

Appendix H

NSW biodiversity assessment



Biodiversity Assessment

Barham Bridge – Truss and Victorian Approach Span Restoration

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ACRONYMS AND ABBREVIATIONS

ASL	Above sea level
AWS	Automatic weather station
BOM	Australian Bureau of Meteorology
CEMP	Construction environmental management plan
Cwth	Commonwealth
DP&I	(NSW) Department of Planning and Infrastructure
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EIA	Environmental impact assessment
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999 (Cwth)
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
ESD	Ecologically Sustainable Development
FM Act	Fisheries Management Act 1994 (NSW)
ha	hectares
ISEPP	State Environmental Planning Policy (Infrastructure) 2007 (NSW)
KFH	Key Fish Habitat
km	kilometres
LEP	Local Environment Plan
m	Metres
Noxious Weeds Act	Noxious Weeds Act 1993 (NSW)
NPW Act	National Parks And Wildlife Act 1974 (NSW)
NSW	New South Wales
NV Act	Native Vegetation Act 2003 (NSW)
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
REP	Regional Environmental Plan
SEPP	State Environmental Planning Policy (NSW)

SEWPAC	(Cwth) Department of Sustainability, Environment, Water, Population and Communities
SIS	Species Impact Statement
sp/spp	Species/multiple species
TSC Act	Threatened Species Conservation Act 1995 (NSW)
Vic	Victoria

EXECUTIVE SUMMARY

NSW Roads and Maritime Services propose to replace the Victorian abutment and approach span, including all trusses, and repaint the lift span and towers of the Barham/Koondrook Bridge over the Murray River in southern NSW. The proposal would also require the installation of a temporary crane pad, the location of which is yet to be determined.

The work forms stages three, four and five of the Barham/Koorndrook Bridge Rehabilitation Project, with stages one and two already completed.

This Biodiversity Assessment has been prepared by NGH Environmental on behalf of NSW Roads and Maritime Services (Roads and Maritime).

Background database searches, and a review of previous studies conducted in the study area, identified the potential presence of a number of threatened species and endangered ecological communities (EEC). Of these, only the vulnerable microchiropteran bat species, the Southern Myotis (*Myotis macropus*), and the *Aquatic Ecological Community in the Natural Drainage System of the Lower Murray River Catchment* EEC (Lower Murray River EEC) were identified as likely to be present in the proposal area. The aquatic environments of the Murray River contain potential habitat for a number of threatened fish occurring in the locality. These species are known to occur in the Murray River where they use snags for refuge and foraging and may use the river bed for spawning. These habitats are generally widespread and not confined to the proposal site.

Terrestrial and aquatic flora and fauna field surveys in the study area were undertaken on 4 and 5 February 2015, including targeted searches for threatened flora and fauna species. The field surveys confirmed the presence of the Southern Myotis and the Lower Murray River EEC. No further threatened flora or fauna were identified. No direct evidence of bats using the bridge for roosting was found.

The vegetation within the proposal area was found to be River Red Gum woodland. The understorey of this community was found to be highly degraded and consists mostly of weeds. The vegetation was classified under the Victorian Habitat Hectares assessment scheme. Under this scheme, the vegetation is classified as Riverine Grassy Woodland EVC, and the proposed clearing represents 0.024 habitat hectares.

A survey of instream habitats found that they were highly degraded and unlikely to provide specific life-cycle resources for any threatened fish species. No fringing or instream vegetation is present within the proposal areas. Snags are present both up and downstream.

The vegetation along the river bank forms part of a corridor of vegetation connecting Campbells Island State Forest to the north-west and the Koondrook-Pericoota Forest to the south east. The section of this connectivity which falls within the proposal area is narrow. Mobile native fauna species, such as birds, ground and arboreal mammals including the Sugar Glider, could utilise this corridor for movement.

The proposal would have the following general impact on flora and fauna:

- Clearing 0.1 hectares of River Red Gum woodland
- Clearing of an additional 0.1 hectares of River Red Gum woodland if a crane pad is required on the bank of the river
- Minor fragmentation of the vegetated corridor along the river
- Removal of one hollow bearing tree
- Removal of potential bat habitat from the bridge
- Disturbance to an existing noxious weed, and the potential of spreading weeds

- Disturbance to the bed of the river
- Sedimentation of the river from pile driving and other in-stream activities
- Partial blockage of the river through the use of coffer dams and/or instream rock platform
- Potential for pollution of water from spills and leaks of oil or fuel from plant and equipment.

Assessments of significance were undertaken for microchiropteran bat species which were considered to have the potential to utilise the habitats within the proposal area, and for the Lower Murray River EEC. The assessments of significance concluded that a Species Impact Statement is not required, given that:

- The extent of habitats which would be impacted is very small
- The quality of the habitats which would be impacted is generally poor
- The proposal is not likely to significantly affect connectivity or increase fragmentation or isolation of habitat such that any species' life cycle would be affected.

Overall, the impact on flora and fauna from the proposal are considered to be minor and would not lead to any substantial decline or disturbance to native flora and fauna or their habitats.

The benefits of undertaking the work are considered to outweigh the low ecological risk associated with the work. The implementation of mitigation measures would minimise the risk of any ecological impact.

1 INTRODUCTION AND BACKGROUND

1.1 SCOPE OF THE REPORT

This Biodiversity Assessment has been prepared by NGH Environmental on behalf of NSW Roads and Maritime Services (Roads and Maritime).

This Biodiversity Assessment assesses the potential ecological impact of the proposed rehabilitation of the Barham Bridge. It describes the ecological features and biodiversity values of the study area and the direct and indirect impact of the proposal. Specifically, this report assesses potential impact on threatened species, populations and ecological communities listed under the *Threatened Species Conservation Act 1995* (TSC Act), *Fisheries Management Act 1994* (FM Act), and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in accordance with the EP&A Act. For the purposes of this work, Roads and Maritime is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The scope and aims of this report are to:

- Describe the ecological features of the study area including any threatened flora or fauna
- Assess the likely impact of the construction and operation of the proposal on the natural ecosystems.
- Consider the scale and duration of any impact on biodiversity within the local and/or regional area in terms of the principles of ecologically sustainable development
- Address the requirements of the relevant legislation including the EP&A Act, the TSC Act, the FM Act and the EPBC Act
- Recommend mitigation measures to avoid, reduce or mitigate any identified impact.

1.2 DESCRIPTION OF THE PROPOSAL

Roads and Maritime propose to replace the Victorian abutment and approach span, replace all trusses, and repaint the lift span and towers of the Barham/Koondrook Bridge over the Murray River in southern NSW. The work forms stages three, four and five of the Barham/Koondrook Bridge Rehabilitation Project, with stages one and two already completed.

The proposed work would include:

- Establishing a site compound on the Victorian side upstream of the bridge in an open area away from the trees. The compound would be about 15 metres wide by 50 metres long
- Establishing other ancillary sites for the storage of materials removed from the bridge, new materials for the rehabilitation work, storage of the temporary bridge components, work area to assemble new bridge trusses, work area to remove lead paint from removable bridge components
- Maintaining the NSW side site office and compound
- Constructing access ramps to pier four (the pier closest to Victoria). The ramps would be on both upstream and downstream sides of the bridge within 10 metres of the bridge abutment. This is similar to what has been completed on the NSW side

- Installing a sheet piling cofferdam instream around pier four and the abutment on the Victorian side. The extent of the work would be similar to what has been completed on the NSW side
- The use of cranes to lift the bridge trusses may need: the construction of crane pads close to the river bank on both sides of the river; the construction of temporary rock platforms in the river; or the use of a barge floating on the river
- Removing trees affected by the work
- Replacing the piles and pier of pier four. The timber piles would be replaced with concrete piles and concrete pile caps. The timber pier would be replaced with timber. This work would be similar to what has been completed on the NSW side
- Constructing a new concrete Victorian abutment about three metres behind the existing timber abutment. This would provide a spill through abutment
- Replacing the Victorian timber approach span, also known as span five, with a steel and concrete composite deck structure
- Replace timber traffic barriers with steel traffic barriers on all spans except for the lift span
- Reconstructing the approach roads to suit new abutment location and height
- Installing scour protection of the Victorian river bank both upstream and downstream of the existing bridge
- Rebuilding and strengthening the two De Burgh timber truss spans over the river, being spans two and four. Where timber replacement is needed this would be done in a like for like manner. Cast iron tension rods would be replaced with steel tension rods with a bigger diameter
- Replacing timber decking and sheeting with a stress laminated timber deck. The deck would be surfaced with asphalt or spray seal
- Replacing corroded webbing in both the iron pylons under the lift span
- Upgrading and replacing the removable mechanical components of the lift span, including the sheaves and shafts
- Removing existing lead paint by grit blasting and repainting of lift span towers. This lead paint work would involve scaffold and containment to prevent lead exposure to the environment
- Constructing a temporary bridge upstream of the existing bridge. The temporary bridge would be about one metre away from the bridge on the NSW bank and about 18 metres from the bridge on the Victorian bank.
- The temporary bridge would be removed once restoration of the Barham-Koondrook Bridge has been completed
- Carrying out any required landscaping and tree planting
- Building of a pedestrian boardwalk underneath the bridge on the NSW side of the river in consultation with Wakool Shire Council
- Restoration of parks and reserves near the Barham-Koondrook Bridge in consultation with Wakool and Gannawarra Councils.

The work would require up to 15 days of bridge closures over about two years. It is preferred to build a temporary bridge to provide an alternative route while the existing bridge is being restored. The preferred temporary bridge location is between 1 metre and 18 metres upstream of the existing bridge. It would be about 110 metres long with a single lane and a pedestrian footway. It would be constructed with concrete abutments and two piers in the river.

Construction of the temporary bridge would be carried out from a barge, rock platform or from the banks of the river. Minor roadwork would be required to realign the existing road network to the temporary bridge.

The temporary bridge would be removed once the Barham/Koondrook Bridge is reopened to traffic. Instream piers would be removed at bed level. Disturbed banks would be rehabilitated.

1.2.1 Site establishment

- Pre-construction identification and marking of sensitive areas as identified in this REF, the Construction Environmental Management Plan (CEMP) and relevant sub-plans
- Installation of environmental controls
- Installation of erosion and sedimentation controls
- Relocation of utilities
- Establishment of site boundaries (for example installation of security fencing)
- Construction of temporary access tracks and haulage roads within the construction footprint
- Installation of traffic controls or detour across temporary bridge
- Clearing and grubbing of vegetation
- Stripping, stockpiling and management of topsoil
- Drainage work (longitudinal and transverse)
- Temporary stockpiling

1.2.2 Temporary bridge

- A temporary bridge would be constructed about one metre upstream of the bridge on the NSW side of the river and about 18 metres upstream of the bridge on the Victorian side. The bridge would be about 119 metres long with an overall deck width of about 4.2 metres. The temporary bridge would consist of three spans, each about 40 metres long, with two piers. The piers in the river channel would generally align with the piers of the existing bridge. There would be a minimal vertical clearance of about four metres for navigational purposes.
- Construction of temporary bridge would include the following:
 - Remove electrical wires and two power poles in Murray Street
 - Protect underground services and survey stations
 - Remove red gum river walk statues and other items from the reserve along Murray Parade in Koondrook. Temporarily store or place items in another public space
 - Construct temporary approach roads to access the temporary bridge from Grigg Road in Koondrook and Thule Street in Barham. This would also involve constructing three temporary intersections at: Dalton Street and Grigg Road in Koondrook; Murray Parade and Grigg Road in Koondrook; and Murray Street and Thule Street in Barham
 - Store temporary bridge components in the Victorian compound on the upstream side of the temporary bridge approach road
 - Provide a platform for piling equipment. This platform would be either a temporary rock platform in the river; a barge if there is enough water at the time; or another form of temporary structure such as a pontoon or jetty
 - Install piles for abutments and piers
 - Install abutments and piers
 - Construct temporary bridge segments on the temporary Victorian approach road

- Launch the temporary bridge spans over the Victorian abutment and piers to the NSW Bank
- Install temporary line marking and road furniture
- Detour traffic from the existing bridge to the temporary bridge.

1.2.3 Removal of temporary bridge

- Remove temporary bridge by either:
 - De-launching: spans would be rolled off the piers one at a time. Each span would then be dis-assembled on the ground on the bridge approach road
 - Crane lift: temporary bridge would be separated into parts that can be lifted off by crane. The parts would then be dis-assembled on the ground on the bridge approach road.
- Remove the steel framed piers within the river that sit between piles and deck are from concrete piers by either:
 - Crane on ground
 - Crane on barge.
- Cut off concrete piles at river bed level using either:
 - A coffer dam to provide a dry area for access to the river bed
 - If the temporary bridge was constructed using a temporary rock platform in the river, this platform would be used for removal activities
 - A temporary platform structure, either floating or fixed, along with a diver working in the river to cut the piles.
- Remove concrete abutments by using one or a combination of the following methods: cutting, breaking up, and lifting out precast sections
- Remove temporary bridge access approach roads and intersection adjustments.

1.2.4 Barham-Koondrook Bridge

- Construction of truss spans two and four
 - Assemble whole new NSW truss span (span two) including stress laminated timber deck, cross girders, bottom chord, struts, top chord, traffic barrier, in the NSW site compound in Parkman Avenue
 - Assemble whole new Victorian truss span (span four) including stress laminated timber deck, cross girders, bottom chord, struts, top chord, traffic barrier, in the Victorian site compound on Grigg Road.
- Pier four and abutment B replacement
 - Build two access ramps to pier four. The ramps would be within 10 metres of the bridge, one upstream and the other downstream
 - Install cofferdam around pier four
 - Install pier four and abutment B piles
 - Build pier four pile caps
 - Install temporary steel support frame at pier four on pile caps
 - Jack spans four and five up off old pier four. A gap of about 10 millimetres is needed.
 - Transfer spans four and five using cranes onto temporary steel support frames (see "replacement of truss spans two and four" below)
 - Remove old pier four timber
 - Build pier four sill beam.
- Replacement of truss spans two and four

- The following options for the replacement of truss spans two and four have been considered. The preferred method would depend on the river level at the time and further design refinement.

Crane on ground option

- Set up large crane along NSW river bank
- Lift off the old span two truss
- Lift on new span two truss
- Relocate large crane to the Victorian river bank
- Lift off old span five (Victorian approach span)
- Lift off old truss span four
- Remove old abutment B with an excavator
- Lift in new precast abutment B
- Lift in new pier four timber
- Lift on new span four truss
- Lift on new span five (Victorian approach span)
- Lift in new precast approach span slab
- Remove temporary steel support frame.

Crane on rock platform option

- Build rock platform in the river
- Set up large crane on rock platform
- Lift off the old span two truss
- Lift on new span two truss
- Lift off old span five (Victorian approach span)
- Lift off old truss span four
- Remove old abutment B with an excavator (see details in "Pier four and abutment B replacement" above)
- Lift in new precast abutment B
- Lift in new pier four timber
- Lift on new span four truss
- Lift on new span five (Victorian approach span)
- Lift in new precast approach span slab
- Remove temporary steel support frame.

Crane on barge in the river option

- Set up large crane on a barge in the river
- Lift off the old span two truss
- Lift on new span two truss
- Lift off old span five (Victorian approach span)
- Lift off old truss span four
- Remove old abutment B with an excavator
- Lift in new precast abutment B
- Lift in new pier four timber
- Lift on new span four truss
- Lift on new span five (Victorian approach span)
- Lift in new precast approach span slab

- Remove temporary steel support frame.

Using a rail system along bridge trusses

- Set up a piling machine on Span 2 and Span 4
- Drive piles approximately in lines 6.5m each side of centreline of Span 2 and Span 4 into river bed
- Place concrete pads on bank in line with each row of piles
- Set up Jack and Skate equipment on piles and pads
- Lift off the old span two truss
- Lift on new span two truss
- Lift off old span five (Victorian approach span)
- Lift off old truss span four
- Remove old abutment B with an excavator
- Lift in new precast abutment B
- Lift in new pier four timber
- Lift on new span four truss
- Lift on new span five (Victorian approach span)
- Lift in new precast approach span slab
- Remove temporary steel support frame.

1.2.5 Lift span restoration

- Establish lift span painting site by installing scaffolding
- Remove all mechanical parts that are able to be removed
- Remove lead-based paint from the lift span and lift span superstructure by either:
 - Grit blasting
 - Off-site blasting and painting of lift span superstructure.
- Re-paint the lift span and lift span superstructure
- Rebalance the lift span and re-install turnbuckles on counter-weight ropes
- The upgrade of the moving span operation and new equipment would be done in accordance with AASHTO LRFD Movable Highway Bridge Design Specifications.

1.2.6 Ancillary project work

- Seal bridge decking
- Line marking and installation of road furniture
- Carry out any required landscaping and tree planting
- Build pedestrian boardwalk underneath the bridge on the NSW side of the river in consultation with Wakool Shire Council
- Reinstate red gum river walk statues and any other items along the river in Koondrook
- Restore parks near the Barham-Koondrook bridge in consultation with Wakool and Gannawarra Councils.

1.2.7 Site disestablishment

- Removal of site environmental controls
- Removal of compound, stockpile and ancillary sites
- Removal of erosion and sedimentation controls

- Removal of traffic control.

1.2.8 *Definitions of the study site*

For the purpose of this report the following definitions apply (Figure 1-1):

Proposal site - the footprint of the proposed work, including the temporary bridge and ancillary facilities.

Proposal area – land within 50m of the proposal site.

Study area – land within 10km of the proposal area.

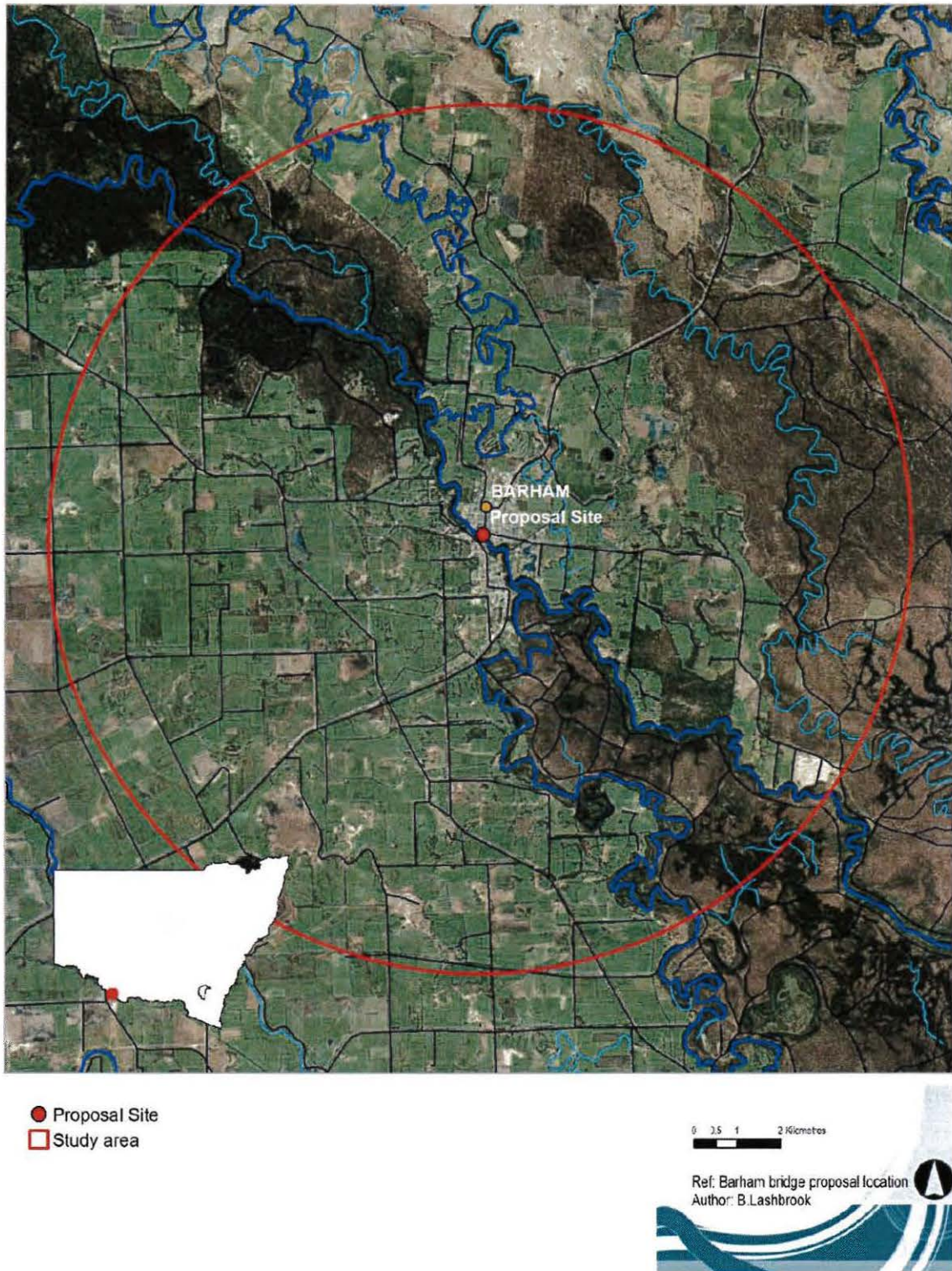


Figure 1-1 Location of the Proposal

2 STATUTORY CONSIDERATIONS

2.1 NSW ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979 (EP&A ACT)

The *Environmental Planning and Assessment Act 1979 (EP&A Act)* provides the framework for the assessment of development in NSW. Roads and Maritime projects are assessed and approved or determined under the following regimes:

- Part 5 applies to the majority of Roads and Maritime road projects. Usually a review of environmental factors (REF) is prepared to assess the environmental impact of a project prior to commencing the work
- Part 5.1 applies to State significant infrastructure. These major projects require approval from the Minister for Planning and Infrastructure. An environmental impact statement is prepared in accordance with the requirements of the Director-General of the Department of Planning and Infrastructure
- Part 4 applies to projects that require development consent from a consent authority (usually a local council). A statement of environmental effects or environmental impact statement (for designated development) is prepared to assess environmental impact
- Division 4.1 of Part 4 applies to State significant development. These major projects require approval from the Minister for Planning and Infrastructure. An environmental impact statement is prepared in accordance with the requirements of the Director-General of the Department of Planning and Infrastructure.

