern Australia and is found as far west as Dubbo and Albury. Primarily found in the canopy of open *Eucaluptus* forest and woodland and also found with *Angophora, Melaleuca* and other tree species. They utilise paddock and other remnant trees as a supplementary food source. Roost in treetops. Nests are in hollows in the limb or trunk of smooth barked Eucalypts. The entrance is approximately 3cm and 2-15m above the ground.	**Present** Eucalypt woodland with hollows in study area.	**49**	**Possible** Suitable habitat present. Records found nearby to the site	**Yes** AoS completed
Grantiella picta **Painted Honeyeater** **BC – V** **EPBC – V**	Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.	**Present** Eucalypt woodland in study area.	**0**	**Unlikely** Suitable habitat present, however, there are no records within 10 km.	**No** Species unlikely to occur in study area
Grus rubicunda **Brolga** **BC-V**	Brolgas feed in dry grassland and ploughed paddocks and are depended on wetlands, particularly shallow swamps. They are found in arid shrublands, forested wetlands, freshwater wetlands, grasslands, saline wetlands and semi-arid woodlands (grassy and shrub formation)	**Absent** No forested wetlands, freshwater wetlands, grasslands, saline wetlands or semi-arid woodlands in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Haliaceetus leucogaster **White-bellied Sea-Eagle** **BC - V**	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby.	**Absent** No areas of large open water study area.	**1**	**Unlikely** Suitable habitat not present, species may be a vagrant visitor and fly over the site.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Hamirostra melanosternon **Black-breasted Buzzard** **BC - V**	Lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. Also hunts over grasslands and sparsely timbered woodlands. Breeds from August to October near water in a tall tree.	**Present** Timbered watercourse in study area.	**0**	**Unlikely** Suitable habitat present, however, there are no records within 10 km.	**No** Species unlikely to occur in study area
Hieraaetus morphnoides **Little Eagle** **BC - V**	The Little Eagle occurs as a single population throughout NSW. It occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	**Present** Riparian woodland in study area.	**29**	**Possible** Suitable habitat present. Records found nearby to the site	**Yes** AoS completed
Ixobrychus flavicollis **Black Bittern** **BC - V**	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. During the day, roosts in trees or on the ground amongst dense reeds.	**Absent** No areas of dense vegetation study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Leipoa ocellate **Malleefowl** **EPBC-V**	Occurs in NSW in the south west centred on Mallee Cliffs NP and extending east to near Balranald and scattered records as far north as Mungo NP. Also occurs in the Scotia mallee including Tarawi NR and Scotia Sanctuary and is part of a larger population north of the Murray River in South Australia. Further east, a population continues to persist in the Goonoo forest near Dubbo. Outside these areas, occasional records have been made in the Pilliga forests Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated by Mulga or native Cypress Pine species. Prefers areas of light sandy to sandy loam soils and habitats with a dense but discontinuous canopy and dense and diverse shrub and herb layers. Mainly forage in open areas on seeds of acacias and other native shrubs (Cassia, Beyeria, Bossiaea), buds, flowers and fruits of herbs and various shrubs, insects (cockroaches, ants, soil invertebrates), and cereals if available. Incubate eggs in large mounds that contain considerable volumes of sandy soil.	**Absent** No mallee communities in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Limosa limosa **Black-tailed Godwit** **BC - V**	Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Roosts and loafs on low banks of mud, sand and shell bars.	**Absent** Proposal is not in a coastal area. No muddy lakes or swamps in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Lophoictinia isura **Square-tailed Kite** **BC - V**	Found in a variety of timbered habitats including dry woodlands and open forests. Particularly prefers timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	**Present** Timbered watercourse in study area.	**0**	**Unlikely** Suitable habitat present, however, there are no records within 10 km. Species may be a vagrant visitor.	**No** Species unlikely to occur in study area
Lophochroa leadbeateri **Major Mitchell's Cockatoo** **BC-V**	In NSW this species occurs commonly as far east as Bourke and Griffith and is scattered further east than that. They are found in treed and treeless inland habitats and are always close to water. Nest in tree hollows in the latter half of the year. Nests are at least 1km apart. They are found in arid shrublands, dry sclerophyll forests, forested woodlands, grasslands and semi-arid woodlands.	**Absent** Timbered watercourse is present, however the site lacks suitable hollows for long term use	**2**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Lathamus discolour **Swift Parrot** **BC - E** **EPBC - CE**	Occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*. They breed in Tasmania from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum Eucalyptus globulus.	**Absent** Feed tree species not present, site is highly disturbed.	**19**	**Unlikely** Suitable habitat not present. Species may be a vagrant vistor	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Melanodryas cucullate cucullate **Hooded Robin** **BC -V**	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Often perches on low dead stumps and fallen timber or on low-hanging branches.	**Absent** Site lacks structurally diverse habitat features.	**13**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Melithreptus gularis gularis **Black-chinned Honeyeater** **BC - V**	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (Eucalyptus sideroxylon), White Box (E. albens), Inland Grey Box (E. microcarpa), Yellow Box (E. melliodora), Blakely's Red Gum (E. blakelyi) and Forest Red Gum (E. tereticornis). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.	**Absent** No dry woodland in study area.	**4**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Neophema pulchella **Turquoise Parrot** **BC - V**	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Nests in tree hollows, logs or posts, from August to December. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine Syncarpia glomulifera, Black She-oak Allocasuarina littoralis, Blackwood Acacia melanoxylon, Rough-barked Apple Angophora floribunda, Cherry Ballart Exocarpus cupressiformis and a number of eucalypt species.	**Present** Eucalypt woodland with hollows in study area.	**7**	**Possible** Suitable habitat present. Records found nearby to the site	**Yes** AoS completed
Ninnox connivens **Barking Owl** **BC - V**	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile riparian soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as *Acacia* and *Casuarina* species. Requires very large permanent territories in most habitats due to sparse prey densities. Eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used.	**Absent** Timbered watercourse in study area, however the site lacks large areas of permanent habitat..	**5**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Ninox strenua **Powerful Owl** **BC - V**	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine Syncarpia glomulifera, Black She-oak Allocasuarina littoralis, Blackwood Acacia melanoxylon, Rough-barked Apple Angophora floribunda, Cherry Ballart Exocarpus cupressiformis and a number of eucalypt species. Nests in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	**Absent** Timbered watercourse in study area, however the site lacks large areas of permanent habitat.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Numenius madagascariensis **Eastern Curlew, Far Eastern Curlew** **EPBC - CE**	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. The Eastern Curlew mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. The Eastern Curlew roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. It occasionally roosts on reef-flats, in the shallow water of lagoons and other near-coastal wetlands.	**Absent** No intertidal sandflats or mudflats in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Oxyura australis **Blue-billed Duck** **BC -V**	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. Will feed by day far from the shore, particularly if dense cover is available in the central parts of the wetland. They feed on the bottom of swamps eating seeds, buds, stems, leaves, fruit and small aquatic insects such as the larvae of midges, caddisflies and dragonflies. Usually nest solitarily in Cumbungi over deep water between September and February. They will also nest in trampled vegetation in Lignum, sedges or Spike-rushes.	**Absent** No permanent wetlands with deep water and dense vegetation in study area.	**4**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Pachycephala inornata **Gilberts Whistler** **BC - V**	The Gilbert's Whistler occurs in a range of habitats within NSW, though the shared feature appears to be a dense shrub layer. It is widely recorded in mallee shrublands, but also occurs in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests, though at this stage it is only known to use this habitat along the Murray, Edwards and Wakool Rivers. Within the mallee the species is often found in association with an understorey of spinifex and low shrubs including wattles, hakeas, sennas and hop-bushes. In woodland habitats, the understorey comprises dense patches of shrubs, particularly thickets of regrowth Callitris pine. Parasitic 'cherries' (Exocarpus species) appear to be an important habitat component in Belah and Red Gum communities, though in the latter case other dense shrubs, such as Lignum and wattles, are also utilised.	**Absent** River Red Gum forest present, however the site has limited understorey growth and no Exocarpus species present.	**5**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Pandion cristatus **Eastern Osprey** **BC - V**	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	**Absent** Proposal does not occur in a coastal area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Petroica boodang **Scarlet Robin** **BC – V**	The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW 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. 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. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.	**Absent** Wet forested woodland present however the site lacks an abundance of fallen timber.	**9**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Petroica phoenicea **Flame Robin** **BC – V**	The Flame Robin is endemic to SE Australia, and ranges from near the Queensland border to SE 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 ground layer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains).	**Absent** Study area lacks a groundcover dominated by native grasses.	**17**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Petroica rodinogaster **Pink Robin** **BC - V**	Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. Nests are situated in an upright or oblique fork, from 30cm to 6m above the ground, in deep undergrowth.	**Absent** No dense vegetated gullies in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Polytelis swainsonii **Superb Parrot** **EPBC – V, BC - V**	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box.	**Present** River Red Gum woodland with hollows in study area.	**164**	**Possible** Suitable habitat present. Many records found nearby	**Yes** AoS completed