Clause 5A and 5C of the EP&A Act requires that the significance of the impact of the proposal on terrestrial and aquatic threatened species, populations and endangered ecological communities is assessed as follows:

- Part 5.1 – the proponent must demonstrate the proposal would improve or maintain biodiversity outcomes. Threatened species assessment guidelines have been developed to assist in making this assessment. Assessment of biodiversity issues is to be in accordance with the requirements of the Director-General of the Department of Planning and Infrastructure
- Part 5 (and Part 4 where relevant) – a seven-part test is prepared in accordance with Clause 5A(2).

The proposal is being assessed under Part 5 of the EP&A Act and this Biodiversity Assessment forms part of the REF.

2.2 NSW THREATENED SPECIES CONSERVATION ACT 1995

2.2.1 *Significance of impact*

The *Threatened Species Conservation Act 1995 (TSC Act)* aims to conserve and protect certain classes of threatened, endangered and vulnerable species, populations and ecological communities.

Section 5A of the EP&A Act lists a number of factors to be taken into account when deciding if there is the likelihood of a significant impact on threatened species, populations and their habitat or on ecological communities. If there is a chance of an impact, then an Assessment of Significance would be required to determine the significance of the impact.

Where a significant impact is likely to occur a species impact statement must be prepared for projects assessed under Part 5 of the EP&A Act. The content of a species impact statement is outlined in Sections 110 – 112 of the TSC Act and includes requesting Director-General's requirements.

Clause 50 requires public authorities to have regard to critical habitat when exercising their functions on land to which a critical habitat declaration applies.

2.3 NSW FISHERIES MANAGEMENT (FM) ACT 1994

The provisions of the *Fisheries Management Act 1994* (FM Act) relating to the development approval process operate similarly to the above TSC Act. The FM Act identifies threatened aquatic species, populations and ecological communities and requires an identical test of significance. Significant impact triggers the need for a species impact statement for Part 5 projects.

The FM Act works in conjunction with the EP&A Act. If the following activities form part of a proposal, a permit from DPI under the FM Act is required:

- Aquaculture
- Harm marine vegetation (mangrove, seagrass, seaweed)
- Dredging or reclamation of waterways, including removal of snags or aquatic vegetation (28 days notification) (sections 198 and 199)
- Temporary or permanent blockage of fish passage requires a permit under section 219.

The proposal would require the installation of at least one cofferdam and may also require the installation of a rock platform. As this is considered dredging or reclamation of waterways Roads and Maritime are required to notify DPI Fisheries of the proposed work.

2.4 NOXIOUS WEEDS ACT 1993

The *Noxious Weeds Act 1993* (NW Act) establishes control mechanisms to reduce the negative impact of weeds on the economy, community and environment. Under Section 13 of the NW Act, Roads and Maritime, as a public authority, is required to control noxious weeds on land that it owns and prevent noxious weeds from spreading to adjoining properties.

One noxious weed species (Bridal Creeper *Asparagus asparagoides*) (Class 4) was found to occur within the proposal site. Class 4 weeds are locally controlled weeds that pose a threat to primary production, the environment or human health.

2.5 VICTORIAN CATCHMENT AND LAND PROTECTIONS ACT 1994

Under this Act, species of plants and animals can be declared as noxious weeds and pest animals.

One noxious weed, Bridal Creeper *Asparagus asparagoides*, was identified at the proposal site. This species is considered a Restricted Species. Trade in these weeds and their propagules, either as plants, seeds or contaminants in other materials is prohibited.

2.6 NSW NATIONAL PARKS AND WILDLIFE (NPW) ACT 1974

This Act aims to conserve nature, habitat, ecosystems, ecosystem processes and biological diversity at the community, species and genetic levels. Under this Act all native fauna is protected,

threatened or otherwise. Schedule 13 of the Act lists protected plants which shall not be harmed or picked on any land either on or off National Park estate.

With regard to threatened species a person must not:

- Harm any animal that is of, or is part of, a threatened species, an endangered population or an endangered ecological community
- Use any substance, animal, firearm, explosive, net, trap, hunting device or instrument or means whatever for the purpose of harming any such animal.

2.7 STATE ENVIRONMENTAL PLANNING POLICY NO. 44 – KOALA HABITAT PROTECTION

The *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44) encourages the conservation and management of natural vegetation areas that provide habitat for Koalas to ensure that permanent free living populations would be maintained over their present range.

The SEPP 44 aims to identify areas of potential and core Koala Habitat. These are described as follows:

- Core Koala Habitat is defined as an area of land with a resident population of Koalas, evidenced by attributes such as breeding females, and recent and historical records of a population
- Potential Koala Habitat is defined as areas of native vegetation where the trees listed in Schedule 2 of SEPP 44 constitute at least 15 per cent of the total number of trees in the upper or lower strata of the tree component.

SEPP 44 does not apply to proposals assessed under Part 5 of the EP&A Act, although it is the practice of Roads and Maritime to consider the objectives of SEPP 44.

Potential Koala habitat is considered to occur in areas of native vegetation where feed trees species (listed under Schedule 2 of SEPP 44) comprise at least 15 per cent of the total tree canopy. If land is potential Koala habitat then further investigations are required to determine if core Koala habitat is present.

The Koala has been recorded within 10 kilometres of the proposal site, including within the Kondrook- Pericoota State Forest several kilometres away. The riparian vegetation along the Murray River next to the proposal site provides potential Core Koala Habitat, and is contiguous with the Koondrook-Pericoota State Forest. Koala feed tree species, namely River Red Gum (*Eucalyptus camaldulensis*) were identified on site.

2.8 NSW WATER MANAGEMENT ACT 2000

The objects of this Act are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. Those objects relating to biodiversity in particular are:

- To protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality
- To integrate the management of water sources with the management of other aspects of the environment, including the land, its soil, its native vegetation and its native fauna
- To encourage best practice in the management and use of water.

These have been considered in the preparation of this assessment and mitigation measures.

2.9 ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION (EPBC) ACT 1999 (COMMONWEALTH)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance. Matters of national environmental significance relevant to biodiversity are:

- Wetlands of international importance
- Nationally listed threatened species and ecological communities
- Listed migratory species
- Commonwealth marine areas.

Significance of impact is determined in accordance with the Significance impact guidelines 1.1 – matters of national environmental significance (Department of Environment, Water, Heritage and the Arts, 2006).

Where a proposal is likely to have a significant impact on a matter of national environmental significance, the proposal is referred to the Commonwealth Minister for the Environment. The referral process involves a decision on whether or not the proposal is a 'controlled action'. When a proposal is declared a controlled action, approval from the Commonwealth Minister for the Environment is required.

2.10 VICTORIA FLORA AND FAUNA GUARANTEE ACT 1988

The purpose of the *Victorian Flora and Fauna Guarantee Act 1988* (FFG Act) is to establish a legal and administrative structure to enable and promote the conservation of Victoria's native flora and fauna and to provide for a choice of procedures which can be used for the conservation, management or control of flora and fauna and the management of potentially threatening processes.

The flora and fauna conservation and management objectives are:

- To guarantee that all taxa of Victoria's flora and fauna other than the taxa listed in the Excluded List can survive, flourish and retain their potential for evolutionary development in the wild
- To conserve Victoria's communities of flora and fauna
- To manage potentially threatening processes
- To ensure that any use of flora or fauna by humans is sustainable
- To ensure that the genetic diversity of flora and fauna is maintained
- To provide programs:
 - Of community education in the conservation of flora and fauna
 - To encourage co-operative management of flora and fauna through, amongst other things, the entering into of land management co-operative agreements under the Conservation, Forests and Lands Act 1987
 - Of assisting and giving incentives to people, including landholders, to enable flora and fauna to be conserved.
- To encourage the conserving of flora and fauna through co-operative community endeavours.

The FFG Act requires that a public authority must be administered to have regard to the flora and fauna conservation and management objectives.

2.11 GANNAWARRA PLANNING SCHEME

The purpose of the Gannawarra Planning Scheme is:

- To provide a clear and consistent framework within which decisions about the use and development of land can be made
- To express state, regional, local and community expectations for areas and land uses
- To provide for the implementation of State, regional and local policies affecting land use and development.

Clause 52.17 of the Gannawarra Planning Scheme relates to the protection of native vegetation. The purpose of this clause is:

- To ensure permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity. This is achieved through the following approach:
 - Avoid the removal of native vegetation that makes a significant contribution to Victoria's biodiversity
 - Minimise the impact on Victoria's biodiversity from the removal of native vegetation
 - Where native vegetation is permitted to be removed, ensure that an offset is provided in a manner that makes a contribution to Victoria's biodiversity that is equivalent to the contribution made by the native vegetation to be removed.
- To manage native vegetation to minimise land and water degradation
- To manage native vegetation near buildings to reduce the threat to life and property from bushfire.

A Gannawarra Shire Council planning permit to remove, prune or destroy native vegetation would be required to remove and prune native vegetation for the temporary bridge construction and for crane operation clearance.

3 METHODOLOGY

3.1 DATABASE SEARCHES AND LITERATURE REVIEW

Previous studies conducted within the region and relevant databases were reviewed to identify the diversity of flora and fauna potentially occurring in the study area. The literature review also ensures that climatic and seasonal variations are considered when analysing the results of the field surveys. Database searches were undertaken in January 2015 (

Table 3-1, Appendix B).

Table 3-1: Database searches undertaken

Resource	Target	Search Area
OEH Wildlife Atlas Data	Threatened flora, fauna and populations	Study area
OEH Threatened species profile search	Threatened flora, fauna and populations	Murray Fans Inland Floodplain Woodlands
EPBC Act Protected Matters Search	Threatened flora and fauna, endangered populations and ecological communities and migratory species.	Study area
DPI Noxious weeds database	Noxious weeds declared for Barham LGA.	Wakool LGA
DPI Fisheries records viewer	Threatened fish species recorded within the Wakool LGA.	Wakool LGA
OEH Vegetation Information System	Vegetation descriptions	Study area
Victorian Biodiversity Atlas	Threatened flora, fauna and populations	Study Area

Further literature relevant to this assessment which was also reviewed includes:

- Existing information on protected and threatened flora and fauna species, populations, EEC's, and their habitats as defined by the TSC Act and EPBC Act that occur or are likely to occur
- Topographic maps and aerial photographs to locate sensitive sites in proximity to the proposal site. The results of the database searches were also used to determine the location of any such sites
- The Bioregions of New South Wales, their biodiversity, conservation and history (NSW 2003)
- OEH Threatened Species Profiles
- Rare or Threatened Australian Plants list (CSIRO)
- Commonwealth Department of the Environment EPBC Act Species Profiles and Threats Database (SPRAT).

The biodiversity assessment contained in the Minor Work REF completed in 2011 (NGH Environmental 2011) for work to the NSW side of the bridge was also reviewed as part of the background research.

3.2 FIELD SURVEY

Field surveys were undertaken on 4 and 5 February 2015. Weather conditions at Kerang (20 kilometres south west of Barham) before, during and after the field survey are shown in

Table 3-2.

Table 3-2: Weather conditions during the field surveys

Survey Date	Minimum temp	Maximum temp	Rainfall (mm)
4 th February 2015	13 °C	27.5 °C	0.0 mm
5 th February 2015	12.6 °C	33.8 °C	0.0 mm

(Source: BOM, 2015)

3.2.1 Flora

The aims of the flora surveys were to:

- Identify threatened species with the potential to occur in the study area
- Locate and describe any suitable habitat for threatened flora species.
- Determine the nature, extent and condition of vegetation communities present within the study area, with reference to the OEH Biometric Vegetation Types Database
- Locate and describe any Endangered Ecological Communities (EECs) (TSC Act and EPBC Act) and determine their extent
- Identify areas of high weed infestation.

A vegetation survey was undertaken on the 5 February 2015. At the time of the survey, the preferred temporary bridge option was not yet known. Therefore, surveys were conducted within the proposal area and within an area 400 m up and downstream of the bridge. The "random meander" method as documented by Cropper (1993) was used to conduct the flora surveys. This method provides a comprehensive account of the number and variety of species within defined vegetation types, and improves opportunities for detecting significant or sparsely distributed plant species. Particular attention was paid to areas containing intact native vegetation on the river banks as these areas were considered most likely to provide habitat for threatened species. The survey was conducted by two NGH Environmental ecologists for a period of eight hours (16 person hours).

Plant and vegetation community nomenclature

The reference list provides the names of field guides and standard texts used during the survey and for species identification (Appendix D.2.2). Botanical nomenclature follows Harden (1990-2002), with recent name changes provided by the Australian Plant Name Index of the Australian National Herbarium. In the body of this report, flora species are referred to by both their common and scientific names when first mentioned. Subsequent references to these species cite the common name only. Where a species does not have a generally accepted common name, the scientific name is used throughout. Common and scientific names are included in the appendices.

3.2.2 Fauna

The aims of the fauna survey was to:

- Identify the location, extent and condition of fauna habitat including important features for threatened species, such as hollow-bearing trees, wildlife corridors, and feeding resources for Koalas
- Record opportunistic sightings of, or signs of the presence of terrestrial and aquatic fauna.
- Record aquatic resources, including habitats within the Murray River and on the floodplain.

A review of the fauna field surveys conducted in October 2009 at the proposal site identified two key fauna groups likely to be present at the site:

- Bats
- Woodland birds.

Surveys for the current study were therefore designed to focus on these fauna groups, as well as in-stream habitats for aquatic fauna. The survey was completed on 4 and 5 February 2015 and involved the below survey methods.

Habitat Assessment

An assessment of the availability, quality and suitability of habitat types for threatened species was conducted across the site in accordance with the OEH Threatened Species Survey and Assessment Guidelines. Factors such as arboreal resources, ground-layer resources, vegetation structure, connectivity and disturbance were noted. As part of the habitat assessment, any hollow-bearing trees (HBT) identified on site were recorded and described. Waypoints were taken at each of the HBTs identified.

Incidental sightings of fauna and their traces (e.g. scats, tracks, scratches) were recorded.

All species of birds observed during the diurnal fauna assessment were recorded (Appendix A).

Koala Surveys

An assessment of the presence of potential or core Koala habitat was undertaken pursuant to SEPP 44, taking into account feed tree densities and evidence of the presence of Koalas including scats and scratches. River Red Gum (*Eucalyptus camaldulensis*), a primary feed tree listed on Schedule 2 of SEPP 44, occurs in the proposal area. This is found predominantly along the river banks.

Searches for Koalas were undertaken in trees adjacent to the river. Searches were also conducted for Koala scats at the base of these trees and for scratch marks on tree trunks and branches.

Bat Surveys

Direct searches for bats were conducted within River Red Gum habitats and by searching underneath the southern abutment for evidence of scat deposits (guano), insect and bat remains.

Roost watches were undertaken on the the southern side of Barham Bridge near the proposed temporary crossing in an attempt to identify possible roosting areas and key exit points along the bridge structure.

The echolocation calls of microchiropteran bats were recorded using one ultrasonic detector (Anabat II and CF Storage ZCAIM and Anabat SD1 detector) over two nights (4th and 5th February 2015). Particular emphasis was placed on the underside of the bridge directly underneath the southern abutment.

Microchiropteran Bat survey effort conducted at the bridge to date:

7th & 8th October 2009 – 2 nights on the NSW abutment. Direct searches, Roost Watches at dusk for bridge and in nearby trees, active anabat recording. *Myotis macropus* was recorded but not observed roosting or emerging from the bridge.

4th & 5th February 2015 – 2 nights on the Victorian abutment. Direct searches, roost watches at dusk and active anabat recordings.

Based on surveys conducted to date, it is considered unlikely that the bridge is being used by *Myotis macropus* for maternity purposes. Given the extent of other suitable habitat (hollow trees) in the area, we consider any potential impacts on *Myotis* to be minor.

3.3 LIMITATIONS

Several constraints and limitations to the current study were encountered including:

- Vegetation surveys undertaken in February 2015 are unlikely to give a comprehensive picture of the flora at the site. In particular, many native grasses and ground covers are difficult to identify during this period of the year
- Surveys were conducted over brief periods of time to obtain an indicative assessment of the proposal area. Survey results may vary during different seasons and if conducted over longer periods of time
- Anabat surveys were undertaken however no further nocturnal surveys, including call play backs or spotlighting were undertaken. A precautionary approach has been adopted throughout to assess the potential impact to threatened species.

4 EXISTING ENVIRONMENT

4.1 LANDSCAPE CONTEXT

The proposal is located within the NSW Riverina Bioregion and the Wakool LGA in NSW and the Gannawarra Shire in Victoria. The proposal is located within the small towns of Barham and Koondrook, with most of the surrounding areas being used for residential, commercial and recreational purposes. As a result vegetation within the proposal area is extremely fragmented and isolated within the broader landscape.

The vegetation within the region is fragmented and generally isolated from vegetation elsewhere. Large areas of remnant and regrowth forest remain within Kondrook-Pericoota Forest (2km from the proposal area) and Campbells Island State Forest, along with riparian habitat along the Murray River and its distributaries. Elsewhere, vegetation is limited to along roadsides, isolated paddock trees and other small patches where clearing has not occurred. This vegetation is continuous along the river bank within the proposal area.

The regional topography near the proposal comprises of mostly flat alluvial plains of the Murray River and associated anabranches. In the proposal area, the river is deeply incised with steep banks.

4.2 LANDUSE

The towns of Barham and Kondrook consist of a number of residential and commercial properties and are surrounded by rural areas that are predominately used for agricultural activities such as cropping and grazing.

In the proposal area, the primary land use is roads and associated infrastructure, and recreation. Parkland is present on both the NSW and Victoria sides of the river around the existing bridge.

4.3 THREATENED SPECIES BACKGROUND RESEARCH

4.3.1 *Endangered Ecological Communities*

Communities listed under the TSC Act

Five state-listed Endangered Ecological Communities (EEC's) have the potential to occur within the study area:

- *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions
- *Allocasuarina luehmannii* Woodland in the Riverina and Murray-Darling Depression Bioregions
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions.

None of these EECs occur in the proposal area.

Communities listed under the EPBC Act

Five federally-listed EECs which have the potential to occur within the study area:

- Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions.
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- Natural Grasslands of the Murray Valley Plains
- Weeping Myall Woodland
- White Box Yellow Box Blakely's Red Gum grassy woodland and derived native grassland CEEC.

None of these EECs occur in the proposal area.

Communities listed under the FM Act

The proposal site is within the "Aquatic Ecological Community In The Natural Drainage System of the Lower Murray River Catchment" (Lower Murray River aquatic ecological community) which is listed as an Endangered Ecological Community (EEC) on the FM Act.