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Pomatostomus temporalis temporalis **Grey-crowned Babbler (eastern subspecies)** **BC-V**	The eastern subspecies (*temporalis)* occurs from Cape York south through Queensland, NSW and Victoria and formerly to the south east of South Australia. In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW. It may be extinct in the southern, central and New England tablelands. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Birds are generally unable to cross large open areas. Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses. Build and maintain several conspicuous, dome-shaped stick nests about the size of a football. A nest is used as a dormitory for roosting each night. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts. Nests are maintained year round, and old nests are often dismantled to build new ones. Breed between July and February.	**Absent** No Box-Gum woodland in study area.	**5**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Rostratula australis **Australian Painted Snipe** **EPBC - E**	They feed in shallow water or at the waters' edge and on mudflats. Most records of Australian Painted Snipe are from temporary or infrequently filled freshwater wetlands and although they have occurred at many sites. Primarily occurs along the east coast from north Queensland (excluding Cape York) to the Eyre Peninsula in South Australia, including the majority of Victoria and NSW. In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Inhabits inland and coastal shallow freshwater wetlands. The species occurs in both ephemeral and permanent wetlands, particularly where there is a cover of vegetation, including grasses, Lignum and Samphire. Individuals have also been known to use artificial habitats, such as sewage ponds, dams and waterlogged grassland. Nests on the ground amongst tall vegetation, such as grass tussocks or reeds.	**Absent** No mudflats in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Stagonopleura guttata **Diamond Firetail** **BC – V**	The Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW. Also found in the Australian Capital Territory, Queensland, Victoria and South Australia. Groups separate into small colonies to breed, between August and January. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season).	**Present** Riparian River Red Gum woodland with hollows in study area.	**19**	**Possible** Suitable habitat present.	**Yes** AoS completed
Stictonetta naevosa **Freckled Duck** **BC-V**	This species breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system. It typically occurs in south-eastern and south-western Australia but disperses during drought. In these times it can occur in coastal NSW and Victoria. They prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. When these areas are dry, the move to other waters such as lakes, reservoirs, farm dams and sewage ponds. Nests are usually found in dense vegetation at or near water level. They usually breed between October and November, but can also at other times.	**Absent** No swamps with dense vegetation in study area.	**1**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Tyto novaehollandiae **Masked Owl** **BC – V**	Extends from the coast where it is most abundant to the western plains. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Habitat for this species is also widespread throughout the dry eucalypt forests of the tablelands, western slopes and the undulating wet-dry forests of the coast. Optimal habitat includes an open understorey and a mosaic of sparse (grassy) and dense (shrubby) ground cover on gentle terrain. Roosts in hollows in live or occasionally dead eucalypts; dense foliage in gullies; and caves. Nest in old hollow eucalypts, live or dead, in a variety of topographic positions, with hollows greater than 40 cm wide and greater than 100 cm deep. Hollow entrances are at least 3 m above ground, in trees of at least 90 cm diameter at breast height. A specialist predator of terrestrial mammals, particularly native rodents. Home range has been estimated as 400-1000 ha according to habitat productivity.	**Absent** Eucalypt woodland present, however the site lacks suitable understorey complexity.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Migratory Species					
Actitis hypoleucos **Common Sandpiper** **EPBC - CE**	A group of shorebirds (also called waders) which occupy a particular area of Botany Bay and includes the characteristic assemblage of the following 20 species: Bar-tailed Godwit (*Limosa lapponica*), Red Knot (*Calidris canutus*), Great Knot (*Calidris tenuirostris*), Sharp-tailed Sandpiper (*Calidris acuminata*), Curlew Sandpiper (*Calidris ferruginea*), Red-necked Stint (*Calidris ruficollis*), Common Sandpiper (*Actitis hypoleucos*), Terek Sandpiper (*Xenus cinereus*), Latham's Snipe (*Gallinago hardwickii*), Grey-tailed Tattler (*Heteroscelus brevipes*), Grey Plover (*Pluvialis squatarola*), Pacific Golden Plover (*Pluvialis fulva*), Common Greenshank (*Tringa nebularia*), Masked Lapwing (*Vanellus miles*), Marsh Sandpiper (*Tringa stagnatilis*), Ruddy Turnstone (*Arenaria interpres*), Pied Oystercatcher (*Haematopus longirostris*), Sooty Oystercatcher (*Haematopus fulinginosus*), Whimbrel (*Numenius phaeopus*), and Eastern Curlew (*Numenius madagascariensis*). Occurs on the relict muddy sand marginal shoal of the Georges River between Taren Point and Shell Point in Botany Bay. Some species identified within this community can also be found foraging and roosting at other locations within Botany Bay. In Botany Bay the shorebird community utilises roosting and foraging habitat (intertidal mud flats and sand flats),the proximity of mangroves (*Avicennia marina*) is important as roosting habitat.	**Absent** Proposal does not occur in a coastal area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Tringa nebularia **Common Greenshank** **EPBC - M**	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees. It was once recorded with Black-winged Stilts (Himantopus himantopus) in pasture, but are generally not found in dry grassland (Higgins & Davies 1996).	**Present**	**4 (over 30 years old)**	**Unlikely** Suitable habitat present, however records within a 10 km radius are over 30 years old and it is unlikely that this species would occur within the project area.	**No** Species unlikely to occur in study area
Tringa stagnatilis **Marsh Sand-piper** **EPBC - M**	Marsh Sandpipers are commonly seen singly, or in small to large flocks in fresh or brackish (slightly salty) wetlands such as rivers, water meadows, sewage farms, drains, lagoons and swamps.	**Present**	**1 (over 30 years old)**	**Unlikely** Suitable habitat present, however records within a 10 km radius are over 30 years old and it is unlikely that this species would occur within the project area.	**No** Species unlikely to occur in study area
Apus pacificus **Fork-tailed Swift** **EPBC - M**	This species breeds in the north-east and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia. It is common in the Kimberley, uncommon to moderately common near north-west, west and southeast coasts and rare to scarce elsewhere. They never settle voluntarily on the ground and spend most of their lives in the air, living on the insects they catch in their beaks.	**Present** Timbered watercourse in study area.	**10**	**Unlikely** Study area outside species known distribution. Species is almost exclusively aerial.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Calidris acuminate **Sharp-tailed Sandpiper** **EPBC - M**	A group of shorebirds (also called waders) which occupy a particular area of Botany Bay and includes the characteristic assemblage of the following 20 species: Bar-tailed Godwit (*Limosa lapponica*), Red Knot (*Calidris canutus*), Great Knot (*Calidris tenuirostris*), Sharp-tailed Sandpiper (*Calidris acuminata*), Curlew Sandpiper (*Calidris ferruginea*), Red-necked Stint (*Calidris ruficollis*), Common Sandpiper (*Actitis hypoleucos*), Terek Sandpiper (*Xenus cinereus*), Latham's Snipe (*Gallinago hardwickii*), Grey-tailed Tattler (*Heteroscelus brevipes*), Grey Plover (*Pluvialis squatarola*), Pacific Golden Plover (*Pluvialis fulva*), Common Greenshank (*Tringa nebularia*), Masked Lapwing (*Vanellus miles*), Marsh Sandpiper (*Tringa stagnatilis*), Ruddy Turnstone (*Arenaria interpres*), Pied Oystercatcher (*Haematopus longirostris*), Sooty Oystercatcher (*Haematopus fulinginosus*), Whimbrel (*Numenius phaeopus*), and Eastern Curlew (*Numenius madagascariensis*). Occurs on the relict muddy sand marginal shoal of the Georges River between Taren Point and Shell Point in Botany Bay. Some species identified within this community can also be found foraging and roosting at other locations within Botany Bay. In Botany Bay the shorebird community utilises roosting and foraging habitat (intertidal mud flats and sand flats). For some species (Terek Sandpiper, Grey-tailed Tattler), the proximity of mangroves (*Avicennia marina*) is important as roosting habitat.	**Absent** Proposal does not occur in a coastal area.	**23**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Calidris ferruginea **Curlew Sandpiper** **EPBC -M**	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh.	**Absent** No mudflats in study area.	**3**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Calidris melanotos **Pectoral Sandpiper** **EPBC - M**	This species breeds in high-arctic tundra from the Yamal Peninsula eastwards to the Bearing Strait in Siberia and in arctic Alaska and Canada,. It is known to migrate mostly through the USA and mexico and spends most of its non-breeding months in South America. A small number of these birds are known to reach Australia and are believed to be concentrated in south-eastern Australia. This species prefers freshwater mudflats.	**Absent** No mudflats in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Gallinago hardwickii **Latham's Snipe, Japanese Snipe** **EPBC - M**	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	**Absent** No wetlands with dense vegetation in study area.	**19**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Hirundapus caudacutus **White-throated Needletail** **EPBC - M**	White-throated Needletails often occur in large numbers over eastern and northern Australia. They arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. The White-throated Needletail feeds on flying insects, such as termites, ants, beetles and flies. White-throated Needletails are non-breeding migrants in Australia.	**Absent**	**4**	**Unlikely-** **Suitable habitat not present.**	**No-** Species unlikely to be impacted by the proposal**.**
Myiagra cyanoleuca **Satin Flycatcher** **EPBC - M**	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is also found in New Guinea.. The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The Satin Flycatcher is a migratory species, moving northwards in winter to northern Queensland and Papua New Guinea, returning south to breed in spring..	**Absent** No heavily forest gullies in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Fish					
Galaxius rostratus **Flathead Galaxias** **CE EPBC** **CE FM**	Below 150 m in altitude. Billabongs, lakes, swamps, and rivers, with preference for still or slow-flowing waters.	**Absent** Study area is above 150 m altitude		**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Maccullochella peelii **Murray Cod** **EPBC - V**	Found extensively throughout the Murray Darling Basin in the south-eastern region of Australia. Murray cod are able to live in a wide range of habitats from clear, rocky streams in the upper western slopes regions of New South Wales to the slow flowing, turbid rivers and billabongs of the western plains. Generally, they are found in waters up to 5m deep and in sheltered areas with cover from rocks, timber or overhanging banks. They typically spawn eggs onto firm substrates such as hollow logs, rocks, pipes and clay banks, from spring to early summer.	**Absent** Creek in study area is less than 5 m deep and lacks sheltered areas of rock, timber and overhanging banks.		**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Macquaria australasica **Macquarie Perch** **EPBC - E**	They are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries. The species spawn in spring or summer in shallow upland streams or flowing parts of rivers where the eggs which settle among stones and gravel of the stream or river bed.	**Absent** Creek in study area lacks river/lake features with no areas of stone or gravel.		**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Maccullochella macquariensis **Trout cod** **FM Act - E**	Trout Cod are often found in faster flowing water with rocky and gravel bottoms, but can also be found in some slower flowing, lowland rivers. Large woody snags are very important for the species as they provide complex habitats for each stage of the species' life cycle.	**Absent** Creek lacks gravel, large woody snags.		**Unlikely** Mapped under DPI threatened fish distribution, however, suitable habitat not present.	**No** Species unlikely to occur in study area
Euastacus armatus **Murray Crayfish** **FM - V**	Murray Crayfish prefer cool, flowing water that is well oxygenated. The species is tolerant of water temperatures up to 27°C and moderate salinities, but are intolerant to low dissolved oxygen concentrations. They create burrows that vary in complexity, from deep burrows with multiple entrances to simple burrows under a rock or log. Murray Crayfish can be found in a variety of habitats ranging from pasture-lands to sclerophyll forest. Snags are important habitat for Murray Crayfish	**Absent** Unsuitable soil for building burrows,		**Unlikely** Mapped under DPI threatened fish distribution, however, suitable habitat not present.	**No** Species unlikely to occur in study area
Mammals					
Chalinolobus dwyeri **Large-eared Pied Bat** **BC – V** **EPBC - V**	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies.	**Absent** No crevices in cliffs, old mine workings or mud nests in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Chalinolobus picatus **Little Pied Bat** **BC – V**	Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings.	**Present** Tree hollows present	**0**	**Unlikely** Suitable habitat present, however, there are no records within +70 km	**No** Species unlikely to occur in study area.
Cercartetus nanus **Eastern Pygmy-possum** **BC - V**	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (Pseudocheirus peregrinus) dreys or thickets of vegetation, (e.g. grass-tree skirts).	**Present** Tree hollows present	**0**	**Unlikely** Suitable habitat present, however, there are no records within +80 km	**No** Species unlikely to occur in study area.
Dasyurus maculatus **Spotted-tailed Quoll** **BC-V, EPBC-E**	In NSW, this species only known to occur in the east. It occupies a range of habitats including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. They use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces for dens. They use communal waste sites, which typically occur on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. They can be identified by characteristic twisted faeces.	**Absent** Riparian woodland present, however, the site lacks diverse structural features	**1**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area.

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Falsistrellus tasmaniensis **Eastern False Pipistrelle** **BC-V**	It is found on the south-east coast and ranges of Australia. They prefer moist habitats with trees more than 20m tall. They prefer to roost in eucalypt hollows but have been found under loose bark on trees. They hibernate in winter, and females are pregnant during late spring to early summer. Found in dry sclerophyll forests, forested wetlands, freshwater wetlands, grassy woodlands, heathlands and rainforests.	**Present** Tree hollows present	**0**	**Unlikely** Suitable habitat present, however there are no records within +30 km	**No** Species unlikely to occur in study area.
Miniopterus schreibersii oceanensis **Eastern Bentwing – bat** **BC - V**	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Cold caves are used for hibernation in southern Australia. Hunt in forested areas, catching moths and other flying insects above the tree tops.	**Absent** No derelict mines, storm-water tunnels, buildings and other man-made structures suitable for roosting in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Myotis Macropus **Southern Myotis** **BC - V**	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish.	**Absent** Tree hollows present, the proposal area is more than 100 km inland.	**2**	**Possible** Suitable habitat not present. Records available for species near the site	**Yes** AoS completed
Nyctophilus corbeni **Corben's Long-eared Bat, South-eastern Long-eared Bat** **BC - V** **EPBC - V**	Inhabits a variety of vegetation types, including mallee, bulloke Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.	**Present** Eucalypt woodland with hollows in study area.	**0**	**Possible** Suitable habitat present.	**Yes** AoS completed
Petaurus australis **Yellow-bellied Glider** **BC - V**	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Roosts in hollows of large trees.	**Absent** Proposal does not occur in a high rainfall area with nutrient rich soils.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Petaurus norfolcensis **Squirrel Glider** **BC - E**	Inhabits a wide range of open forest, woodland and riverine forest habitats. Utilise remnants of various sizes, including small remnants and even small stands of trees within Travelling Stock Reserves, roadside reserves or private land. Often utilise linear remnant vegetation along roadsides or rivers and streams. Eucalypt species known to provide suitable denning and foraging resources include (but are not restricted to): Blakely's Red Gum (Eucalyptus blakelyi), Grey Box (E. microcarpa), Red Box (E. polyanthemos), Mugga Ironbark (E. sideroxylon), River Red Gum (E. camaldulensis), White Box (E. albens) and Yellow Box (E. melliodora). Require abundant tree hollows for refuge and nest sites, so are more likely to inhabit mature or old growth forest.	**Present** River Red Gums present, abundance of suitable hollows.	**282**	**Likely** Suitable habitat present and observations have been made nearby.	**Yes** AoS completed
Petrogale penicillate **Brush-tailed Rock-wallaby** **BC-E, EPBC-V**	In NSW this species occurs from the Queensland boarder down to Shoalhaven and as far west as the Warrumbungle Ranges. They habitat rocky escarpments, outcrops and cliffs. They prefer complex structures with fissures, caves and ledges. They are primarily found in North and sometimes South facing slopes. They are heavily associated with sense arboreal cover (especially fig trees). They are found on slopes near dense rainforest, wet and dry sclerophyll forest, vine ticket and open forest.	**Absent** No rocky escarpments, outcrops or cliffs in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Phascogale tapoatafa **Brush-tailed Phascogale** **BC-V**	This species is mainly found to the east of the Great Dividing Range, with occasional records to the west. They prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. They are also found in heath, swamps, rainforest and wet sclerophyll forest. They nest and take shelter in tree hollows with entrances 2.5-4cm wide.	**Absent** No open forest in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Phascolarctos cinereus ***Koala*** **BC - V** **EPBC - V**	In NSW it mainly occurs on the central and north coasts with some populations in the western region. The koala inhabits a range of eucalypt forest and woodland communities, including coastal forests, the woodlands of the tablelands and western slopes, and the riparian communities of the western plains.	**Present** Eucalypt woodland with feed tree species in study are	**4**	**Possible** Suitable habitat present.	**No** Refer to Section 6.5