The Lower Murray River aquatic ecological community includes all native fish and aquatic invertebrates within all natural creeks, rivers and associated lagoons, billabongs and lakes of the regulated portions of the Murray, Murrumbidgee and Tumut rivers, as well as all their tributaries and branches. The community includes 23 native fish species and over 400 recorded native invertebrate species. The Lower Murray River aquatic ecological community occurs in a lowland riverine environment, characterised by meandering channels and wide floodplains. The land is generally flat to gently sloping.

4.3.2 Threatened flora

NSW

One state-listed threatened flora species listed on the TSC Act has been previously recorded within the study area, the Boland Yellow Gum (*Eucalyptus leucoxylon subsp. Pruinosa*). Two other state-listed threatened species have the potential to occur within the study area based on a review of habitat requirements. In addition, six federally-listed threatened flora species have the potential to occur within the study area (Appendix H of the REF).

An evaluation of the potential for these species to occur within the proposal area was undertaken (Appendix C). None of these species were deemed likely to occur in the proposal area.

Victoria

One endangered flora species, the Stiff Groundsel (*Senecio behrianus*), is listed as potentially occurring in the study area.

An evaluation of the potential for this species to occur within the proposal area was undertaken (Appendix C). This species was deemed unlikely to occur in the proposal area.

4.3.3 Threatened fauna

11 threatened fauna species (NSW, Victorian and federally listed) have been previously recorded within study area. A further 15 threatened species, nine migratory species and five invasive fauna species have the potential to occur within the study area (Appendix B). It is considered unlikely that any threatened terrestrial fauna species would rely on the habitats present at the proposal site, given that the proposal site is located in an urban area, is of limited value due to the regrowth

nature of the trees and lack of understorey, and is highly disturbed and affected by road traffic. Woodland birds may traverse the proposal site to access foraging and roosting/nesting resourced in the study area, but would not rely on the habitats present. Similarly, the Koala and the Squirrel Glider may use the proposal site as a movement corridor. Impacts from the proposal on these two species are further discussed in Section 5.1.3.

No endangered populations occur within the study area.

Primary feed tree species for the Koala were recorded in the proposal area. However, no koalas or evidence of koalas were found during the field surveys. The habitat is not considered core koala habitat but could be considered as Potential Koala habitat pursuant to SEPP 44 (see Section 4.8).

Five state-listed and three federally-listed threatened fish species have been previously recorded across the Murray catchment area or have the potential to occur in the study area. A summary of habitat requirements for these species is provided in Table 4-1. The study area does not contain any areas that have been declared as critical habitat under the TSC Act and FM Act.

Refer to Appendix B for all background search results.

Table 4-1: Threatened aquatic species with potential to occur in the study area

Species	Listing	Spawning Period	Habitat Present in the Proposal Area
Trout Cod	FM-E	Spawning occurs during spring and early summer.	Absent - Limited cover along the river in the proposal area and water was slow flowing.
Eel Tailed Catfish	FM - EP	Spring and midsummer.	Present - Species is known to inhabit slow flowing rivers, however, cover is absent for this species within the proposal area.
Silver Perch	FM-V	Spring and summer.	Present - Species is known to inhabit slow flowing rivers, however, cover is absent for this species within the proposal area.
Murray Hardyhead	FM-CE EPBC-V	Spawning occurs from October to February.	Marginal - General habitat is present (slow flowing river) however specific aquatic vegetation is not present in the proposal area.
Macquarie Perch	FM-E EPBC-E	Macquarie perch spawn in spring or summer.	Absent – the river is typically slow flowing in the proposal area.
Murray Cod	EPBC-V	Spawning occurs in spring and early summer	Present - Limited cover over the river. Limited snags and overhanging vegetation in the proposal area.

4.4 FIELD SURVEY RESULTS – FLORA SPECIES AND VEGETATION COMMUNITIES

4.4.1 Flora Species recorded during field surveys

A total of 12 flora species were recorded within the proposal area during field investigations. Five (41 per cent) of these species are introduced and one is classified as noxious under the Wakool LGA (Bridal Creeper *Asparagus asparagoides*). No threatened flora species were recorded.

4.4.2 Vegetation Communities – Victorian Classification (Habitat Hectares)

The habitat hectare classification method used in Victoria is a site based assessment which measures the condition of native vegetation with reference to a benchmark for the same vegetation type. The condition, combined with the area, determines the amount of habitat hectares in a patch of vegetation. The method is the Victorian Department of Environment and Primary Industries (DEPI) approved method of assessing native vegetation, for the purposes of regulation and investment. The habitat hectares approach requires that the condition of native vegetation at the site scale be assessed in comparison to a 'benchmark' that represents the average characteristics of a mature and apparently long-undisturbed state for the same vegetation type (Parkes et al. 2003).

The vegetation communities in the proposal area were given a vegetation condition as per the DEPI Ecological Vegetation Classes (EVC). The vegetation in the proposal area consists of Riverine Grassy Woodland EVC (EVC 295). This EVC is described as:

Occurs on the floodplain of major rivers, in a slightly elevated position where floods are rare, on deposited silts and sands, forming fertile alluvial soils. River Red Gum woodland to 20 m tall with a groundlayer dominated by graminoids and sometimes lightly shrubby or with chenopod shrubs.

The habitat hectares assessment approach involves assigning a habitat score to a habitat zone that indicates the quality of the vegetation relative to the EVC benchmark. This habitat score can then be multiplied by the area of the habitat zone (in hectares) to determine the quality and quantity of vegetation (in habitat hectares).

The components of the 'habitat score' and their relative weightings and assessment are shown in Table 4-2.

Table 4-2 Components and weightings of the habitat score.

	Component	Score	EVC Benchmark	Habitat Hectares Site Assessment score ¹
'Site Condition'	Large Trees (80 cm DBH)	10	12 / hectare	2
	Tree Canopy Cover	5	20 %	3
	Understorey	25	75 %	5
	Lack of weeds	15		7
	Recruitment	10	Continuous	0
	Organic Litter	5	10 %	2
	Logs	5	20 m / 0.1 ha	0
'Landscape Context'	Patch Size	10		1 (0.1 ha)
	Neighbourhood	10		2.4
	Distance to Core Area	5		2

¹ Values were assessed using the Victorian DSE (2004) Vegetation Quality Assessment Manual Guidelines for applying the Habitat Hectares scoring method

	Total	100	24.4
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The final habitat score out of 100 for the habitat zone is determined by summing all the scores from each site condition and landscape context component. This score can be converted to a score out of 1.00. The habitat score for the proposal area is 0.244.

The final habitat hectare value is a measure of both the quality (habitat score) and quantity (hectares) of the vegetation, and therefore requires consideration of the total number of hectares present. It is determined by multiplying the habitat score (as a decimal) of the habitat zone by the number of hectares in the habitat zone (Table 4-3).

Table 4-3 calculation of overall *habitat hectares* within the proposal site.

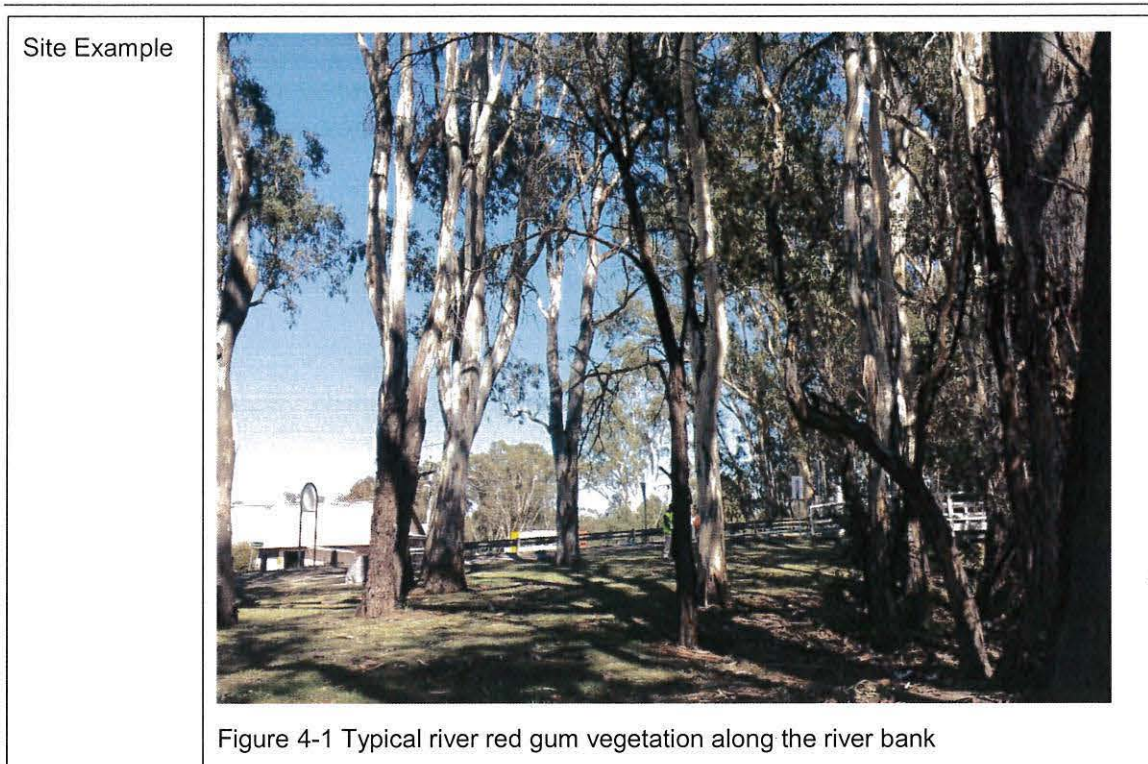
Area (ha)	Habitat Score	Calculation	Habitat Hectares
0.1	0.244	0.1 x 0.24	0.024

4.4.3 Vegetation Communities – NSW Classification

The vegetation community present on the NSW side of the river at the proposal site is River Red Gum forest. The trees consist a mixture of old remnant individuals, and younger regrowth. The understorey is dominated by exotic species and noxious weeds. Overall, the vegetation on the NSW side of the river at the proposal site considered to be in poor condition.

Table 4-4 Vegetation community table

Regrowth River Red Gum Forest	
Occurrence	This vegetation community occurred along a narrow band adjacent to the river bank.
Structure	Trees: 15 - 25m 50% cover Shrubs: to 3m <1% cover Ground: <50cm 0 – 20% cover Bare earth (30% cover) and fallen timber (<1% cover)
Conservation Status	This vegetation type is not listed as an endangered ecological community (EEC) under either the TSC or EPBC Acts.
Common Species	River Red Gum (<i>Eucalyptus camaldulensis</i>) was the dominant species of this community. The species was present as regrowth and as remnants. The mid-storey was nonexistent. Common ground stratum species includes Khaki Weed (<i>Alternanthera pungens</i>) and Kikuyu Grass (<i>Pennisetum clandestinum</i>).



4.4.4 Noxious weeds

One noxious weed species, declared in both NSW and Victoria for the proposal area, was recorded within the proposal site. This species should be managed during the construction phase of the project according to the legal requirements in Table 4-5 below.

Table 4-5: Noxious weed identified during site surveys within the Wakool and Gannawarra LGA's.

Common Name	Scientific Name	Noxious Weed Class	Legal Requirements
Bridal Creeper	<i>Asparagus asparagoides</i>	Class 4	The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its flowering and reproduction.

4.4.5 Groundwater dependant ecosystems

Groundwater dependent ecosystems (GDEs) are ecosystems which have their species composition and their natural ecological process determined by groundwater (NOW 2002). There are several types of GDE with six types conventionally recognised in Australia (NWC 2013):

- Terrestrial vegetation that relies on the availability of shallow groundwater
- Wetlands such as paperbark swamp forests and mound springs ecosystems
- River base flow systems where a groundwater discharge provides a base flow component to the rivers discharge
- Aquifer and cave ecosystems where life exists independent of sunlight
- Terrestrial fauna, both native and introduced, that rely on groundwater as a source of drinking water

- Estuarine and near shore marine systems, such as some coastal mangroves, salt marshes and sea grass beds, which rely on the submarine discharge of groundwater.

The River Red Gum Forest vegetation along the Murray River is likely to rely on the associated shallow groundwater of the river. The vegetation in this area is considered to comprise a GDE.

There are no other wetlands, estuarine or nearshore systems within the study area. None of the other vegetation types within the study area are considered likely to rely on groundwater resources.

4.5 FIELD SURVEY RESULTS - TERRESTRIAL FAUNA SPECIES AND HABITATS

4.5.1 Fauna habitats

Potential habitat for a number of microchiropteran bat species is present within the bridge and riparian vegetation, particularly large trees. The timber elements of the bridge are quite old, displaying a number of cracks and gaps that could provide potential roosting habitat for bats.

One hollow bearing tree was recorded within the proposal area. This tree is located on the southern bank of the Murray River, approximately 30 metres upstream of the bridge (Figure 4-2). Other hollow bearing trees are present immediately outside the proposal area.



Figure 4-2 Looking north towards the Barham Bridge along the proposed temporary crossing location

Other fauna habitats in the proposal area include grasslands, used by some native fauna for foraging, and fallen timber on the river bank, which is used by some native fauna species for

roosting and foraging. Overall, the quality of terrestrial habitats in the proposal area is poor, typical of a maintained urban environment.

4.5.2 Fauna species recorded during field surveys

One threatened species, *Myotis macropus* (Southern Myotis), was recorded during both the 2009 and 2015 investigations. Bats (unknown species) were observed flying throughout River Red Gum trees immediately adjacent to the bridge (south side). Bats were also observed flying under the bridge.

Whilst the timber sections of the bridge were found to contain a number of cracks and gaps that could provide potential roosting habitat for many bat species, no evidence of bat activity was found within the bridge. No bats were seen flying in or out of the bridge and no insect casings were present nor was any guano found. Hollow-bearing River Red Gums located along the Murray River would provide suitable roosting and breeding habitat for microchiropteran bats.

No other threatened fauna species were observed during the field surveys.

A number of commonly occurring bird species were observed in the proposal area during field surveys, including the Australian Magpie (*Cracticus tibicen*) and the Sulphur Crested Cockatoo (*Cacatua galerita*). Other bird species would be expected to occur in the proposal area, including threatened bird species reliant upon woodland habitats.

No mammals were recorded during the field surveys. Commonly occurring mammals such as Kangaroos, Echidna's and Wombats would be expected to occur in the proposal area. Similarly, commonly occurring reptiles including snakes, lizards and turtles would occur in the proposal area.

Although the Sugar Glider is not listed as a threatened species on the TSC Act, it is an iconic native species facing threats from various sources such as habitat modification and removal. The Sugar Glider has been previously recorded within the study area (NSW Atlas of Wildlife Database). This species was not recorded during the field surveys undertaken for this assessment, although nocturnal surveys which are most likely to detect this species were not conducted. Potential habitat is present in woodland vegetation along the river, local roads and irrigation channels.

4.6 FIELD SURVEYS RESULTS – AQUATIC FAUNA SPECIES AND HABITATS

4.6.1 Aquatic habitats

Aquatic habitats within the study area are associated with the Murray River. There is intact riparian vegetation and woody debris along the river corridor which provides refuge and foraging habitat for aquatic fauna such as frogs, reptiles and invertebrates. In the proposal area, the Murray River is a deeply incised channel with steep banks. The river is regulated, meaning river levels fluctuate according to irrigation and water demand as well as natural runoff events. Evidence of ongoing erosion of the banks is present both up and downstream of the proposal site. The bed of the river in the proposal area is predominantly a silty substrate, with occasional rocks closer to the banks of the river (including from rock scour protection). No in-stream aquatic vegetation was observed in the proposal area.

Fallen timber and dead wood (including one large snag around 10 metres downstream of the southern abutment) are present on the lower banks and bed of the river in the proposal area. These features provide suitable habitat for ground dwelling terrestrial species as well as

shelter, breeding and foraging habitat for aquatic species such as macroinvertebrates and fish.

Aquatic habitats and resources in the proposal area include open water, pools, submerged woody debris and sandy/ silty substrate. These provide foraging, breeding and shelter habitat for a range of aquatic fauna such as fish, tortoises, macroinvertebrates and waterbirds.

Overall the quality of aquatic habitat is considered to be moderate.



Figure 4-3 The Murray River showing vegetation and snag habitat on the banks

4.6.2 Threatened Aquatic Fauna and Ecosystems

The aquatic environments of the Murray River contain potential habitat for a number of threatened fish occurring in the locality, namely the Eel Tailed-catfish (*Tandanus tandanus*) Silver Perch (*Bidyanus bidyanus*) and Murray Cod (*Maccullochella peelii*). These species are known to occur in the Murray River. The Eel Tailed Catfish swims along the sandy substrate of lakes and slow-flowing waterbodies which support fringing vegetation. The Murray Cod is known to use snags for refuge and foraging. The Silver Perch may use the river bed for spawning.

One Endangered Ecological Community, the Aquatic Ecological Community in Natural Drainage System of the Lower Murray River Catchment, was identified within the proposal area.



Figure 4-4 Aquatic habitat upstream of the proposal site.

4.7 WILDLIFE CORRIDORS IN THE PROPOSAL AREA

The landscape in the study area is highly modified, with vegetation generally fragmented and isolated from other vegetation. The main vegetated wildlife corridor follows the Murray River and provides a moderate level of connectivity between areas of remnant vegetation at Campbells Island State Forest to the north-west and the Koondrook-Pericoota Forest to the south east of the proposal area. The proposal area forms part of this narrow vegetated corridor.

4.8 SEPP 44 – KOALA HABITAT PROTECTION

An assessment of the Koala habitat in the proposal area was conducted during the field surveys. One Koala feed tree species listed on SEPP 44, the River Red Gum, occurs within the proposal site. The proposal area therefore is considered Potential Koala Habitat pursuant to SEPP 44.

The koala has been recorded within the Koondrook-Pericoota Forest to the east of the proposal site. However, no evidence of Koalas was observed in the proposal area during the field surveys,

despite targeted searches. Therefore, the proposal area is not considered to be Core Koala Habitat pursuant to SEPP 44.

5 ASSESSMENT OF IMPACT

5.1 CONSTRUCTION

5.1.1 General

The proposal would have the following general impact on flora and fauna:

- Clearing 0.1 hectares of River Red Gum woodland
- Removal of one hollow bearing tree
- Removal of potential bat habitat from the bridge
- Disturbance to an existing noxious weed, and the potential of spreading weeds
- Disturbance to the bed of the river
- Sedimentation of the river from pile driving and other in-stream activities
- Partial blockage of the river through the use of coffer dams and/or instream rock platform.

The proposal would require the operation of a crane to assist with the removal of components of the bridge. Several options are possible, including:

- Crane on ground option

This would involve the construction of a crane pad on the river bank downstream of the Victorian abutment. It would require the removal of an additional 0.1 hectares of River Red Gum vegetation.

- Crane on rock platform option

This would involve the construction of a rock platform within the Murray River. This would result in partial blockage of the river, potential scouring of the bed and river bank from changes to the flow velocities of the river, and sedimentation.

- Crane on barge in the river option

This would involve operating a crane from a floating barge within the river. This option is only possible if the water level in the river is high enough for a barge to operate. This option would have minimal impact on flora and fauna, although there is a slight increase in risks from spills and leakages of plant on the barge affecting water quality.

The impact of all three options have been assessed in this report.

5.1.2 Flora

Vegetation clearing and habitat loss

The proposal would require the removal of approximately 0.1 hectares of River Red Gum vegetation to allow for the proposed temporary bridge to be constructed (Figure 5-1).

Should a crane pad be required on the bank of the river, an additional 0.1 hectares of regrowth River Red Gum woodland would be cleared (making a total of 0.2 hectares).

In addition, ground cover vegetation would be disturbed and/or removed as part of the proposal. This vegetation consists mostly of exotic species and noxious weeds.

No in-stream vegetation exists at the proposal site.

Weeds

The proposal has the potential to spread Bridal Creeper (a Class 4 noxious weed species) during vegetation removal and through the movement of vehicles and machinery into or out of the site.

Weeds are easily transported as seeds and propagules on machinery brought to the site. Equally, they can be carried away to other areas from the site or spread within it. Generally, the greater the area of soil disturbance and the longer it is left without vegetative cover, the more susceptible an area is to weed infestation. Bridal Creeper is considered to be a significant weed as it is highly invasive and should be controlled as a priority. If this plant is not controlled prior to work commencing then there is the potential for it to be spread throughout the site during and following construction.