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Pteropus poliocephalus **Grey-headed Flying-fox** **BC – V** **EPBC - V**	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.	**Absent** No gullies with dense vegetation in study area.	**37**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Miniopterus orianae oceanensis **Large Bent-winged Bat**	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves.	**Present** Man-made structures in study area, such as Marshalls Creek Bridge	**1**	**Unlikely** No evidence of Bat's utilising Marshalls Creek bridge for roosting	**No** Species unlikely to occur in study area
Saccolaimus flaviventris **Yellow-bellied Sheathtail-bat** **BC – V**	Roosts in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March.	**Present** Tree hollows present	**1**	**Possible** Suitable habitat present. Records available within Wagga City limits.	**Yes** AoS completed
Amphibians					
Crinia sloanei **Sloane's Froglet** **BC-V**	This species is widely distributed in the floodplains of the Murray Darling Basin. It has been found in dry sclerophyll forests (shrub/grass formation), forested wetlands (Blakely's Red Gum x Dirty Gum, River Red Gum herbaceous, River Red Gum swampy woodland wetland), freshwater wetlands, grassy woodlands (floodplain transition woodlands) and water bodies such as rivers, lakes and streams.	**Absent** River Red Gum present, however the site lacks grassy aquatic vegetation and is highly disturbed.	**0**	**Unlikely** Suitable habitat not present. Study area outside species known distribution.	**No** Species unlikely to occur in study area
Litoria booroolongensis **Booroolong frog** **BC – E** **EPBC - E**	Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing connected or isolated pools.	**Absent** Creek occurs within the proposal area, however the site lacks cobble banks and submerged rock structures.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Litoria raniformis **Growling Grass Frog, Southern Bell Frog** **BC - E** **EPBC - V**	Currently, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. During the breeding season animals are found floating amongst aquatic vegetation (especially cumbungi or Common Reeds) within or at the edge of slow-moving streams, marshes, lagoons, lakes, farm dams and rice crops. Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.	**Absent** No Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs in study area.	**0**	**Unlikely** Suitable habitat not present. Study area outside species known distribution.	**No** Species unlikely to occur in study area
Reptiles					
Aprasia parapulchella **Pink-tailed Worm-lizard, Pink-tailed Legless Lizard** **EPBC – V** **BC - V**	Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks.	**Absent** No open woodland with a native groundcover or rocky outcrops in study area.	**0**	**Unlikely** Suitable habitat not present. Study area outside species known distribution.	**No** Species unlikely to occur in study area

Species and Status	Description of habitat[4]	Presence of habitat	Bionet records	Likelihood of occurrence	Potential for impact?
Delmar impar **Striped Legless Lizard** **BC – V** **EPBC - V**	Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass Themeda australis, spear-grasses Austrostipa spp. and poa tussocks Poa spp., and occasionally wallaby grasses Austrodanthonia spp. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter.	**Absent** No open woodland with a native groundcover or surface rocks in study area.	**0**	**Unlikely** Suitable habitat not present. Study area outside species known distribution.	**No** Species unlikely to occur in study area
Hoplocephalus bitorquatus **Pale-headed Snake** **BC -V**	Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, it appears to favour habitats close to riparian areas. Shelter during the day between loose bark and tree-trunks, or in hollow trunks and limbs of dead trees.	**Present** Riparian woodland with hollows in study area.	**0**	**Unlikely** Suitable habitat present, however study area is outside species known distribution and there are no records within 10 km	**No** Species unlikely to occur in study area
Varanus rosenbergi **Rosenberg's Goanna** **BC - V**	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	**Absent** No termite mounds in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area
Invertebrates					
Synemon plana **Golden Sun Moth** **BC-E, EPBC-CE**	This species is found between Queanbeyan, Gunning, Young and Tumut. It is found in Natural Temperate Grasslands and grassy Box-Gum Woodlands only when the groundcover is dominated by wallaby grasses. These areas are typically low and open. Bare ground between tussocks is important habitat.	**Absent** No Box-Gum grassy woodland with wallaby grasses in study area.	**0**	**Unlikely** Suitable habitat not present.	**No** Species unlikely to occur in study area

E BC = listed as Endangered under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*

E EPBC = listed as Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

V BC = listed as Vulnerable under Schedule 2 of the *Biodiversity Conservation Act 2016.*

V EPBC = listed as Vulnerable under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

M EPBC = listed as Migratory under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

CE EPBC = listed as Critically Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

CAMBA = Chinese-Australia Migratory Bird Agreement

JAMBA = Japan-Australia Migratory Bird Agreement

Appendix I

Threatened species assessments of significance

Biodiversity Conservation Act FIVE–part test

Part 7.3 of the *Biodiversity Conservation Act 2016* (BC Act) specifies five factors to be taken into account in deciding whether a development is likely to significantly affect threatened species, populations or ecological communities, or their habitats, listed at the state level under the *Biodiversity Conservation Act 2016*.

This *Five-part Test* characterises the significance of likely impacts associated with the proposal on the following species:

- Birds
    - Varied Sittella (*Daphoenositta chrysoptera*) –V
    - Black Falcon (*Falco subniger*) –V
    - Little Eagle (Hieraaetus morphnoides) – V
    - Superb Parrot (*Polytelis swainsonii*) - V
    - Turquoise Parrot (*Neophema pulchella*) - V
    - Little Lorikeet (*Glossopsitta pusilla*) - V
    - Diamond Firetail (*Stagonopleura guttata*) - V
- Mammals
    - Corben's Long-eared Bat (*Nyctophilus corbeni*) – V
    - Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) – V
    - Southern Myotis (*Myotis Macropus*) – V
    - Squirrel Glider (*Petaurus norfolcensis*) - E
- Flora
    - Small Scurf-pea (*Cullen parvum*) – E

a) In the case of a threatened species, whether the proposed development is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
Birds: Varied Sittella, Black Falcon, Little Eagle, Superb Parrot, Turquoise Parrot, Little Lorikeet, Diamond Firetail
Potential habitat for Varied Sittella, Black Falcon, Little Eagle, Superb Parrot, Turquoise Parrot, Little Lorikeet, and Diamond Firetail occurs within the study area. These species were not detected during the site survey; however no targeted surveys were completed. The proposed work would require the removal of 0.27 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.34 ha of exotic vegetation and 0.16 ha of planted native vegetation. Three hollow bearing trees would be removed and fallen timber would be retained on site. While there is potential for these species to occur in the construction footprint, the proposal would impact only a small area of suitable habitat which would predominantly be used by these species for foraging. It is unlikely that the proposal would have an adverse impact on the life cycle of these species, such that a viable local population is likely to be placed at risk of extinction.
Mammals: Corben's Long-eared Bat, Yellow-bellied Sheathtail Bat, Southern Myotis, Squirrel Glider

The bats identified above are known to roost in tree hollows, crevices and under loose bark and the squirrel glider is known to roost exclusively in tree hollows. Potential habitat for these mammals occurs within the construction footprint. These species were not detected during the site survey; however no targeted surveys were completed.