Appropriate measures according to Guide 6 (Weed Management) of the Roads and Maritime *Biodiversity Guidelines* (RTA 2011a) would be required to ensure weeds are not spread within or out of the proposal site. All noxious weeds present within the subject site would be treated according to the requirements of both the NW Act and Guide 6 (Weed Management) of the Roads and Maritime *Biodiversity Guidelines* (RTA 2011a). Rehabilitation of disturbed areas and ongoing weed management after the completion of construction activities would limit the establishment and spread of weed species during operation. The mitigation measures outlined in Section 6 of this report recommend weed management measures.

Groundwater dependent ecosystems

The extraction of water from the coffer dams during the bridge work is considered to be minimal compared to the other demands on the water resource and is unlikely to alter groundwater levels such that they would have an impact on any groundwater dependent ecosystems surrounding the proposal site.



Figure 5-1 Trees which would be removed as part of the proposed work

5.1.3 Fauna

Habitat removal and impacts on connectivity

The proposed work would remove up to 0.2 hectares of woodland habitat next to the southern abutment of the bridge. This is unlikely to significantly reduce habitat for any native fauna species. The removal of this vegetation, together with the temporary operation of an additional bridge, may have a slight impact upon the wildlife using vegetation along the riverbank for movement. Such wildlife, however, is likely to be highly mobile and able to utilise habitats in disturbed environments. Therefore, any impact would be very minor and unlikely to prevent fauna using the vegetation corridor for movement.

The landscape in the study area is highly modified, with vegetation generally fragmented and isolated from other vegetation. The main vegetated wildlife corridor follows the Murray River and provides a moderate level of connectivity between areas of remnant vegetation. The existing bridge creates an approximate 10 metre gap in the canopy of riparian vegetation at this location. The proposal would extend this gap, on the Victorian side of the river, to about 30-40 metres. Species affected by connectivity are generally limited to arboreal mammals and some ground-dwelling mammals and reptiles. In particular, the gliders and Koalas can be impacted by the loss of connectivity of habitat. However, it is considered that a 30-40 metres gap in connectivity, in this river landscape, would not be likely to prevent animals from moving through the study area. Gliders are known to be able to traverse 30-60 meters, and Koalas are known to travel across the ground substantial distances. The removal of trees along the southern bank of the river is unlikely to create a gap which would prevent the movement of fauna through the area.

Microchiropteran bats

The proposal has the potential to impact bat habitat within the existing bridge. Given there was no evidence of bats utilising the bridge structure, the impact is likely to be minor. The amount of habitat which would be removed is small in the regional context and is located in a highly disturbed road corridor.

Koala

An assessment of the Koala habitat in the proposal area was conducted during the field surveys. One Koala feed tree species listed on SEPP 44, the River Red Gum, occurs within the proposal site. The proposal area therefore is considered Potential Koala Habitat pursuant to SEPP 44.

Assessment of impacts to the Koala has been undertaken with reference to the EPBC Act Referral Guidelines for the Vulnerable Koala (DoE 2014). Impacts to this species from the proposal are limited to the direct removal of 0.2 hectares of potential habitat, and a slight decrease in connectivity along the southern bank of the Murray River riparian habitat corridor. The habitat which would be impacted is considered not to be critical to the survival of the Koala in the locality due to the very small extent and the young nature of the trees present.

The Habitat Score has been calculated as 4 (Appendix C). Based on the guidelines, referral is not recommended.

5.1.4 Aquatic

Impact from the proposal on aquatic habitat and resources would come from:

- Constructing access ramps to pier four (the pier closest to Victoria). The ramps would be on both upstream and downstream sides of the bridge within 10 metres of the bridge abutment. This is similar to what has been completed on the NSW side.
- Installing a sheet piling cofferdam instream around pier four and the abutment on the Victorian side. The extent of the work would be similar to what has been completed on the NSW side.
- The use of cranes to lift the bridge trusses.
- Removing trees affected by the work.
- Replacing the piles and pier of pier four. The timber piles would be replaced with concrete piles and concrete pile caps. The timber pier would be replaced with timber. This work would be similar to what has been completed on the NSW side.
- Constructing a new concrete Victorian abutment about three metres behind the existing timber abutment.
- Installing scour protection of the Victorian river bank both upstream and downstream of the existing bridge.
- Constructing a temporary bridge upstream of the existing bridge. The temporary bridge would be about one metre away from the bridge on the NSW bank and about 18 metres from the bridge on the Victorian bank.

The primary impact from instream work would be from the use of a rock platform from which to operate a crane. Should this option be chosen, there is the potential for erosion to the bed and banks of the river downstream from changes to the way in which water flows around the platform. Other impact to aquatic flora and fauna are limited to sedimentation of the river and potential pollution of the river from spills and leakages of oils and fuels.

Overall, the area of impact is small relative to the extent of aquatic habitat within the study area. Furthermore, the quality of aquatic habitat in the proposal area is poor given past and ongoing disturbance from infrastructure and the impact of river regulation.

Fish stranding is possible during the installation of the coffer dam. Measures would be in place to monitor fish stranding and relocate fish.

Some sedimentation is considered likely during piling and instream work, although the Murray River in the proposal area is already heavily sediment-laden and the impact from the proposal is not expected to be noticeable in the river. Any sedimentation would have minimal impact upon aquatic habitats or resources.

The small area of impact along the river bank is unlikely to disrupt any breeding events or cause any impact to fish movement through the area. Given that the proposal would not block the river nor remove any habitats of value to any threatened fish species, the proposal is unlikely to impact upon them.

5.1.5 Threatened Species

Assessments of significance under the TSC Act were undertaken for microchiropteran bat species (Appendix D) which were considered to have the potential to utilise the habitats within the proposal area (Appendix C). The assessments of significance concluded that a Species Impact Statement is not required, given that:

- The extent of habitats which would be impacted is very small

- The quality of the habitats which would be impacted is generally poor
- The proposal is not likely to significantly affect connectivity or increase fragmentation or isolation of habitat such that any species' life cycle would be affected.

The Lowland Murray River aquatic EEC occurs within the study area and a 7 Part Test under the FM Act was undertaken for this community (Appendix D). This assessment concluded no significant impact would be likely on the EEC and the long-term survival of this aquatic community within the study area would not be threatened by the proposed work.

5.2 OPERATIONAL

5.2.1 Flora

The proposal would not have an additional impact on flora or vegetation communities during operation.

5.2.2 Fauna

Operationally, the proposal is unlikely to result in any increase or change to the impact on fauna. Once the temporary bridge is removed, the proposal area would operate similarly to the existing situation, although a reduction in connectivity for the Sugar Glider and other species would remain. The replacement of old timber with new timber may reduce the amount of potential habitat for bats in the bridge structure, however given there was no evidence that bats were using the structure currently, this is not likely to result in any impact in the future.

5.3 IMPACT ON RELEVANT KEY THREATENING PROCESSES

Under the TSC Act, a threat can be listed as a 'key threatening process' if it adversely affects threatened species, populations or ecological communities or if it could cause species, populations or ecological communities that are not threatened to become threatened.

Under the EPBC Act, A threatening process is defined as a key threatening process if it threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community.

Table 5-1 identifies key threatening processes under both the TSC and EPBC Acts that are relevant to the proposal.

Table 5-1 Key threatening process relevant to the proposal

Key Threatening Processes		
TSC Act	EPBC Act	Relevance
Clearing of native vegetation	Land clearance	The proposal would require the removal of a small amount of woodland vegetation from the proposed temporary crossing footprint. Construction of the proposal would directly impact on native vegetation as a result of vegetation clearance. Direct impact would be via the clearance of up to 0.2 hectares of vegetation.
Removal of dead wood and dead trees		Areas of fallen timber are present within the riparian areas, adjacent to the existing bridge. Any Coarse Woody Debris would be relocated to adjacent areas and managed in accordance with the requirements the Roads

Key Threatening Processes

and Maritime *Biodiversity Guidelines* (RTA, 2011) - Guide 5 (CWD).

6 MITIGATION MEASURES

The proposal would follow the Roads and Maritime *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA, 2011). These guidelines are a tool to assist with minimising the impact on biodiversity during the planning, construction, operation and maintenance of projects in view of the following key aims:

- Avoid and minimise impact first
- Mitigate impact where avoidance is not possible
- Offset where residual impact cannot be avoided.

Safeguards and mitigation measures recommended for the proposal are detailed in Table 6-1 below and are in accordance with the Roads and Maritime Biodiversity Guidelines (2011).

Table 6-1: Safeguards and mitigation measures to be implemented for the proposal

Impact	Environmental Safeguard	Responsibility	Timing
Pre-clearing	<ul style="list-style-type: none"> • Obtain a planning permit from Gannawarra Shire Council to remove or prune native vegetation on the Victorian side of the Murray River. • If unexpected threatened fauna or flora species are discovered, work will stop immediately and the Roads and Maritime Unexpected Threatened Species Find Procedure in the Roads and Maritime - <i>RTA Biodiversity Guidelines 2011 – Guide 1 (Pre-clearing process)</i> (RTA, 2011) will be followed. • The extent of the construction footprint will be clearly marked and the movement of vehicles and plant outside of these areas will be avoided. Trees and vegetation to be retained will be protected through temporary fencing, especially areas of EEC. 	<p>Roads and Maritime</p> <p>Contractor</p> <p>Contractor</p>	<p>Pre-construction</p> <p>Pre-construction</p> <p>Pre-construction</p>
Clearing of native vegetation	<ul style="list-style-type: none"> • Clearing of vegetation would be restricted to that assessed in the project REF and includes trees located within 30 metres east of the bridge along the southern riverbank. The limit of clearing would be delineated (eg temporary site fencing, flagging, earth bunding) along the river and at the stockpile and compound site. Clearing limits would be discussed in the site induction to ensure staff and contractors are made aware of limits of clearing. • Trees will be removed in such a way as not to cause damage to surrounding vegetation. This will ensure groundcover disturbance is kept to a minimum. 	Contractor	<p>Construction</p> <p>Construction</p>

	<ul style="list-style-type: none"> • Utilise areas already impacted by previous clearing or disturbance and minimise clearing where feasible. Trimming is preferred over removal where feasible. • Clearing of hollow-bearing trees should be undertaken in accordance with Roads and Maritime Biodiversity Guidelines (RTA 2011) - Guide 4 (Clearing of vegetation and removal of bushrock). 		<p>Construction</p> <p>Construction</p>
Fauna and habitat impact	<ul style="list-style-type: none"> • Fauna handling must be carried out in accordance with the requirements the Roads and Maritime <i>Biodiversity Guidelines</i> (RTA, 2011) - Guide 9 (Fauna Handling). • Details of the local veterinary and/or wildlife carer (WIRES) will be available onsite. • The CEMP must include a procedure for the relocation of stranded fish. NSW DPI must be consulted in the preparation of this procedure. • Investigate the practicability of constructing a number of glider poles to reduce the impact of fragmentation to Sugar Gliders in the study area. 	Contractor	<p>Construction</p> <p>Construction</p> <p>Pre-Construction</p> <p>Pre-construction</p>
Fauna and habitat impact Microchiropteran bat species	<ul style="list-style-type: none"> • A bat management plan will be developed for the proposed work and must include the following: <ul style="list-style-type: none"> ○ Staff should be educated about microchiropteran bats, their ecological role, conservation significance, and the risk of disease with certain species ○ The Bat Management Plan should include detailed and targeted pre-clearing surveys to identify roost sites at dusk over at least 2 nights prior to any construction in the area. ○ Impacts on microchiropteran bats should be re-assessed if they are identified to be using the bridge during the breeding season (November – January). ○ Undertake final inspection of the bridge components to be removed to locate any bat roost sites prior to the commencement of removing each component. ○ If evidence of roost sites are identified, implement exclusion techniques such as the use of spotlights on the bridge at night, installing netting/ plastic sheeting 	Contractor	<p>Pre-construction</p> <p>Construction</p>

	<p>once bats have left, starting an oxy-torch (to cut bolts).</p> <ul style="list-style-type: none"> ○ If bats are observed emerging from the bridge components to be removed, work must cease and an experienced ecologist with bat handling experience be consulted. ○ If roost sites in the form of hollow bearing trees have to be removed an experienced ecologist must be on hand to inspect each hollow prior to the destruction so bats can be excluded and or have time to relocate. ○ Timing of deck removal must avoid bat breeding and lactating periods (September-November). 		
Weed spread and establishment	<ul style="list-style-type: none"> • Declared noxious weeds are to be managed according to requirements under the <i>Noxious Weeds Act 1993</i> and Guide 6 (Weed Management) of the <i>Roads and Maritime Biodiversity Guidelines</i> (RTA, 2011) in particular for Bridal creeper. 	Contractor	Construction
	<ul style="list-style-type: none"> • Machinery would be cleaned prior to commencing the work to ensure that weed seeds and propagules are not imported. 	Contractor	Construction
	<ul style="list-style-type: none"> • Herbicides would be used in accordance with the manufacturer's guidelines. • Any weed contaminated material would be disposed of offsite at a licensed waste facility. 	Contractor	Construction
Disturbance to fallen timber and dead wood	<ul style="list-style-type: none"> • Any snags located within the study area would be relocated to nearby areas of habitat, if necessary. 	Contractor	Construction
	<ul style="list-style-type: none"> • DPI Fisheries would be contacted regarding the re-use of CWD as aquatic habitat. • Large trunks and logs would be placed into nearby aquatic habitat. • Coarse Woody Debris would be placed within the nearby river bank and would be managed in accordance with the requirements the <i>Roads and Maritime Biodiversity Guidelines</i> (RTA, 2011) - Guide 5 (CWD). 	Contractor	Construction
Temporary bridge construction – Barge for crane in river.	<ul style="list-style-type: none"> • Ensure the height of the river is sufficient to avoid contact with the stream bed. 	Contractor	Construction

	<ul style="list-style-type: none"> • Ensure that the barge has a sufficient bund to prevent and spills entering the waterway. • Timing of work to occur outside of spawning of native fish species. 		
Temporary bridge construction – Rock platform for crane in the river.	<ul style="list-style-type: none"> • Fish passage would be maintained throughout the site during the length of the work • Any snags located within the study area would be relocated to nearby areas of habitat, if necessary. • DPI Fisheries would be contacted regarding the re-use of CWD as aquatic habitat. 	Contractor	Construction
Crane pads on the river banks (1 in NSW and 1 in VIC)	<ul style="list-style-type: none"> • DPI Fisheries would be contacted regarding the re-use of CWD as aquatic habitat. • Investigate the use of glider poles to maintain connectivity for the Sugar Glider. 	Contractor	Construction
Extra coffer dams may need to be built in the river for removal of piles, depending on design of temporary bridge	<ul style="list-style-type: none"> • Notify DPI Fisheries prior to any work withinwater land not included in the scope of this Biodiversity Assessment. • Any snags located within the study area would be relocated to nearby areas of habitat, if necessary. • DPI Fisheries would be contacted regarding the re-use of CWD as aquatic habitat. 	Contractor	Construction

7 CONCLUSION

This Biodiversity Assessment has assessed the impact associated with the proposed rehabilitation work on the Barham-Koondrook Bridge over the Murray River. The proposal includes work on the southern abutment, approach spans, the bridge decking and the lift span elements. The Biodiversity Assessment has found that the proposal area supports limited habitats and resources for native flora and fauna species. In particular, no evidence of bat occupation of the bridge was found. Impact from the proposal include the removal of up to 0.2 hectares of native vegetation, one hollow bearing tree, bed and bank disturbances including the use of a coffer dam, instream impact from the potential use of a rock platform, and temporary widening of the road corridor during the use of the temporary bridge. The removal of vegetation may also have a minor impact on the connectivity of habitats along the river. Overall, the impact is considered to be small and not lead to any substantial decline or disturbance to native flora and fauna or their habitats.

7 Part Tests of significance were conducted for the Southern Myotis and the Lower Murray River ecological community. The tests concluded that it is unlikely that any threatened biota would be significantly impacted or become threatened as a result of the proposed work due to the limited scope and impact area. There are significant stands of River Red Gum woodland in the study area surrounding the proposed work that provide habitats and resources for threatened species.

The benefits of undertaking the work are considered to outweigh the low ecological risk associated with the work. The implementation of mitigation measures would minimise the risk of any ecological impact.

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APPENDIX A FLORA AND FAUNA SPECIES LIST

A list of all flora and fauna species identified within the study area is provided in Table 8-1 and Table 8-2. The flora survey was undertaken along the riverbank on the NSW side approximately 20 metres upstream and downstream of the bridge. The survey was undertaken on the 5th February 2015.

Status:

Ex Denotes an introduced species.

Nox Class 4 Denotes a species listed as a Noxious Weed of within the Wakool LGA.

Table 8-1 List of flora species recorded during the survey.

Scientific name	Common name	Status
Acacia acinacea	Gold-dust Wattle	
Acacia salicina	Cooba	
Alternanthera pungens Kunth.	Khaki Weed	Ex
Amyema miquelii	Box mistletoe	
Asparagus asparagoides	Bridal Creeper	Nox Class 4
Brachychiton populneus	Kurrajong	
Bromus diandrus	Great Brome	
Callistemon sp.	Bottle Brush	
Eucalyptus camaldulensis	River Red Gum	
Lactuca serriola	Prickly Lettuce	Ex
Pennisetum clandestinum	Kikuyu Grass	Ex
Tribulus terrestris	Cathead	Ex

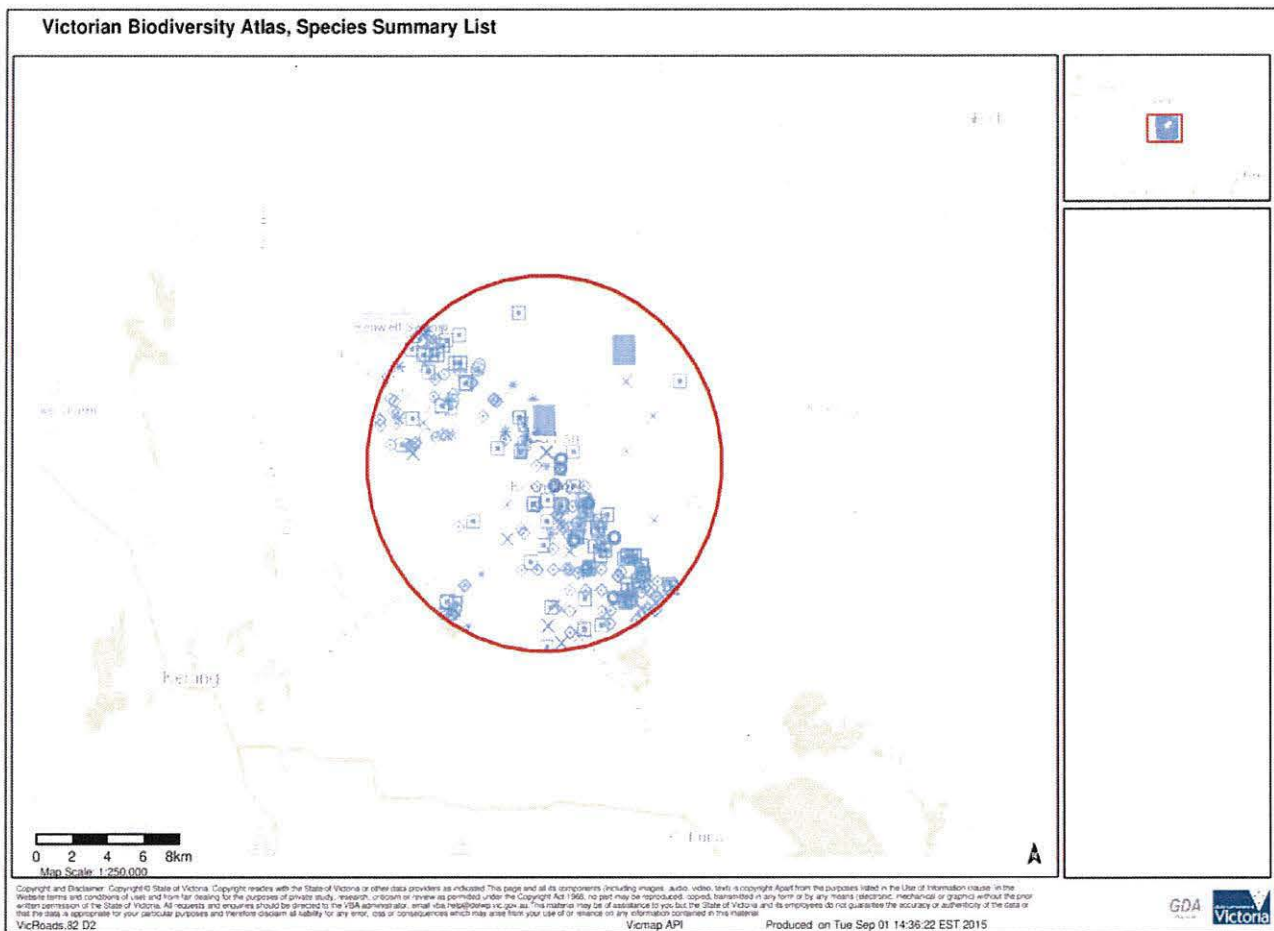
Table 8-2 List of fauna species recorded during the survey.