The proposal would result in the removal of approximately 0.27 ha (PCT 5) of suitable roosting habitat. Three hollow bearing trees would be removed and fallen timber would be retained on site. Mitigation measures are proposed for the removal of hollow-bearing trees.

While there is potential for these species to occur in the construction footprint, the proposal would impact only a small area of suitable habitat which would predominantly be used by these species for foraging. With the implementation of mitigation measures, it is unlikely that the proposal would have an adverse impact on the life cycle of these species, such that a viable local population is likely to be placed at risk of extinction.

Flora: Small Scurf-pea

The Small Scurf-pea population is known to occur in grasslands, River Red Gum Woodland and Box-Gum Woodland. There are four key management areas for this species, none of which occur within the proposal area. This species can occur on grazed land, usually along table drains or adjacent to drainage lines or watercourses. The site survey was conducted outside the survey period for this species.

The proposed work would require the removal of 0.27 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.34 ha of exotic vegetation and 0.16 ha of planted native vegetation.

Whilst there is potential for the Small Scurf-pea to occur within the proposal area, the proposal would also only impact a small area of low-quality habitat and is considered unlikely to have an adverse impact upon the life cycle of this species such that a viable local population of the species is likely to be placed at risk of extinction.

b) In the case of an endangered ecological community, or critically endangered ecological community, whether the proposed development or activity:

- **a. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**
- **b. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Birds

Not applicable

Mammals

Not applicable

Flora

Not applicable

c) In relation to the habitat of a threatened species or ecological community:

- **i. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
- **ii. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**
- **iii. The importance of the habitat to be removed, modified, fragmented or isolated to the long–term survival of the species or ecological community in the locality.**

Birds

i. The proposed work would require the removal of 0.27 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.34 ha of exotic vegetation and 0.16 ha of planted native vegetation. Three hollow bearing trees would be removed.

ii. The proposal area and surrounding locality already contains fragmented patches of habitat due to road infrastructure and urban development. The proposal would permanently remove a small area (0.20 ha) of potential habitat. The area of habitat is unlikely to become further fragmented or isolated from other areas of habitat as a result of the proposal.

iii. Habitat within the construction footprint is low-quality and frequently disturbed. It is considered unlikely that the habitat to be disturbed is important to the long-term survival of the community in the locality.

Mammals

i. The proposal would require the permanent removal of approximately 0.27 ha (PCT 5) of suitable roosting habitat. Three hollow bearing trees would be removed.

ii. The proposal area and surrounding locality already contains fragmented patches of habitat due to road infrastructure and urban development. The proposal would permanently remove a small area (0.27 ha) of potential habitat. The area of habitat is unlikely to become further fragmented or isolated from other areas of habitat as a result of the proposal.

iii. Habitat within the construction footprint is low-quality and frequently disturbed. It is considered unlikely that the habitat to be disturbed is important to the long-term survival of the community in the locality.

Flora

i. The proposed work would require the removal of 0.27 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.34 ha of exotic vegetation and 0.16 ha of planted native vegetation.

ii. The proposal area and surrounding locality already contains fragmented patches of habitat due to road infrastructure and urban development. The proposal would permanently remove a small area (0.27 ha) of potential habitat. The area of habitat is unlikely to become further fragmented or isolated from other areas of habitat as a result of the proposal.

iii. Habitat within the construction footprint is low-quality and frequently disturbed. It is considered unlikely that the habitat to be disturbed is important to the long-term survival of the community in the locality.

d) Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).

There are no declared areas of outstanding biodiversity value within the proposal area.

e) Whether the proposed development or activity is part of a key threatening process or is likely to increase the impact of a key threatening process.

The BC Act lists numerous key threatening processes (KTP's). KTP's relevant to the proposal include the following:

- Clearing of native vegetation.
- Invasion of native plant communities by exotic perennial grasses.
- Invasion and establishment of exotic vines and scramblers.

Clearing of Native Vegetation

The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the Scientific Committee's determination, it was found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity.' Clearing can lead to direct habitat loss, habitat fragmentation and associated

genetic impacts, habitat degradation and off-site impacts such as downstream sedimentation. Disturbed native roadside vegetation would also be cleared as a result of the proposal. The proposal has the potential to increase the impact of this KTP. However, the contribution of this proposal would be relatively minor given the minimal amount of habitat to be removed and the extent of habitat that would remain in the local area.

Invasion of native plant communities by exotic perennial grasses

A number of exotic perennial grasses including Buffel Grass (*Cenchrus ciliaris*), Coolatai Grass (*Hyparrhenia hirta*), African Lovegrass (*Eragrostis curvula*), Chilean Needlegrass (*Nassella neesiana*) and Serrated Tussock (*Nassella trichotoma*) invade and may dominate native plant communities, competing with, and displacing, many native species. Dense monocultures of perennial grasses that develop after invasion threaten local vegetation at all sites that are affected. This may result in local and regional declines of many native species and communities, possibly to the extent that they become endangered.

The proposal involves disturbance that can lead to the establishment of exotic perennial grasses. During the site survey, none of the exotic perennial grasses listed were identified in the construction footprint. The proposal has the potential to introduce species into the proposal area. As part of the mitigation measures, it has been recommended that construction machinery would be cleaned prior to entering and exiting work sites, and regular targeted control of priority weeds would be undertaken to reduce the risk of weeds being introduced and spread. With the implementation of these measures, the proposal would be unlikely to increase the impact of this KTP.

Invasion and establishment of exotic vines and scramblers

A large number of exotic vines and scramblers have become established in New South Wales, which have significant adverse impacts on biodiversity. They can smother native vegetation and seedlings, and prevent recruitment, especially in riparian areas. The proposal involves disturbance that could lead to the establishment of exotic vines and scramblers. During the site survey, no exotic vines or scramblers were identified in the study area. As part of the mitigation measures, it has been recommended that construction machinery would be cleaned prior to entering and exiting work sites, and regular targeted control of weeds would be undertaken to reduce the risk of exotic vines and scramblers being introduced. With the implementation of this measure, the proposal would be unlikely to increase the impact of this KTP.