Scientific name	Common name
Cacatua galerita	Sulphur Crested Cockatoo
Platycercus eximius	Eastern Rosella
Manorina melanocephala	Noisy Miner
Dacelo novaeguineae	Laughing Kookaburra
Threskiornis spinicollis	Straw Necked Ibis

APPENDIX B DATABASE SEARCH RESULTS

Victorian Biodiversity Atlas, Species Summary List

(Date: 01/09/2015 02:36 PM)



Selected Area

Type: Buffer Base point: POINT (144.12420070019485 -35.62987894582259) Within: 10000 metres

Common Filter

Scientific Name :	Common Name :
VBA Taxon ID :	Conservation Status : Victorian Advisory List
Taxon Level : Species	Taxon Type :
Other Agency Codes :	Discipline :
Date Since : (dd/mm/yyyy)	Date To : (dd/mm/yyyy)

Sensitive records are in search area

Data Publication Date: 19 Aug 2015

Taxon ID	Scientific Name	Common Name	Victorian Advisory List	Discipline	Taxon Origin	Short Name	Count of Sightings
4871	Maccullochella peelii	Murray Cod	Vulnerable	Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		mac pee	4
4873	Macquaria ambigua	Golden Perch	Near threatened	Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		mac amb	6
5133	Chelodina expansa	Broad-shelled Turtle	Endangered	Aquatic fauna, Terrestrial fauna			3
5134	Chelodina longicollis	Eastern Snake-necked Turtle	Data deficient	Aquatic fauna, Terrestrial fauna			5

10001	<i>Dromaius novaehollandiae</i>	Emu	Near threatened	Terrestrial fauna		13
10018	<i>Turnix velox</i>	Little Button-quail	Near threatened	Terrestrial fauna		2
10050	<i>Porzana pusilla palustris</i>	Baillon's Crane	Vulnerable	Terrestrial fauna		3
10099	<i>Phalacrocorax varius</i>	Pied Cormorant	Near threatened	Terrestrial fauna		2
10110	<i>Chlidonias hybridus javanicus</i>	Whiskered Tern	Near threatened	Terrestrial fauna		4
10145	<i>Charadrius australis</i>	Inland Dotterel	Vulnerable	Terrestrial fauna		1
10158	<i>Tringa nebularia</i>	Common Greenshank	Vulnerable	Terrestrial fauna		3
10168	<i>Gallinago hardwickii</i>	Latham's Snipe	Near threatened	Terrestrial fauna		2
10170	<i>Rostratula australis</i>	Australian Painted Snipe	Critically endangered	Terrestrial fauna		2
10173	<i>Stiltia isabella</i>	Australian Pratincole	Near threatened	Terrestrial fauna		1
10174	<i>Burhinus grallarius</i>	Bush Stone-curlew	Endangered	Terrestrial fauna		11
10178	<i>Plegadis falcinellus</i>	Glossy Ibis	Near threatened	Terrestrial fauna		11
10181	<i>Platalea regia</i>	Royal Spoonbill	Near threatened	Terrestrial fauna		22
10185	<i>Egretta garzetta nigripes</i>	Little Egret	Endangered	Terrestrial fauna		7
10186	<i>Ardea intermedia</i>	Intermediate Egret	Endangered	Terrestrial fauna		15
10187	<i>Ardea modesta</i>	Eastern Great Egret	Vulnerable	Terrestrial fauna		41
10192	<i>Nycticorax caledonicus hillii</i>	Nankeen Night Heron	Near threatened	Terrestrial fauna		23
10195	<i>Ixobrychus minutus dubius</i>	Little Bittern	Endangered	Terrestrial fauna		4
10197	<i>Botaurus poiciloptilus</i>	Australasian Bittern	Endangered	Terrestrial fauna		3
10212	<i>Anas rhynchotis</i>	Australasian Shoveler	Vulnerable	Terrestrial fauna		17
10214	<i>Stictonetta naevosa</i>	Freckled Duck	Endangered	Terrestrial fauna		4
10215	<i>Aythya australis</i>	Hardhead	Vulnerable	Terrestrial fauna		14
10217	<i>Biziura lobata</i>	Musk Duck	Vulnerable	Terrestrial fauna		7
10218	<i>Circus assimilis</i>	Spotted Harrier	Near threatened	Terrestrial fauna		1
10220	<i>Accipiter novaehollandiae novaehollandiae</i>	Grey Goshawk	Vulnerable	Terrestrial fauna		1
10226	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Vulnerable	Terrestrial fauna		7
10230	<i>Lophoictinia isura</i>	Square-tailed Kite	Vulnerable	Terrestrial fauna		1
10319	<i>Alcedo azurea</i>	Azure Kingfisher	Near threatened	Terrestrial fauna		7
10325	<i>Todiramphus pyrropygia pyrropygia</i>	Red-backed Kingfisher	Near threatened	Terrestrial fauna		1
10341	<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	Near threatened	Terrestrial fauna		1
10423	<i>Coracina maxima</i>	Ground Cuckoo-shrike	Vulnerable	Terrestrial fauna		3
10443	<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	Endangered	Terrestrial fauna		48
10603	<i>Anthochaera phrygia</i>	Regent Honeyeater	Critically endangered	Terrestrial fauna		1
10652	<i>Stagonopleura guttata</i>	Diamond Firetail	Near threatened	Terrestrial fauna		8
12177	<i>Pogona barbata</i>	Bearded Dragon	Vulnerable	Terrestrial fauna		1
13117	<i>Pseudophryne bibronii</i>	Brown Toadlet	Endangered	Terrestrial fauna, Aquatic fauna, Aquatic invertebrates		5
60555	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (south-eastern ssp.)	Near threatened	Terrestrial fauna		32
501901	<i>Lepidium fasciculatum</i>	Bundled Peppercross	Poorly known	Flora	Lepi fasc	1
501908	<i>Lepidium pseudohyssopifolium</i>	Native Peppercross	Poorly known	Flora	Lepi p'hy	1
503101	<i>Senecio behrianus</i>	Stiff Groundsel	Endangered	Flora	Sene behr	2
503104	<i>Senecio cunninghamii</i> var. <i>cunninghamii</i>	Branching Groundsel	Rare	Flora	Sene cunn	2
505032	<i>Cardamine moirensis</i>	Riverina Bitter-cress	Rare	Flora	Card moire	1

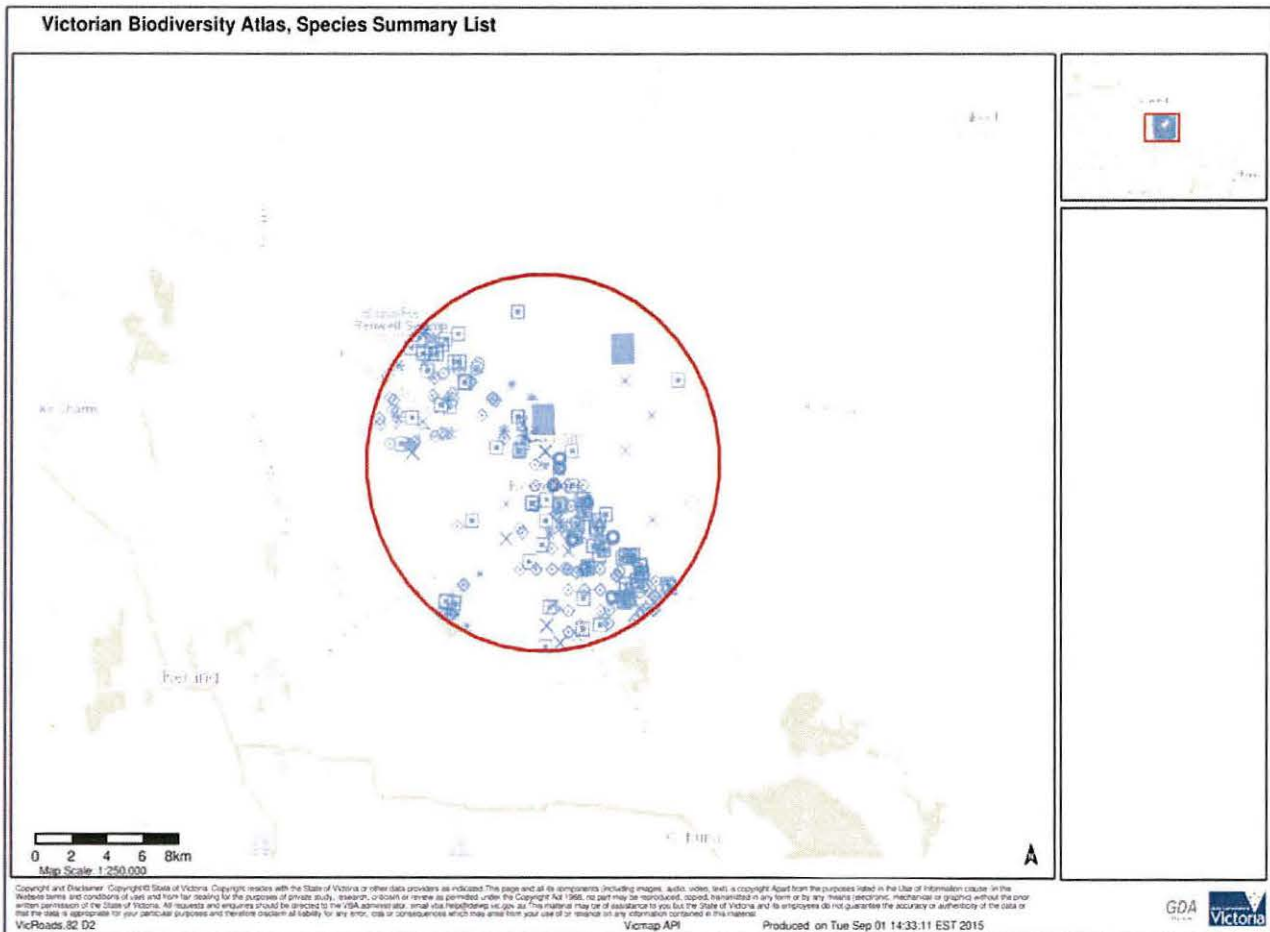
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Victorian Biodiversity Atlas, Species Summary List
(Date: 01/09/2015 02:33 PM)



Selected Area

Type: Buffer Base point: POINT (144.12420070019485 -35.62987894582259) Within: 10000 metres

Common Filter

Scientific Name :	Common Name :
VBA Taxon ID :	Conservation Status : EPBC
Taxon Level : Species	Taxon Type :
Other Agency Codes :	Discipline :
Date Since : (dd/mm/yyyy)	Date To : (dd/mm/yyyy)

Data Publication Date:19 Aug 2015

Taxon ID	Scientific Name	Common Name	Victorian Advisory List	Discipline	Taxon Origin	Short Name	Count of Sightings
4871	Maccullochella peelii	Murray Cod	Vulnerable	Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		mac pee	4
10170	Rostratula australis	Australian Painted Snipe	Critically endangered	Terrestrial fauna			2
10197	Botaurus poiciloptilus	Australasian Bittern	Endangered	Terrestrial fauna			3
10603	Anthochaera phrygia	Regent Honeyeater	Critically endangered	Terrestrial fauna			1
503101	Senecio behrianus	Stiff Groundsel	Endangered	Flora		Sene behr	2

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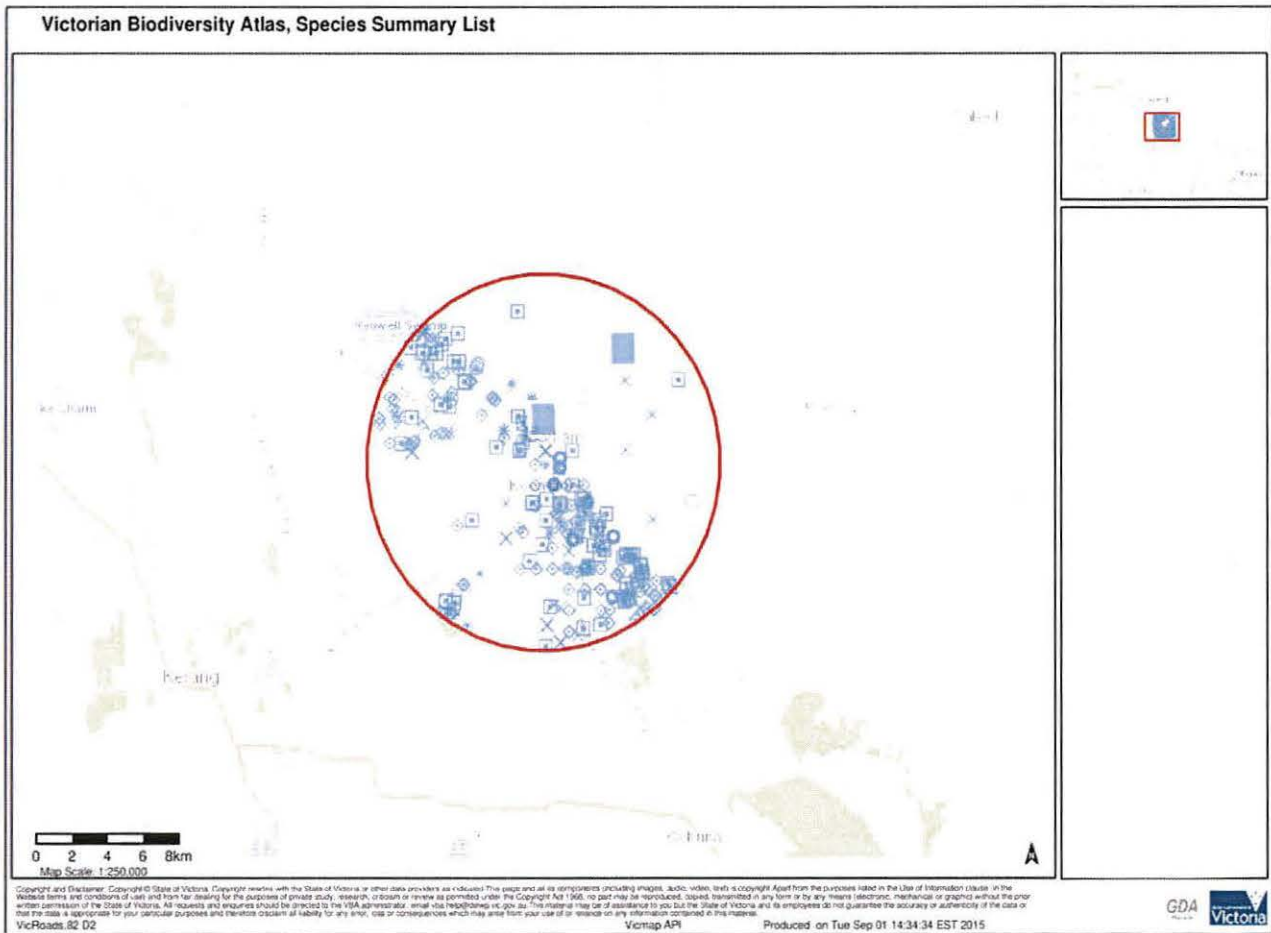
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Victorian Biodiversity Atlas, Species Summary List

(Date: 01/09/2015 02:34 PM)



Selected Area

Type: Buffer Base point: POINT (144.12420070019485 -35.62987894582259) Within: 10000 metres

Common Filter

Scientific Name :	Common Name :
VBA Taxon ID :	Conservation Status : FFG
Taxon Level : Species	Taxon Type :
Other Agency Codes :	Discipline :
Date Since : (dd/mm/yyyy)	Date To : (dd/mm/yyyy)

Sensitive records are in search area

Data Publication Date: 19 Aug 2015

Taxon ID	Scientific Name	Common Name	Victorian Advisory List	Discipline	Taxon Origin	Short Name	Count of Sightings
4663	Nematalosa erebi	Bony Bream		Aquatic fauna, Aquatic invertebrates, Marine		nem ere	2
4786	Craterocephalus stercusmuscarum fulvus	Unspecked Hardyhead		Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		cra ster	1
4871	Maccullochella peelii	Murray Cod	Vulnerable	Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		mac pee	4
4873	Macquaria ambigua	Golden Perch	Near threatened	Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		mac amb	6

5133	Chelodina expansa	Broad-shelled Turtle	Endangered	Aquatic fauna, Terrestrial fauna	3
10050	Porzana pusilla palustris	Baillon's Crake	Vulnerable	Terrestrial fauna	3
10170	Rostratula australis	Australian Painted Snipe	Critically endangered	Terrestrial fauna	2
10174	Burhinus grallarius	Bush Stone-curlew	Endangered	Terrestrial fauna	11
10185	Egretta garzetta nigripes	Little Egret	Endangered	Terrestrial fauna	7
10186	Ardea intermedia	Intermediate Egret	Endangered	Terrestrial fauna	15
10187	Ardea modesta	Eastern Great Egret	Vulnerable	Terrestrial fauna	41
10195	Ixobrychus minutus dubius	Little Bittern	Endangered	Terrestrial fauna	4
10197	Botaurus poiciloptilus	Australasian Bittern	Endangered	Terrestrial fauna	3
10214	Stictonetta naevosa	Freckled Duck	Endangered	Terrestrial fauna	4
10220	Accipiter novaehollandiae novaehollandiae	Grey Goshawk	Vulnerable	Terrestrial fauna	1
10226	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Terrestrial fauna	7
10230	Lophoictinia isura	Square-tailed Kite	Vulnerable	Terrestrial fauna	1
10423	Coracina maxima	Ground Cuckoo-shrike	Vulnerable	Terrestrial fauna	3
10443	Pomatostomus temporalis temporalis	Grey-crowned Babbler	Endangered	Terrestrial fauna	48
10603	Anthochaera phrygia	Regent Honeyeater	Critically endangered	Terrestrial fauna	1
10652	Stagonopleura guttata	Diamond Firetail	Near threatened	Terrestrial fauna	8
10675	Struthidea cinerea	Apostlebird		Terrestrial fauna	2
13117	Pseudophryne bibronii	Brown Toadlet	Endangered	Terrestrial fauna, Aquatic fauna, Aquatic invertebrates	5
501258	Eucalyptus camaldulensis	River Red-gum		Flora	Euca cama 29
503101	Senecio behrianus	Stiff Groundsel	Endangered	Flora	Sene behr 2

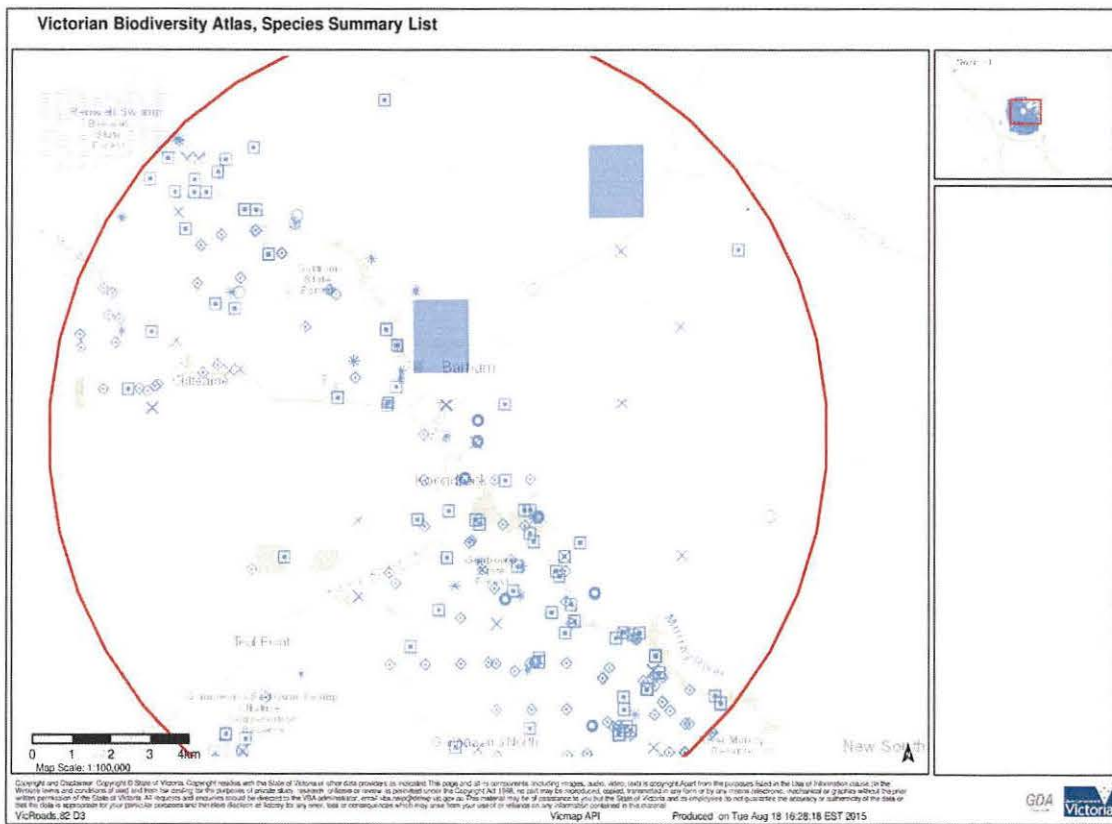
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Victorian Biodiversity Atlas, Species Summary List (Date: 18/08/2015 04:28 PM)



Selected Area

Type: Buffer Base point: POINT (144.12471898568782 -35.63053856173882) Within: 10000 metres

Common Filter

Scientific Name :	Common Name :
VBA Taxon ID :	Conservation Status : EPBC, FFG
Taxon Level : Species	Taxon Type :
Other Agency Codes :	Discipline :
Date Since : (dd/mm/yyyy)	Date To : (dd/mm/yyyy)

Sensitive records are in search area

Data Publication Date: 11 Aug 2015

Taxon ID	Scientific Name	Common Name	Victorian Advisory List	Discipline	Taxon Origin	Short Name	Count of Sightings
4663	Nematalosa erebi	Bony Bream		Aquatic fauna, Aquatic invertebrates, Marine		nem ere	2
4786	Craterocephalus stercusmuscarum fulvus	Unspecked Hardyhead		Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		cra ster	1
4871	Maccullochella peelii	Murray Cod	Vulnerable	Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		mac pee	4
4873	Macquaria ambigua	Golden Perch	Near threatened	Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		mac amb	6
5133	Chelodina expansa	Broad-shelled Turtle	Endangered	Aquatic fauna, Terrestrial fauna			3
10050	Porzana pusilla palustris	Baillon's Crane	Vulnerable	Terrestrial fauna			3
10170	Rostratula australis	Australian Painted Snipe	Critically endangered	Terrestrial fauna			2
10174	Burhinus grallarius	Bush Stone-curlew	Endangered	Terrestrial fauna			11
10185	Egretta garzetta nigripes	Little Egret	Endangered	Terrestrial fauna			9
10186	Ardea intermedia	Intermediate Egret	Endangered	Terrestrial fauna			17
10187	Ardea modesta	Eastern Great Egret	Vulnerable	Terrestrial fauna			43
10195	Ixobrychus minutus dubius	Little Bittern	Endangered	Terrestrial fauna			4
10197	Botaurus poiciloptilus	Australasian Bittern	Endangered	Terrestrial fauna			3

8/18/2015		Victorian Biodiversity Atlas			
10214	<i>Stictonetta naevosa</i>	Freckled Duck	Endangered	Terrestrial fauna	4
10220	<i>Accipiter novaehollandiae novaehollandiae</i>	Grey Goshawk	Vulnerable	Terrestrial fauna	1
10226	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Vulnerable	Terrestrial fauna	8
10230	<i>Lophoictinia isura</i>	Square-tailed Kite	Vulnerable	Terrestrial fauna	1
10423	<i>Coracina maxima</i>	Ground Cuckoo-shrike	Vulnerable	Terrestrial fauna	3
10443	<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	Endangered	Terrestrial fauna	48
10603	<i>Anthochaera phrygia</i>	Regent Honeyeater	Critically endangered	Terrestrial fauna	1
10652	<i>Stagonopleura guttata</i>	Diamond Firetail	Near threatened	Terrestrial fauna	8
10675	<i>Struthidea cinerea</i>	Apostlebird		Terrestrial fauna	2
13117	<i>Pseudophryne bibronii</i>	Brown Toadlet	Endangered	Terrestrial fauna, Aquatic fauna, Aquatic invertebrates	5
501258	<i>Eucalyptus camaldulensis</i>	River Red-gum		Flora	Euca cama 29
503101	<i>Senecio behrianus</i>	Stiff Groundsel	Endangered	Flora	Sene behr 2

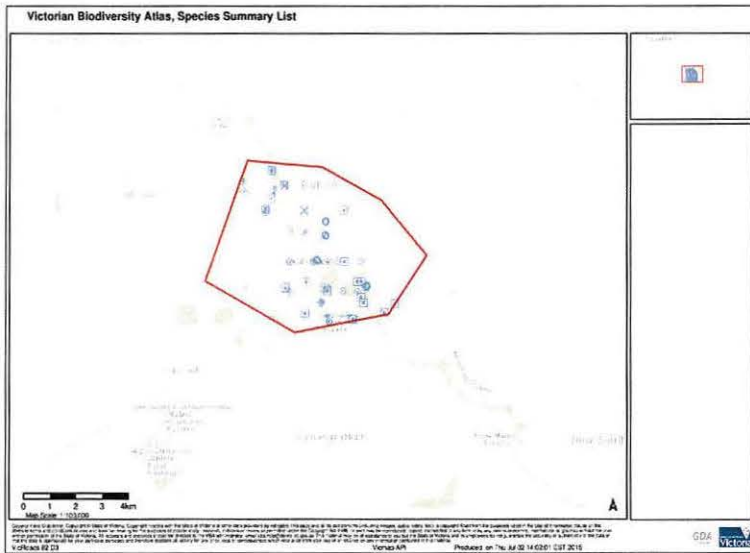
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Victorian Biodiversity Atlas, Species Summary List
(Date: 02/07/2015 02:02 PM)



Selected Area

Type: User Polygon Value: POLYGON ((144.1031 -35.6074,144.0848 -35.6464,144.1224 -35.6634,144.1619 -35.6577,144.1782 -35.6387,144.1594 -35.6207,144.1347 -35.6098,144.1031 -35.6074))

Common Filter

Scientific Name :
 VBA Taxon ID :
 Taxon Level : Species
 Other Agency Codes :
 Date Since : (dd/mm/yyyy)

Common Name :
 Conservation Status : EPBC, FFG
 Taxon Type :
 Discipline :
 Date To : (dd/mm/yyyy)

Data Publication Date:20 Jun 2015

Taxon ID	Scientific Name	Common Name	Victorian Advisory List	Discipline	Taxon Origin	Short Name	Count of Sightings
4871	<i>Maccullochella peelii</i>	Murray Cod	Vulnerable	Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		mac pee	4
4873	<i>Macquaria ambigua</i>	Golden Perch	Near threatened	Aquatic fauna, Aquatic invertebrates, Terrestrial fauna		mac amb	5
5133	<i>Chelodina expansa</i>	Broad-shelled Turtle	Endangered	Aquatic fauna, Terrestrial fauna			2
10185	<i>Egretta garzetta nigripes</i>	Little Egret	Endangered	Terrestrial fauna			1
10186	<i>Ardea intermedia</i>	Intermediate Egret	Endangered	Terrestrial fauna			2
10187	<i>Ardea modesta</i>	Eastern Great Egret	Vulnerable	Terrestrial fauna			3
10443	<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	Endangered	Terrestrial fauna			8
10652	<i>Stagonopleura guttata</i>	Diamond Firetail	Near threatened	Terrestrial fauna			1
10675	<i>Struthidea cinerea</i>	Apostlebird		Terrestrial fauna			2
13117	<i>Pseudophryne bitronii</i>	Brown Toadlet	Endangered	Terrestrial fauna, Aquatic fauna, Aquatic invertebrates			5
501258	<i>Eucalyptus camaldulensis</i>	River Red-gum		Flora		Euca cama	4

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EPBC Act Protected Matters Report

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

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

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

Report created: 13/03/15 15:49:39

[Summary](#)

[Details](#)

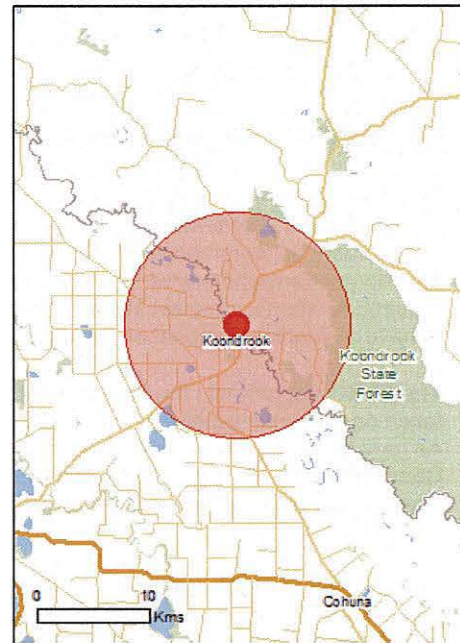
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

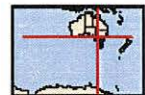
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[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	6
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	21
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	9
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

Place on the RNE:	1
State and Territory Reserves:	8
Regional Forest Agreements:	None
Invasive Species:	27
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (RAMSAR)	[Resource Information]
Name	Proximity
Banrock station wetland complex	Upstream from Ramsar
Coorong and lakes alexandrina and albert	Upstream from Ramsar
Gunbower forest	Within Ramsar site
Kerang wetlands	Within 10km of Ramsar
Nsw central murray state forests	Within Ramsar site
Riverland	Upstream from Ramsar

Listed Threatened Ecological Communities	[Resource Information]	
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Natural Grasslands of the Murray Valley Plains	Critically Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species	[Resource Information]	
Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species

Name	Status	Type of Presence
Pedionomus torquatus Plains-wanderer [906]	Vulnerable	habitat may occur within area Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Bidyanus bidyanus Silver Perch, Bidyan [76155]	Critically Endangered	Species or species habitat likely to occur within area
Craterocephalus fluviatilis Murray Hardyhead [56791]	Endangered	Species or species habitat may occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Nyctophilus corbeni South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Plants		
Austrostipa metatoris [66704]	Vulnerable	Species or species habitat may occur within area
Austrostipa wakoolica [66623]	Endangered	Species or species habitat likely to occur within area
Caladenia tensa Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat likely to occur within area
Lepidium monoplocoides Winged Pepper-cress [9190]	Endangered	Species or species habitat likely to occur within area
Maireana cheelii Chariot Wheels [8008]	Vulnerable	Species or species habitat likely to occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		

Name	Status	Type of Presence
Delma impar Striped Legless Lizard [1649]	Vulnerable	Species or species habitat may occur within area

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

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Migratory Terrestrial Species

Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area

Migratory Wetlands Species

Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Breeding likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

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

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

Name
Commonwealth Land - Australian Telecommunications Commission

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

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

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Breeding likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

Places on the RNE [\[Resource Information \]](#)

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Gunbower Island State Forest	VIC	Indicative Place

State and Territory Reserves [\[Resource Information \]](#)

Name	State
FMA's in MURRAY	NSW
Gannawarra Red Gum Swamp N.C.R.	VIC
Harts Swamp W.R.	VIC
Murrabit B.R.	VIC
Myall B.R. 2	VIC
Pollack	NSW
River Murray Reserve	VIC
River Murray Reserve (non-PV)	VIC

Invasive Species [\[Resource Information \]](#)

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur

Name	Status	Type of Presence
Genista monspessulana		within area
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lycium ferocissimum		
African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp.		
Prickly Pears [82753]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate		
Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla		
Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii		
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Nationally Important Wetlands		[Resource Information]
Name		State
Gunbower Island		VIC
Koondrook and Perricoota Forests		NSW

Coordinates

-35.62851 144.12905

Caveat

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

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

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

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

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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

- migratory and
- marine

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

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

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

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

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

Acknowledgements

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

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

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

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

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You are here: [Home](#) > Atlas search results

Search results

Which species or group?

- All entities
- Animals
- Plants
- Fungi
- Communities
- Threats
- Endangered populations
- Search for a species or group of species (e.g. birds)

[Download records](#) [Save species list](#) [View map](#)

Search criteria: Public Report of all Valid Records of Threatened (listed on TSC Act 1995) Communities in selected area [North: -34.89 West: 143.31 East: 145.09 South: -36.18] returned 0 records for 5 entities.
Report generated on 9/04/2015 3:40 PM.

Displaying 1-5 of 5 species below

To map records for individual species, select up to 5 species then click "view map".
To map all records, click on "view map" (without selecting any species first).

Common name	Scientific name	Map [Clear all]	NSW status	Comm. status	No. of records	
Community Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions		E3		K	
Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions	Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions		E3	E	K	
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions		E3	E	K	
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions		E3	E	K	
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions		E3		K	

[Home](#) > [Threatened species](#) > [Search for threatened species](#) > Find by region and habitat

Combined geographic and habitat search

Use the form below to submit a search

CMA	Murray Fans	Choose a catchment management authority region or sub-region
Habitat Type	Inland Floodplain Woodlands	Search by habitat type.
Species Type	All species types	You can search by all species or by a particular species.
<input type="button" value="Search"/>		

Matching records: 31

[Save to CSV](#)

Click on column headers to sort

CMA sub-region	Scientific name	Common name	NSW status	Commonwealth status	Occurrence	Vegetation class
Murray Fans	Anseranas semipalmata	Magpie Goose	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Ardeotis australis	Australian Bustard	Endangered		Known	Inland Floodplain Woodlands
Murray Fans	Botaurus poiciloptilus	Australasian Bittern	Endangered	Endangered	Known	Inland Floodplain Woodlands
Murray Fans	Burhinus grallarius	Bush Stone-curlew	Endangered		Known	Inland Floodplain Woodlands
Murray Fans	Certhionyx variegatus	Pied Honeyeater	Vulnerable		Predicted	Inland Floodplain Woodlands
Murray Fans	Chalinolobus picatus	Little Pied Bat	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Circus assimilis	Spotted Harrier	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Daphoenositta chrysoptera	Varied Sittella	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Eucalyptus leucoxylon subsp. pruinosa	Boland Yellow Gum	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Falco hypoleucos	Grey Falcon	Endangered		Known	Inland Floodplain Woodlands
Murray Fans	Grantiella picta	Painted Honeyeater	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Grus rubicunda	Brolga	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Hamirostra melanosternon	Black-breasted Buzzard	Vulnerable		Predicted	Inland Floodplain Woodlands
Murray Fans	Hieraetus morphnoides	Little Eagle	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Lepidium monoplacoides	Winged Peppergrass	Endangered	Endangered	Known	Inland Floodplain Woodlands
Murray Fans	Litoria raniformis	Southern Bell Frog	Endangered	Vulnerable	Known	Inland Floodplain Woodlands
Murray Fans	Lophochroa	Major Mitchell's	Vulnerable		Known	Inland Floodplain

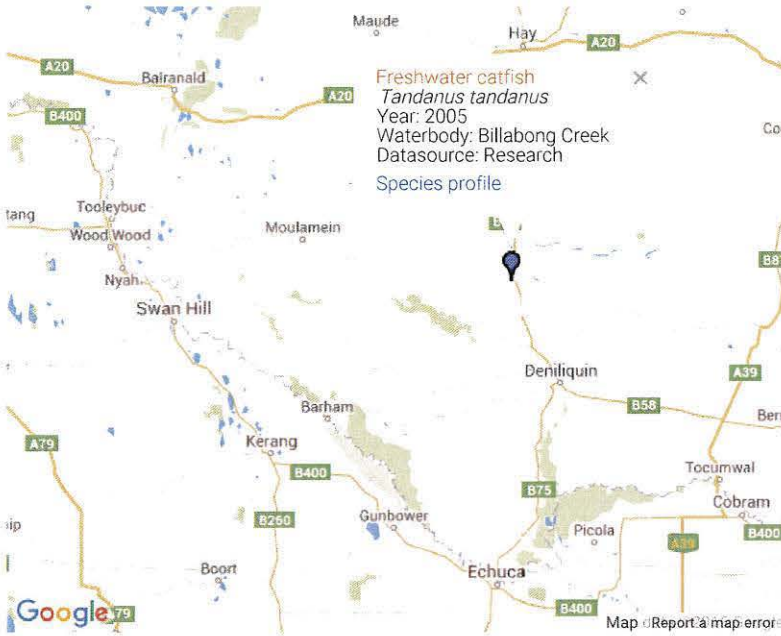
	leadbeateri	Cockatoo				Woodlands
Murray Fans	Lophoictinia isura	Square-tailed Kite	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Ninox connivens	Barking Owl	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Pachycephala inornata	Gilbert's Whistler	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Petaurus norfolcensis	Squirrel Glider	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Phascolarctos cinereus	Koala	Vulnerable	Vulnerable	Known	Inland Floodplain Woodlands
Murray Fans	Polytelis anthopeplus monarchoides	Regent Parrot (eastern subspecies)	Endangered	Vulnerable	Known	Inland Floodplain Woodlands
Murray Fans	Polytelis swainsonii	Superb Parrot	Vulnerable	Vulnerable	Known	Inland Floodplain Woodlands
Murray Fans	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Rostratula australis	Australian Painted Snipe	Endangered	Endangered	Known	Inland Floodplain Woodlands
Murray Fans	Saccolaimus flaviventris	Yellow-bellied Sheath-tail-bat	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Stagonopleura guttata	Diamond Firetail	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Stictonetta naevosa	Freckled Duck	Vulnerable		Known	Inland Floodplain Woodlands
Murray Fans	Tyto novaehollandiae	Masked Owl	Vulnerable		Known	Inland Floodplain Woodlands



Home » Fishing and aquaculture » Species protection » Records

Threatened & protected species - records viewer

Records for this map are from the NSW Department of Primary Industries research surveys, they do not indicate the entire distribution of the species and there may be errors and omissions. To view the records using Google Earth you must download and install the Google Earth Plugin.

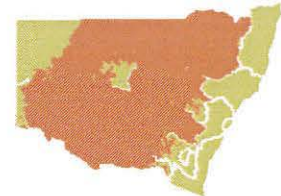


Records search

Step 1
 Select an area type to search by:
 Statewide
 Catchment Management Authority
 Local Government Area

Step 2
 Select a species:
 Australian grayling
 Eastern cod
 Freshwater catfish
 Macquarie perch
 Murray cod

Step 3
 Select a time period:
 pre 1980
 post 1980
 all records



NOTE: The map depicts the expected distribution of this species in NSW. The records indicate locations where the species has been found.

Records

- Freshwater catfish**
 Waterbody: Peel River Year: 2009 Datasource: Research
- Freshwater catfish**
 Waterbody: Cockburn River Year: 2009 Datasource: Research
- Freshwater catfish**
 Waterbody: Cockburn River Year: 2009 Datasource: Research
- Freshwater catfish**
 Waterbody: Peel River Year: 2009 Datasource: Research
- Freshwater catfish**
 Waterbody: Peel River Year: 2009 Datasource: Research





Home » Fishing and aquaculture » Species protection » Records

Threatened & protected species - records viewer

Records for this map are from the NSW Department of Primary Industries research surveys, they do not indicate the entire distribution of the species and there may be errors and omissions. To view the records using Google Earth you must download and install the Google Earth Plugin.

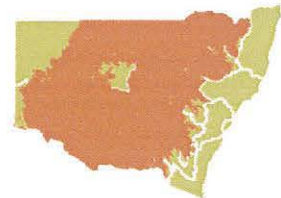


Records search

Step 1
Select an area type to search by:
 Statewide
 Catchment Management Authority
 Local Government Area

Step 2
Select a species:
 Australian grayling
 Eastern cod
 Freshwater catfish
 Macquarie perch
 Murray cod

Step 3
Select a time period:
 pre 1980
 post 1980
 all records



NOTE: The map depicts the expected distribution of this species in NSW. The records indicate locations where the species has been found.