Conclusion

The impacts of the proposal on the assessed threatened species listed under the BC Act are manageable and further assessment is not required. A significant impact is considered unlikely, based on the following conclusions:

- The amount of habitat would be removed or disturbed by the proposal that is relatively small in the local context
- No fragmentation or isolation of habitat would occur
- No substantial contribution to any Key Threatening Process would be expected
- Mitigation measures have been recommended and can be implemented

EPBC Act Significant Impact Assessment

Vulnerable Species

The *Environment Protection and Biodiversity Conservation Act 1999* specifies factors to be taken into account in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. These assessments characterise the significance of likely impacts associated with the proposal on the following **Vulnerable** species:

- Birds
    - Superb Parrot (Polytelis swainsonii)
- Bats
    - Corben's Long-eared Bat (*Nyctophilus corbeni*)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
a) Will the action lead to a long-term decrease in the size of an important population of a species?
Superb Parrot
Potential foraging habitat for the Superb Parrot occurs within the study area. These species were not detected during the site survey; however no targeted surveys were completed. The proposed work would require the removal of 0.27 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.34 ha of exotic vegetation and 0.16 ha of planted native vegetation. Three hollow bearing trees would be removed and fallen timber would be retained on site. While there is potential for these species to occur in the construction footprint, the proposal would impact only a small area of suitable habitat which would predominantly be used by these species for foraging. It is unlikely that the proposal would have an adverse effect on the species such that it would lead to a long-term decrease in the size of an important population.
Corben's Long-eared Bat
Corben's Long-eared bat roosts in tree hollows, crevices and under loose bark. Potential foraging and roosting habitat for Corben's Long-eared Bat occurs within the construction footprint. This species was not detected during the site survey; however no targeted surveys were completed. The proposal would result in the removal of approximately 0.27 ha (PCT 5) of suitable roosting habitat. Three hollow bearing trees would be removed and fallen timber would be retained on site. While there is potential for these species to occur in the construction footprint, the proposal would impact only a small area of suitable habitat which would predominantly be used by these species for foraging. With the implementation of mitigation measures, it is unlikely that the proposal would have an adverse effect on the species such that it would lead to a long-term decrease in the size of an important population.
b) Will the action reduce the area of occupancy of an important species?
Superb Parrot
The removal of previously disturbed roadside habitat and other low-quality habitat could reduce the area of occupancy of this species. The proposal area is not located in a known important population of this species, these species are highly mobile, would forage over large areas, and similar habitat is widespread in the locality. In this context, the removal of a relatively small area of potential habitat as a result of the proposal is considered unlikely to reduce the area of occupancy of an important population of this species.
Corben's Long-eared Bat
The removal of disturbed roadside habitat could reduce the area of occupancy of this species. The proposal area is not located in a known important population of this species, these species are highly mobile, would forage over large areas, and similar habitat is widespread in the locality. In this context, the removal of a relatively small area of potential habitat as a result of the proposal is considered unlikely to reduce the area of occupancy of an important population of this species.
c) Will the action fragment an existing important population into two or more populations?

Superb Parrot
The proposal area and surrounding locality already contains fragmented patches of habitat due to road infrastructure and urban development. The proposal would permanently remove a small area (0.77 ha) of potential habitat. The removal of this habitat is unlikely to fragment an existing important population into two or more populations.
Corben's Long-eared Bat
The proposal area and surrounding locality already contains fragmented patches of habitat due to road infrastructure and urban development. The proposal would permanently remove a small area (0.27ha) of potential habitat. The removal of this habitat is unlikely to fragment an existing important population into two or more populations.
d) Will the action adversely affect habitat critical to the survival of a species?
Superb Parrot
The proposal area does not occur in areas of critical habitat for this species.
Corben's Long-eared Bat
The proposal area does not occur in areas of critical habitat for this species.
e) Will the action disrupt the breeding cycle of an important population?
Superb Parrot
Superb Parrots breed in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers in hollow bearing trees between September and January. The proposal would only result in the removal of foraging habitat and it is considered unlikely that the proposal would disrupt the breeding cycle of an important population of these species.
Corben's Long-eared Bat
Corben's Long-eared Bat breeds during autumn with young born in late spring to summer. No hollow-bearing trees which provide potential breeding habitat would be impacted by the proposal. The proposal area is not located in a known important population of these species. In this context, the removal of a relatively small area of potential habitat as a result of the proposal is considered unlikely to disrupt the breeding cycle of an important population of these species.
f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?
Superb Parrot
The proposed work would require the removal of 0.27 ha of native vegetation (PCT 5). The proposal would also require the disturbance of 0.34 ha of exotic vegetation and 0.16 ha of planted native vegetation. Three hollow bearing trees would also be removed. Given the current size and distribution of the population and the small area of habitat to be removed, is considered unlikely that the proposal would lead a decline in the species population.
Corben's Long-eared Bat
The proposal would require the permanent removal of approximately 0.27 ha (PCT 5) of suitable roosting and foraging habitat. Three hollow bearing trees would be removed. Given the current size and distribution of the population and the small area of habitat to be removed, is considered unlikely that the proposal would lead a decline in the species population.
g) Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?
A number of invasive flora species, including some priority weeds, have been recorded on the site. The proposal has the potential to contribute to the spread of invasive species in the proposal area through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal would

therefore be unlikely to result in invasive species that are harmful to these species becoming established in their potential habitat.

h) Will the action introduce disease that may cause the species to decline?

The proposal has the potential to contribute to the spread of invasive species in the proposal area through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds and the introduction of soil borne diseases to the site. The proposal would therefore be unlikely to result in the introduction of invasive species or diseases that are harmful becoming established in their potential habitat.

i) Will the action interfere substantially with the recovery of the species?

Superb Parrot

The National Recovery Plan for Superb Parrot lists the following specific objectives:

1. Determine population trends in the Superb Parrot
2. Increase the level of knowledge of the Superb Parrot's ecological requirements
3. Develop and implement threat abatement strategies
4. Increase community involvement in and awareness of the Superb Parrot recovery program.

The proposal would not interfere with any of these objectives.

Corben's Long-eared Bat

No recovery plan has been prepared for Corben's Long-eared Bat.

Conservation Advice by the Threatened Species Scientific Committee lists the following conservation and management actions:

- Protect known and potential habitat of key populations, including within conservation reserves, from habitat loss and fragmentation
- Provide relevant state government land management agencies, CMA/NRM regional bodies and local shires with the location of key populations under their jurisdiction to incorporate these into planning mechanisms to assist in habitat protection
- Incorporate findings of research into the impact of forestry practices into forest management to protect key populations
- Where feasible, undertake habitat renewal actions to link habitat supporting known populations or potential habitat
- Retain hollow-bearing trees and provide for hollow tree recruitment where possible
- Incorporate key population locations into the planning and decision-making process for major infrastructure projects, such as the development of new roads and pipeline routes, and extractive industries
- Implement control programmes of feral species identified as having a known or potential impact on key populations
- If grazing is assessed as posing a threat to the species, ensure relevant land owners/managers use an appropriate management regime and stock density that does not detrimentally affect this species (does not reduce foraging habitat)
- As a precautionary approach, while detailed information is being collected on the appropriate fire regimes for this species, map all areas of old growth mallee within the range of this species, and take these into consideration when planning fuel reduction burns
- Once investigations into impact of fire frequency and intensity are complete, incorporate this information into fire management plans across the species' range
- Encourage landholders on private property or leaseholders on crown land supporting key populations to minimise habitat loss and fragmentation, and enhance habitat values by participating in voluntary conservation and incentive programmes

- As a precautionary approach, while information is being collected on impacts of agrichemicals on this species, constrain the use of agrichemicals, especially in and around areas that have been identified as important populations
- Identify opportunities for community involvement in the conservation of the south-eastern long-eared bat
- More precisely assess population size, distribution, demographics, ecological requirements by targeted surveys and surveys of poorly known areas
- Design and implement a long-term monitoring programme.

The proposal would not interfere with any of these conservation and management actions.

Conclusion

The impacts of the proposal on the assessed threatened species and populations listed under the EPBC Act are considered to be manageable and further assessment is not required. A referral to the commonwealth under the EPBC Act is not required based on the impacts assessed. A significant threat is considered unlikely based on the following conclusions:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context
- No fragmentation of the habitat would occur
- No substantial contribution to any key threatening process would be expected
- Mitigation measures have been recommended and can be implemented

Appendix J

FM Act 7 part test -Natural Drainage System of the Lower Murray River Catchment (EEC)

Endangered Ecological community

Part 7A Division 12, 221ZV of the *Fisheries Management Act 1994* specifies seven factors to be taken into account in deciding whether a development is likely to significantly affect threatened species, populations or ecological communities (unless it is carried out in critical habitat)—

This seven-part test characterises the significance of likely impacts associated with the proposal on the following:

Ecological Community

- Aquatic ecological community in the natural drainage system of the Lower Murray River Catchment.
-

In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
N/A
a) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.
N/A
b) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.
Marshalls Creek is a part of the Endangered Ecological Community - Natural Drainage System of the Lower Murray River Catchment (EEC). ▪ The proposal will impact a small area of the EEC. Marshalls Creek is identified on the DPI Fisheries portal as Very Poor Freshwater Fish Community. Given the local extent in connection to the Murrumbidgee River the proposed works are not likely to have an adverse effect on the extent of the EEC such that its local occurrence is likely to be placed at risk of extinction. ▪ The works will cause a short-term disturbance to this EEC in a small area. The proposed works will not adversely modify the composition of the EEC such that its local occurrence is likely to be placed at risk of extinction.
c) In relation to the habitat of a threatened species, population or ecological community: i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.
i. A small area of Marshalls Creek will be temporarily impacted by the proposed works. This habitat to be impacted is of reasonable poor and constantly disturbed quality. Duration of the impact is expected to be around 6 months and mitigation measures will minimise this impact. These impacts will be readily reversible with no permanent impacts proposed to this habitat. ii. The proposed works would not halt water flow. Water flow will not be permanently diverted as a result of the works. Water flow will be maintained through 1:8-dimension culverts during works. Culverts will be designed in a way that encourages and maintains appropriate fish

passage. The works would only cause a temporary disturbance with no permanent interruption. Therefore, the works will not fragment or permanently isolate the habitat

iii. This Section of habitat to be impacted is very small given the local context in connection to the Murrumbidgee River. The habitat is of poor quality and will only incur short term disturbances. The habitat is not considered important to the survival of the EEC.

d) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

N/A

e) Whether the action proposed is consistent with the objectives or actions of a Recovery Plan or Threat Abatement Plan.

EEC

The recovery actions underway listed for this EEC under the NSW DPI Primefact publication 2007 are as follows:

- Allocate and manage environmental water flows in regulated rivers, to lessen the impacts of unseasonal flow and temperature patterns.
- Mitigate the impact of cold water pollution from major regulating structures.
- Prevent sedimentation and poor water quality by improving land management practices, conserving and restoring riparian vegetation and using effective erosion control measures.
- Develop and implement control programs for introduced species.
- Reinstate large woody debris where appropriate.
- Continue to assess and manage the impacts of fishing.
- Provide fish passage by removing barriers or installing fishways in consultation with affected stakeholders.

The proposed works would not interfere with these recovery actions.

f) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Degradation of native riparian vegetation along NSW water courses.

Riparian vegetation is degraded by the complete removal or modification of native plants. At a local scale riparian vegetation is frequently degraded by clearing or by activities such as gravel extraction, cropping, livestock grazing and trampling. Riparian vegetation is vegetation on land that adjoins, directly influences or is influenced by, a body of water.

The proposal involves the removal of approximately 0.43ha of native vegetation (including 0.16 ha of planted native vegetation). The proposal has the potential to increase the impact of this KTP. However, the contribution of this proposal would be relatively minor given the minimal amount of habitat to be removed, the degraded and low quality nature of the riparian habitat and the extent of habitat that would remain in the local area.

Appendix K

Consultation

11 Term and references

Term/ Acronym	Description
AHIMS	Aboriginal Heritage Information Management Systems
BC Act	*Biodiversity Conservation Act 2016* (NSW).
BCD	Biodiversity Conservation Division
CEMP	Construction environmental management plan
EIA	Environmental impact assessment
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Ground Dependent Ecosystems
Heritage Act	*Heritage Act 1977* (NSW)
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	NSW Interim Construction Noise Guideline (2009)
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.
LLS	Local Land Services
MNES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
NML	Noise Management Level
NPI	the NSW Noise Policy for Industry (2017)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
OEH	Office of Environmental and Heritage (now BCD)
OOHW	Out of hours work
PACHCI	Procedure for Aboriginal cultural heritage consultations and investigation
PCT	Plant Community Type
RBL	Rating Background Level
RMS	NSW Roads and Maritime Services, now known as Transport for NSW
RWCC	Riverina Water County Council
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
TEC	Threatened Ecological Community

Term/ Acronym	Description
Transport	Transport for New South Wales
QA Specifications	Specifications developed by Transport for NSW for use with road work and bridge work contracts let by Transport for NSW.
WWCC	Wagga Wagga City Council