Records

Murray cod	Waterbody: Barwon River Year: 2002 Datasource: Research
Murray cod	Waterbody: Barwon River Year: 2002 Datasource: Research
Murray cod	Waterbody: Barwon River Year: 2002 Datasource: Research
Murray cod	Waterbody: Barwon River Year: 2002 Datasource: Research
Murray cod	Waterbody: Warrah Creek Year: 2002 Datasource: Research

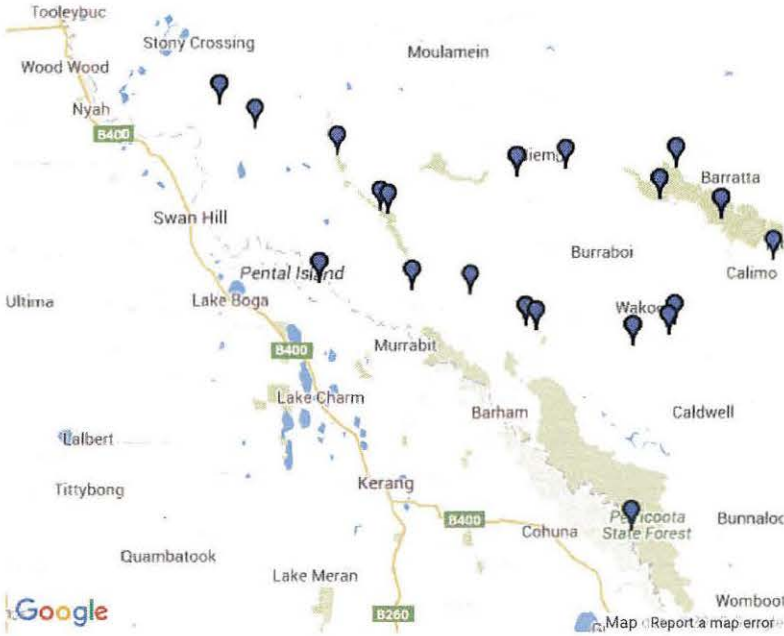




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Threatened & protected species - records viewer

Records for this map are from the NSW Department of Primary Industries research surveys, they do not indicate the entire distribution of the species and there may be errors and omissions. To view the records using Google Earth you must download and install the Google Earth Plugin.

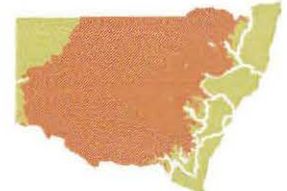


Records search

Step 1
Select an area type to search by:
 Statewide
 Catchment Management Authority
 Local Government Area

Step 2
Select a species:
 Purple-spotted gudgeon
 River blackfish
 Silver perch
 Southern pygmy perch
 Trout cod

Step 3
Select a time period:
 pre 1980
 post 1980
 all records



NOTE: The map depicts the expected distribution of this species in NSW. The records indicate locations where the species has been found.

Records

- Silver perch**
Waterbody: Murrumbidgee River Year: 2009 Datasource: Research
- Silver perch**
Waterbody: Wyangala Dam Year: 2009 Datasource: Research
- Silver perch**
Waterbody: Murray River Year: 2009 Datasource: Research
- Silver perch**
Waterbody: Murray River Year: 2009 Datasource: Research
- Silver perch**
Waterbody: Murray River Year: 2009 Datasource: Research



APPENDIX C THREATENED SPECIES EVALUATIONS

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations listed for Barham in the *Atlas of NSW Wildlife*² and those identified as potentially occurring in the area according to the Commonwealth EPBC *Protected Matters Search Tool*³.

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.

² The *Atlas of NSW Wildlife* is administered by the NSW Department of Environment, Climate Change and Water (OEH) and is an online database of fauna and flora records that contains over four million recorded sightings.

³ 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, Water, Heritage and the Arts.

C.1 FLORA

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
FLORA				
A Spear Grass <i>Austrostipa metatoris</i> EPBC-V TSC – V	Occurs in the Murray Valley, from the central-western slopes to the far south-western plains. Sites include Cunninyeuk Station, Stony Crossing, Kyalite State Forest and Lake Cargelligo. Grows in sandy areas of the Murray Valley; habitats include sandhills, sandridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils. Associated species include <i>Eucalyptus populnea</i> , <i>E. intertexta</i> , <i>Callitris glaucophylla</i> , <i>Casuarina cristata</i> , <i>Santalum acuminatum</i> and <i>Dodonaea viscosa</i> . Flowers in response to rain. It is not known if fire plays a role in the ecology of this species although most species of <i>Austrostipa</i> provide an abundance of highly flammable ephemeral fuel in periods following above-average rainfall. Recorded in populations as locally frequent or dominant only in scattered patches.	Marginal – Species occurs on floodplains of the Murray River, although associated species were not recorded within the proposal site.	Unlikely – Areas around the bridge to be affected by the work consists of mown grassland and disturbed embankment areas with minimal groundcover vegetation.	No
A Spear Grass <i>Austrostipa wakoolica</i> EPBC – E TSC - E	A densely-tufted, perennial spear-grass that grows to one metre tall. 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. Recorded as common in the Mairjimmy State Forest population. 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 <i>Callitris glaucophylla</i> , <i>Eucalyptus microcarpa</i> , <i>E. populnea</i> , <i>Austrostipa eremophila</i> , <i>A. drummondii</i> , <i>Austrodanthonia eriantha</i> and <i>Einadia nutans</i> . Flowers from October to December, mainly in response to rain. Seed dispersal is mainly by wind, rain and flood events; the awn and sharp point of the floret appear to be an adaptation for burying the seed into the soil; grass	Marginal – Species occurs on floodplains of the Murray River, although associated species were not recorded within the proposal site.	Unlikely – Areas around the bridge to be affected by the work consists of mown grassland and disturbed embankment areas with minimal groundcover vegetation.	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	seed is traditionally believed to be viable for three to five years, so a long-lived seed bank is considered unlikely for this species.			
Caladenia tensa Greencomb Spider-orchid EPBC - E	<p>Historically, the Greencomb Spider-orchid was widespread on aeolian sand deposits surrounding, and including, the Little Desert in western Victoria and south-east South Australia. The species was found within the areas of the Murray-Darling Depression bioregion and generally associated with 300–400 mm annual rainfall areas (Todd 2000).</p> <p>In the early 1990s, the species was considered to be confined to western Victoria: in the Murray Mallee, Lowan Mallee and Wimmera Natural Regions (Conn 1993). The orchid has been recorded at: Little Desert Camping Ground; Little Desert - Tallageira Track; Little Desert - Plains Track; and Little Desert - 800 m east of Chinaman Flat (Cross 1995). Todd (2000) described the Victorian distribution as being widespread in, and surrounding, the Little Desert in western Victoria.</p> <p>The Greencomb Spider-orchid grows on red-brown sandy loams on rises in open woodland dominated by Yellow Gum (<i>Eucalyptus leucoxylon sens. lat.</i>) and Rottnest Island Pine (<i>Callitris preissii</i>). 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 (<i>Eucalyptus largiflorens</i>)/Yellow Gum woodland and mallee/heathland (MEL collection records).</p>	Present	Unlikely - This distinctive species was not observed during the site visit.	No
Yellow Gum <i>Eucalyptus leucoxylon</i> subsp. <i>pruinosa</i> TSC-V	Yellow Gum is a small to medium-sized tree growing to about 20 m high. It has dark, rough-scaly bark at the base (rarely higher); the rest is smooth, grey, mottled yellow or white and bluish-grey, deciduous, shedding in oval patches above. The adult leaves are alternate, narrow to broadly lanceolate, 4-7 cm long 3-3.5 cm wide, stalked. The juvenile leaves are opposite, sessile and heart-shaped, pruinose (bluish green or grey) with a white surface wax. Flowers are whitish, borne in clusters of three, each cluster on a drooping slightly flattened common stalk. Flowering winter (May) to summer (December). Buds are 1.2 cm long and 0.7 cm wide, the cap conical to beaked, as long or longer than the base. The fruit are ovoid, flattened on top, 1.7 cm long and 1.6 cm in diameter, on a slender short stalk, the valves deeply enclosed. Restricted to several	Present – Species known to occur along the Murray River around Barham and Euston.	None – Species was not identified within the proposal area.	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	small areas between Barham and Euston. This species is not known from any protected area within NSW, though some remnants occur within State Forests along the Murray River, particularly within Campbells Island and Euston State Forests.			
Winged Peppergrass <i>Lepidium monoplocoides</i> TSC – E EPBC - E	Erect annual herb or perennial forb, 15-20 cm high. Widespread in the semi-arid western plains regions of NSW. Collected from widely scattered localities, with large numbers of historical records but few recent collections. There is a single collection from Broken Hill and only two collections since 1915, the most recent being 1950. Also previously recorded from Bourke, Cobar, Urana, Lake Cargelligo, Balranald, Wanganella and Deniliquin. Recorded more recently from the Hay Plain, south-eastern Riverina, and from near Pooncarie. Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by <i>Allocasuarina luehmannii</i> (Bulloak) and/or eucalypts, particularly <i>Eucalyptus largiflorens</i> (Black Box) or <i>Eucalyptus populnea</i> (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses. Recorded in a wetland-grassland community comprising <i>Eragrostis australasicus</i> , <i>Agrostis avenacea</i> , <i>Austrodanthonia duttoniana</i> , <i>Homopholis proluta</i> , <i>Myriophyllum crispatum</i> , <i>Utricularia dichotoma</i> and <i>Pycnosorus globosus</i> , on waterlogged grey-brown clay. Also recorded from a <i>Maireana pyramidata</i> shrubland. Flowers from late winter to spring, or August to October. The species is highly dependent on seasonal conditions. Occurs in periodically flooded and waterlogged habitats and does not tolerate grazing disturbance.	Absent – Associated vegetation communities were not recorded within the study area.	None	No
Chariot Wheels <i>Maireana cheelii</i> TSC-V EPBC-V	Restricted to the southern Riverina region of NSW, mainly in the area between Deniliquin and Hay. Also has a limited distribution in Victoria where very rare. NSW collections have mainly been from the Moulamein, Deniliquin and Hay districts, including Tchelery and Zara Stations. There is an outlying record from “Wangareena east of Wanaaring”. Usually found on heavier, grey clay soils with <i>Atriplex vesicaria</i> (Bladder Saltbush). Recorded on the Hay Plain in <i>Atriplex vesicaria</i> , <i>Maireana aphylla</i> and <i>Acacia homalophylla</i> shrublands. Soils include heavy brown to red-brown clay-loams, hard cracking red clay, other heavy texture-contrast soils. Tends to grow in	Absent – Associated species and habitat not present around the bridge.	None	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	shallow depressions, often on eroded or scalded surfaces, and does not extend to the higher soils in the habitat. It has been found on the edges of bare, windswept clay pans, in shallow depressions of eroded surfaces where rainwater collects and on a "shelf" in the crabhole complex of heavy grey soils. Associated species include <i>Atriplex vesicaria</i> , <i>Maireana pentagona</i> , <i>M. excavata</i> , <i>M. ciliata</i> , <i>Cressa cretica</i> , <i>Avena fatua</i> and <i>Acacia homalophylla</i> . Flowering time is mostly spring to summer. Bears fruits mostly from September to November. The species is never common, with small localised occurrences in scattered localities. It has been recorded as common, dense and very abundant in its localised populations.			
Slender Darling Pea <i>Swainsona murrayana</i> TSC – V EPBC - V	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. The species 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 <i>Maireana</i> 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. The species may require some disturbance and has been known to occur in paddocks that have been moderately grazed or occasionally cultivated. <i>Swainsona</i> species contain a poisoning principle, swainsonine, which affects the nervous system and is toxic to stock.	Absent – Associated vegetation types and <i>Maireana</i> species were not recorded within the study area.	None	No
Stiff Groundsel <i>Senecio behrianus</i> EPBC – E Vic – E	The Stiff Groundsel is an erect, short, woolly perennial forb or small shrub that can grow up to 1 m in height, but more typically growing to between 15-25 cm. The Stiff Groundsel is endemic to Victoria. The species' is known from four populations near Corup (south-west of Kyabram), one near Ballarat and possibly one near Gunbower. All wild populations occupy <0.25 ha in extent. Extant current populations grow on poorly-drained sedimentary grey clays or sandy clays, on or close to floodplains, and on basalt-derived grey cracking clays, in	Present – floodplain is present in the proposal area.	None. The species has is known from only 3 locations, none of which are near the proposal area.	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	<p>periodically flooded depressions. A common feature seems to be that habitats are seasonally inundated, and hydrological regime is probably an important aspect of habitat, although the optimal timing and extent of flooding are unknown. Plant growth appears to be more prolific in areas that are flooded to a depth of 30 cm or more. Populations at Corop tend to grow on slightly raised areas such as drainage channel banks and natural mounds, rather than in the bottom of depressions.</p> <p>Native plants that grow in association with Stiff Groundsel at Corop include Cumbungi (<i>Typha</i> spp.), Lignum (<i>Meuhlenbeckia florulenta</i>), Common Nardoo (<i>Marsilea drummondii</i>), Grey Gernander (<i>Teucrium racemosum</i>), Star-fruit (<i>Damasonium minus</i>), Bindweed (<i>Convolvulus</i> spp.) and Blue Devil (<i>Eryngium ovinum</i>). At the Ballarat site, other native species include Cotton Fireweed (<i>Senecio quadridentatus</i>), Common Blown-grass (<i>Arostis avenaceae</i>) and Prickfoot (<i>Eryngium vesiculosum</i>).</p>			
EEC's				
<p>White box yellow box Blakely's red gum grassy woodland and derived native grassland EEC</p> <p>TSC – EEC EPBC- CEEC</p>	<p>White Box Yellow Box Blakely's Red Gum Woodland (commonly referred to as Box-Gum Woodland) is an open woodland community (sometimes occurring as a forest formation) , in which the most obvious species are one or more of the following: White Box <i>Eucalyptus albens</i>, Yellow Box <i>E. melliodora</i> and Blakely's Red Gum <i>E. blakelyi</i>. Intact sites contain a high diversity of plant species, including the main tree species, additional tree species, some shrub species, several climbing plant species, many grasses and a very high diversity of herbs. 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. The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include Kangaroo Grass (<i>Themeda australis</i>) Poa Tussock (<i>Poa sieberiana</i>), wallaby grasses (<i>Austrodanthonia</i> spp.), spear-grasses (<i>Austrostipa</i> spp.).</p>	<p>Absent – The characteristic tree species of this community were not recorded within the study area.</p>	None	No
<p>Grey Box (Eucalyptus)</p>	<p>Inland Grey Box Woodland includes those woodlands in which the most characteristic tree species, <i>Eucalyptus microcarpa</i> (Inland Grey Box), is often</p>	<p>Absent – The characteristic tree</p>	None	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
<p>microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EPBC – E Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions TSC - E</p>	<p>found in association with <i>E. populnea</i> subsp.<i>bimbil</i> (Bimble or Poplar Box), <i>Callitris glaucophylla</i> (White Cypress Pine), <i>Brachychiton populneus</i> (Kurrajong), <i>Allocasuarina luehmannii</i>(Bulloak) or <i>E. melliodora</i> (Yellow Box), and sometimes with <i>E. albens</i> (White Box). Shrubs are typically sparse or absent, although this component can be diverse and may be locally common, especially in drier western portions of the community. A variable ground layer of grass and herbaceous species is present at most sites. At severely disturbed sites the ground layer may be absent. The community generally occurs as an open woodland 15–25 m tall but in some locations the overstorey may be absent as a result of past clearing or thinning, leaving only an understorey.</p>	<p>species of this community were not recorded within the study area.</p>		
<p>Natural Grasslands of the Murray Valley Plains EPBC - CEEC</p>	<p>The Natural Grasslands of the Murray Valley Plains ecological community occurs on the plains of western and northern Victoria, extending into southern New South Wales. The grasslands are naturally treeless or almost so, with sparse tree cover. Most occurrences of the Natural Grasslands of the Murray Valley Plains ecological community are associated with Quaternary alluvial sediments, consisting of calcareous clay loams and clays on wetter sites, including self-mulching (cracking) clays. The ecological community is mainly restricted to the heavy-textured grey, brown and red clays.</p> <p>The ecological community ranges from open to closed tussock grassland, but may also be dominated or co-dominated by a range of forb species, depending on seasonal conditions and management history. At other sites, the grassland may grade into an</p>	<p>Absent</p>	<p>None</p>	<p>No</p>

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	open grassy shrubland where low chenopod shrubs become co-dominant with the grass component. Trees and large shrubs are generally absent to sparse, amounting to less than 10% projective foliage cover for emergent trees or shrubs within a patch.			
Weeping Myall Woodland EPBC – EEC Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions TSC - E	This ecological community is 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 <i>Acacia pendula</i> (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 stratum may have been reduced or eliminated by clearing or heavy grazing.	Absent – The characteristic tree species of this community was not recorded within the study area.	None	No
Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions EPBC - EEC Allocasuarina luehmannii Woodland in the Riverina and	Allocasuarina luehmannii Woodland has been recorded in the southern part of the Riverina bioregion from near Urana and Mulwala in the east to the Barham district, and may extend as far west as Euston in the southern part of the Murray-Darling Depression bioregion. The community occurs in small patches within this range and is currently estimated to cover less than 500-1500 hectares. Approximately six hectares of Allocasuarina luehmannii Woodland are estimated to occur within Lake Urana and Wiesners Swamp Nature Reserves. The remainder of the community occurs on private land or on public easements. Allocasuarina luehmannii Woodland typically occupies patches of red-brown loamy sands with alkaline sub-soils on the alluvial plain of the Murray River and its tributaries in south-western NSW.	Absent – The characteristic tree species of this community was not recorded within the study area.	None	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
Murray-Darling Depression Bioregions TSC-EEC				
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions TSC - E	Acacia melvillei Shrubland typically has an open canopy of shrubs or small trees, sometimes with scattered mid-stratum shrubs, and with a sometimes sparse, but highly variable ground layer dominated by grasses, chenopods and herbs. The structure and species composition of the community varies depending on disturbance history and temporal variability in rainfall. The open stratum of large shrubs or small trees may be reduced to isolated individuals or may be absent as a result of past clearing. The shrub/tree layer is dominated by Acacia melvillei, either in pure stands or with a range of other less abundant trees or tall shrubs. These may include Nelia (Acacia loderi), Western Rosewood (Alectryon oleifolius subsp. canescens), Belah (Casuarina pauper) and Sugarwood (Myoporum platycarpum).	Absent – The characteristic shrub species of this community was not recorded within the study area.	None	No
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions TSC - E	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 (<i>Callitris glaucophylla</i>). 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 <i>C. glaucophylla</i> , either in pure stands or with a range of other less abundant trees or tall shrubs. The structure and species composition of the community varies depending on disturbance history and temporal variability in rainfall.	Absent – The characteristic tree species of this community was not recorded within the study area.	None	No
Lower Murray River aquatic ecological community	The lower Murray aquatic ecological community includes all native fish and aquatic invertebrates within all natural creeks, rivers and associated lagoons, billabongs and lakes of the regulated portions of the Murray, Murrumbidgee and Tumut rivers, as well as all their tributaries and branches. The community includes 23 native fish species and over 400 recorded native invertebrate species. The lower Murray	Present – This community is present within the study area	Present	Yes - 7 part test applied.

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
FM Act - EEC	ecological community occurs in a lowland riverine environment, characterised by meandering channels and wide floodplains. The land is generally flat to gently sloping.			

TSC-V	Listed as Vulnerable under the Threatened Species Conservation Act
TSC-E	Listed as Endangered under the Threatened Species Conservation Act
TSC-Ex	Listed as 'Presumed Extinct' under the Threatened Species Conservation Act
TSC-EEC	Listed as an Endangered Ecological Community under the Threatened Species Conservation Act
EPBC-V	Listed as Vulnerable under the Environment Protection and Biodiversity Conservation Act
EPBC-E	Listed as Endangered under the Environment Protection and Biodiversity Conservation Act
EPBC-CE	Listed as Critically Endangered under the Environment Protection and Biodiversity Conservation Act
EPBC-CECC	Listed as a Critically Endangered Ecological Community under the Environmental Protection and Biodiversity Conservation Act.
EPBC-Ex	Listed as Extinct under the Environment Protection and Biodiversity Conservation Act

C.2 FAUNA

An evaluation of the likelihood and extent of impact to threatened fauna recorded from within a five kilometre radius of Barham Bridge. Records are from a requested search of the Office of Environment and Heritage (OEH) Wildlife Atlas and the BioNet database. The EPBC Environmental Reporting Tool available from the Department of Environment, Water, Heritage and the Arts website was also undertaken with a five kilometre. Ecology information has been obtained from the Threatened Species Profiles on the NSW OEH website (www.threatenedspecies.environment.nsw.gov.au).

Codes:

Presence of Habitat:

Yes: Potential or known foraging, roosting, nesting, refuge, movement corridor (including movement of genetic material) or other habitat is present within the Proposal Site

No: No potential foraging, roosting, nesting or other habitat is present within the Proposal Site.

Likelihood of Occurrence

None: Species would not occur

Unlikely: Species is not likely to occur

Vagrant: Species could occur on occasion as a vagrant or passing over/across the Proposal Site (usually applies to more mobile species)

Possible: Species could occur and utilise resources in the Proposal Site

Present: Species was recorded during the field investigations.

Possible Impact

No: The proposal would not impact this species or its habitats. No 7-Part Test is necessary for this species



Yes: The proposal could impact this species or its habitats. A 7-Part Test has been completed for this species.

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
FAUNA				
AMPHIBIANS				
Southern Bell Frog <i>Litoria raniformis</i> TSC-E EPBC-V	One of the largest frog species in Australia, these animals may reach up to 104 mm in length, with females usually larger than males. In NSW the species was once distributed along the Murray and Murrumbidgee Rivers and their tributaries, the southern slopes of the Monaro district and the central southern tablelands as far north as Tarana, near Bathurst. 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. Breeding occurs during the warmer months and is triggered by flooding or a significant rise in water levels. The species has been known to breed anytime from early spring through to late summer/early autumn (Sept to April) following a rise in water levels. 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. Tadpoles require standing water for at least four months for development and metamorphosis to occur but can take up to 12 months to develop. 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. Prey includes a variety of invertebrates as well as other small frogs, including young of their own species.	No – This species prefers areas of permanent or ephemeral black box or lignum swamps	None	No
Brown Toadlet <i>Pseudophryne bibronii</i> Vic – E	The Brown Toadlet lives in forests, heathlands and grasslands where it can be heard calling throughout the year, in southeastern Australia. This species is found in dry forest, woodland, shrubland and grassland, and shelters under leaf-litter and other debris in moist soaks and depressions. Calling is from February to August and frogs have been noted calling in temperatures of only 4°C. Between 70 and 200 large eggs are deposited terrestrially on damp leaf mould, in shallow nests or under stones and logs near water, and these hatch after rain floods the area and provides pools for larvae. Metamorphosis takes three to seven months.	Present	Unlikely	No – Leaf litter and/or moist depressions are not present at the proposal site.

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
BIRDS				
Magpie Goose Anseranas semipalmata TSC - V	The Magpie Goose is a large, distinctive black and white water-bird (from 70 - 90 cm long) with a prominent knob on the head, and orange legs. It is black at each 'end' - head, neck and upper chest, plus rump and tail - with white body and wings in between. The Magpie Goose is still relatively common in the Australian northern tropics, but had disappeared from south-east Australia by 1920 due to drainage and overgrazing of reed swamps used for breeding. Since the 1980s there have been an increasing number of records in central and northern NSW. Vagrants can follow food sources to south-eastern NSW. Mainly found in shallow wetlands (less than one metre deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.	No - Wetland areas are not present within the proposal site and species moves to monsoonal areas to breed.	None - This species is highly flight mobile, with no wetland areas located within the study area.	No
Regent Honeyeater Anthochaera Phrygia TSC-CE EPBC-E Vic - CE	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region although breeding has been observed outside these areas. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years non-breeding flocks converge on flowering coastal woodlands and forests. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging	No - Species prefers areas of river sheoak and Box-Ironbark Woodland.	Unlikely - Species may use the vegetation along the river for movement.	No - Work would require some tree removal but this would not affect movement corridors for mobile species.

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises : <i>E. microcarpa</i> , <i>E. punctata</i> , <i>E. polyanthemos</i> , <i>E. mollucana</i> , <i>Corymbia robusta</i> , <i>E. crebra</i> , <i>E. caleyi</i> , <i>Corymbia maculata</i> , <i>E.mckieana</i> , <i>E. macrorhyncha</i> , <i>E. laevopinea</i> , and <i>Angophora floribunda</i> . Nectar and fruit from the mistletoes <i>A. miquelii</i> , <i>A. pendula</i> , <i>A. cambagei</i> are also eaten during the breeding season. When nectar is scarce lerp and honeydew comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings. A shrubby understory is an important source of insects and nesting material. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak.			
Australasian Bittern <i>Botaurus poiciloptilus</i> TSC – E EPBC – E Vic - E	The Australasian Bittern is a large, stocky bird, reaching up to 75 cm in length. Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch.	No - Species prefers areas of wetlands and dense rushes.	Unlikely – Suitable habitat may be present in adjacent areas and the species could use the riparian area for migration.	No - Work would require some tree removal but this would not affect movement corridors for mobile species.
Bush Stone Curlew <i>Burhinus grallarius</i> TSC – E Vic - E	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. The Bush Stone-curlew stands about 55 cm tall. It has a grey to light brown back, marked with black blotches, and a streaked rump. This species has large, bright yellow eyes and a hunch-shouldered stance on long spindly legs. When disturbed it lies flat on	No – Proposal area has limited fallen timber and woodland.	Unlikely	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	the ground, with its head and neck outstretched. Its call is a loud eerie wailing "wee-loo", mostly heard at night. Inhabits open forests and woodlands with a sparse grassy ground layer 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.			
Certhionyx variegatus Pied honeyeater TSC - V	Widespread throughout acacia, mallee and spinifex scrubs of arid and semi-arid Australia. Occasionally occurs further east, on the slopes and plains and the Hunter Valley, typically during periods of drought. Inhabits wattle shrub (primarily Mulga, <i>Acacia aneura</i>), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (<i>Eremophila</i> spp.); also from mistletoes and various other shrubs (e.g. <i>Brachysema</i> spp. and <i>Grevillea</i> spp.); also eats saltbush fruit, berries, seed, flowers and insects.	Absent	Possible	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
Circus assimilis Spotted Harrier TSC - V	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. 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.	Absent	Possible	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
Falco hypoleucos Grey Falcon TSC – 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. Also occurs near wetlands where surface water attracts prey	Absent	Unlikely	No
Grantiella picta Painted Honeyeater TSC – V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occur on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it	Absent	Unlikely	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
EPBC - V	is more likely to be found in the north of its distribution. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.			
Grus rubicunda Brolga TSC – V	The Brolga was formerly found across Australia, except for the south-east corner, Tasmania and the south-western third of the country. It still abundant in the northern tropics, but very sparse across the southern part of its range. Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged.	Present – There is suitable habitat away from the proposal site within 10km	Possible	No
Hamirostra melanosternon Black-breasted Buzzard TSC -V	The Black-breasted Buzzard is found sparsely in areas of less than 500mm rainfall, from north-western NSW and north-eastern South Australia to the east coast at about Rockhampton, then across northern Australia south almost to Perth, avoiding only the Western Australian deserts.	Present	Unlikely	No
Hieraatus morphinoides Little Eagle TSC -V	The Little Eagle is a medium-sized bird of prey that occurs in two colour forms: either pale brown with an obscure underwing pattern, or dark brown on the upperparts and pale underneath, with a rusty head and a distinctive underwing patten of rufous leading edge, pale 'M' marking and black-barred wingtips. Both forms have a black-streaked head with a slight crest, a pale shoulder band on the upperwings, a rather short and square-tipped barred tail, and feathered legs. The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Present	Possible	No
Swift Parrot Lathamus discolor	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia	No – Favoured feed trees are	None	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
EPBC-E TSC-E	to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they 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 <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i> . Return to home foraging sites on a cyclic basis depending on food availability.	not present at the site.		
Lophochroa leadbeateri Major Mitchell Cockatoo TSC – V	Nesting, in tree hollows, occurs throughout the second half of the year; nests are at least one kilometre apart, with no more than one pair every 30 square kilometres. Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines	Present	Possible	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
Lophoictnia isura Square-tailed Kite TSC – V Vic - V	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March.	Present	Possible	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
Melanodryas cucullata cucullata Hooded Robin TSC - V	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. The south-eastern form (subspecies cucullata) is found from Brisbane to Adelaide and throughout much of inland	Present	Possible	No - Given the small area of the proposal the possible impact would

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	NSW, with the exception of the extreme north-west, where it is replaced by subspecies <i>picata</i> . Two other subspecies occur outside NSW.			be mitigated by appropriate safeguards
Ninox connivens Barking Owl TSC - V	The Barking Owl is found throughout continental Australia except for the central arid regions. Although common in parts of northern Australia, the species has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains (especially the Pilliga) and in some northeast coastal and escarpment forests. Many populations have crashed as woodland on fertile soils was cleared, leaving linear riparian strips of remnant trees as the last inhabitable areas. Sometimes extend their home range into urban areas, hunting birds in garden trees and insects attracted to streetlights.	Present	Possible	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
Gilbert's Whistler Pachycephala inornata TSC - V	The Gilbert's Whistler occurs in ranges, plains and foothills in arid and semi-arid timbered habitats. It occurs mostly in mallee shrubland, but also in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests. Within the mallee it is often found in association with spinifex and low shrubs including acacias, hakeas, sennas and grevilleas. In woodland habitats, the understorey comprises dense patches of shrubs. The Gilbert's Whistler forages on or near the ground in shrub thickets and in tops of small trees for spiders and insects such as caterpillars, beetles and ants, and occasionally seeds and fruits are eaten. Breeding takes place from August to November. Patches of dense understorey shrubs associated with mallee or woodland are essential for territorial pairs to breed. Aggregations of nesting pairs are sometimes recorded. Nests are built two metres above the ground in the fork of dense foliage of prickly plants such as acacias. The nest is either a lined cup or sometimes birds use the old nests of other species, particularly disused babbler's nests. The pair holds and defends the territory all year round. Whistlers do not make any regular large-scale movements, though young disperse after fledging.	No - Species prefers areas of box-ironbark forests or Cypress Pine areas in association with Spinifex and low shrubs.	Unlikely - Species may use the vegetation along the river for movement.	No - Work would require some tree removal but this would not affect movement corridors for mobile species.
Plains Wanderer Pedionomus torquatus TSC - E	The Plains-wanderer (<i>Pedionomus torquatus</i>) is a small quail-like bird standing about 12-15 cm tall and weighing 40-95 g. The vast majority (>99%) of records of Plains-wanderers in NSW over the past 30 years come from an area of the western Riverina bounded by Hay and Narrandera on the Murrumbidgee River in the north, the Cobb Highway in the west,	No - Species inhabits grassland areas often with a	None	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
EPBC - CE	the Billabong Creek in the south, and Urana in the east. Even within its western Riverina stronghold, the Plains-wanderer has a very patchy distribution. Surveys in the 1990s across 5,000km ² of the western Riverina covering 37 properties found only 5% of the total area comprised suitable habitat. The amount of high quality habitat in the Riverina drops to 1-2% during very wet or dry years when grasslands become too dense or are grazed too bare for Plains-wanderers (Maher 1997). Its current stronghold is the western Riverina of southern NSW. They occur in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species. Grassland habitat structure is more important than species composition. Preferred habitat typically has 50% bare ground, 10% fallen litter, and the remaining 40% comprised of herbs, forbs and grasses. Most of the vegetation is <5 cm high but some vegetation up to a maximum of 30 cm is important for concealment, grass tussocks are spaced 10-20 cm apart. Individual birds range over about 12 hectares but share around half this area with a mate, meaning that pairs require about 18 hectares of suitable habitat.	high diversity of plant species.		
Regent Parrot Polytelis anthopeplus monachoides TSC-E EPBC-V	The eastern subspecies is restricted to areas around the Murray River in South Australia, Victoria and NSW. In NSW it occurs along the Murray River downstream of Tooleybuc (though there are few records between Mildura and the South Australian border), the Wakool River downstream of Kyalite, and the Murrumbidgee River immediately upstream from the junction with the Murray River and adjoining areas of mallee. There are scattered records along the Darling River as far north as Menindee, but at this stage the species has not been confirmed to breed along this river. The nominate subspecies occurs in south western Western Australia.	Present	Possible	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
Superb Parrot Polytelis swainsonii TSC-V EPBC-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. Nest in small colonies, often with more than one nest in a single tree. Breed between September and January. May forage up to 10 km from nesting sites, primarily in grassy box woodland. Feed in trees and understorey shrubs	Yes – Species inhabits hollows and riparian areas.	Possible - Species could use the vegetation along the Murray River for	No - Only one hollow bearing tree may be removed by the work and this hollow is small and

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	<p>and on the ground and their diet consists mainly of grass seeds and herbaceous plants. Also eaten are fruits, berries, nectar, buds, flowers, insects and grain.</p>		<p>nesting and migration.</p>	<p>would not be used by this species. The removal of trees around the bridge would not affect movement corridors for more mobile species.</p>
<p>Grey Crowned Babbler Pomatostomus temporalis temporalis TSC –V Vic - E</p>	<p>Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Flight is laborious so birds prefer to hop to the top of a tree and glide down to the next one. Birds are generally unable to cross large open areas. Live in family groups that consist of a breeding pair and young from previous breeding seasons. A group may consist of up to fifteen birds. All members of the family group remain close to each other when foraging. A soft ‘chuck’ call is made by all birds as a way of keeping in contact with other group members. 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. Usually two to three eggs are laid and incubated by the female. During incubation, the adult male and several helpers in the group may feed the female as she sits on the nest. Young birds are fed by all other members of the group. Territories range from one to fifty hectares (usually around ten hectares) and are defended all year.</p>	<p>No – Species inhabits Box Woodland and Box-Cypress Pine.</p>	<p>Unlikely - Species may use the vegetation along the river for movement, although this is unlikely due to the fragmented nature around the bridge.</p>	<p>No</p>

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	Territorial disputes with neighbouring groups are frequent and may last up to several hours, with much calling, chasing and occasional fighting.			
Australian Painted Snipe <i>Rostratula australis</i> TSC - E EPBC – E Vic - CE	The Painted Snipe has a scattered distribution in Australia, primarily occurring along the east coast from north Queensland to the Eyre Peninsula in South Australia, and including the majority of New South Wales and Victoria. Scattered records indicate that it may also occur in western Queensland, throughout Western Australia and the Northern Territory. A single record is known from Tasmania. The Painted Snipe inhabits inland and coastal shallow freshwater wetlands, occurring in both ephemeral and permanent wetlands, particularly where there is grass. Individuals have been spotted in artificial dams, sewage ponds and waterlogged grasslands. The movements of the Painted Snipe are poorly known and it may be a migratory species. Sightings of individuals are erratic, and it is thought the species is likely to be nomadic in response to suitable conditions, such as floods. The Painted Snipe forages at night on mud flats and in shallow water. It feeds on invertebrates such as worms, snails and water beetles, and plant material such as seeds. The Painted Snipe nests on the ground amongst tall vegetation such as grass tussocks and reeds. Nests, which consist of a scrape in the ground lined with grass and leaves, are often located on small islands. The female is polyandrous, meaning that she leaves the male to look after the young while she moves on to mate with as many other males as she can attract. Incubation of the eggs and brooding of the young is therefore done by the male alone.	No – Species prefers to inhabit areas of permanent wetlands or waterlogged grasslands.	Unlikely - Species may use the vegetation along the river for movement.	No - Work would require some tree removal but this would not affect movement corridors for mobile species.
<i>Stagonopleura guttata</i> Diamond Firetail TSC – V Vic - NE	The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It 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, though is very rare west of the Darling River.	Present	Possible	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
Stictonetta naevosa Freckled Duck TSC – V Vic - E	The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times.	Present	Possible	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
Ballions Crake <i>Porzana pusilla palustris</i>	This species has an extremely large range. African and Australasian populations of this species are non-migratory or only make local movements in response to seasonal habitat changes. The species frequents similar habitats throughout its range and throughout the year, although its breeding areas are characterised by low, dense, tussocky or continuous vegetation such as flooded sedges and grasses. It inhabits freshwater, brackish or saline marshy wetlands, both inland and coastal (Australasia), permanent and temporary, with dense emergent and floating vegetation (especially reeds, rushes, sedges, tall dense grasses and Typha spp.). Typical habitats include marshes, swamps, peat bogs, flooded meadows, damp grassland, seasonally flooded pans and depressions, tussocky grassland interspersed with patches of mud on the margins of open water (e.g. lakes and reservoirs), pools in sand-dunes, swampy creeks, rivers and streams, tall reedbeds (2-3 m high) with extensive mud, shallow puddles and Sesbania bushes, and occasionally salt-marsh	Absent	None	No
Little Egret <i>Egretta garzetta nigripes</i> Vic – E	The Little Egret is found mainly in coastal and inland areas of northern, eastern and south-eastern Australia. The Little Egret frequents tidal mudflats, saltwater and freshwater wetlands, and mangroves.	Absent	None	No
Intermediate Egret <i>Ardea intermedia</i> Vic – E	Occupying a great variety of habitats, the intermediate egret is mainly found around shallow inland freshwater areas with abundant emergent aquatic vegetation. This includes habitats such as seasonally flooded marshes, inland deltas, ponds, swamp forests,	Absent	None	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	freshwater swamps, pools, rivers, streams, rice-fields, wet meadows, and flooded and dry pastures near water.			
Grey Goshawk <i>Accipiter novaehollandiae novaehollandiae</i> Vic – V	The Grey Goshawk is found in coastal areas in northern and eastern Australia. The white morph is predominant in the more open forests of north-western Australia and coastal Victoria and is the only form found in Tasmania. The grey morph is more common in the thicker, sub-tropical forests of the east coast. The Grey Goshawk is found in most forest types, especially tall closed forests, including rainforests.	Absent	None	No
Ground Cuckoo-Shrike <i>Coracina maxima</i> Vic – V	This species has an extremely large range. Inhabits open, usually rather dry, lightly timbered country, including low eucalypt woodland.	Present	Unlikely	No – Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
Tyto novaehollandiae Masked Owl TSC - V	A medium-sized owl to 40 - 50 cm long, with dark eyes set in a prominent flat, heart-shaped facial disc that is encircled by a dark border. The feet are large and powerful, with fully feathered legs down to the toes. The owl exists in several colour forms, with wide variation in plumage. The upperparts are grey to dark brown with buff to rufous mottling and fine, pale spots. The wings and tail are well barred. The underparts are white to rufous-brown with variable dark spotting. The palest birds have a white face with a brown patch around each eye; the darkest birds have a chestnut face. The dark form of the Masked Owl is much browner than the Sooty Owl <i>Tyto tenebricosa</i> . Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution.	Present	Possible	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
MAMMALS				

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
Little Pied Bat <i>Chalinolobus picatus</i> TSC-V	The Little Pied Bat is a distinctive black and white bat that weighs four to eight grams. The head and body are about 4.5 cm in length; the tail 3.5 cm. The fur is glossy black on the back, grey on the belly, with white fur along the flanks forming a 'V' in the pubic area. The Little-Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria. Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, Bimbil box. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. Can tolerate high temperatures and dryness but need access to nearby open water. Feeds on moths and possibly other flying invertebrates.	No - Preferred habitat not present on site.	Unlikely	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
Southern Myotis <i>Myotis macropus</i> TSC-V	The Large-footed 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 by raking their feet across the water surface. In NSW females have one young each year usually in November or December.	Yes – Species occurs along major rivers where it forages for food and nests in hollow bearing trees and under bridges.	Present - This species was observed foraging over open water adjacent to the bridge. No evidence of the species utilising the bridge for roosting was observed.	Yes - 7-part test applied.
Corben's Long-eared Bat <i>Nyctophilus corbeni</i> TSC-V EPBC-V	The Corben's Long-eared Bat is also known as Eastern Long-eared Bat. It is uniformly dark grey-brown. The ears are about three centimetres long and larger than the head. Overall, the distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. It inhabits a variety of vegetation types, including mallee, bullocke <i>Allocasuarina leuhmanni</i> 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. This species is a low flying agile bat, utilising the understorey to hunt	No – Associated vegetation types are not present within the study area. Species may fly over the site.	Unlikely - This species is highly mobile and can traverse to other adjacent areas for habitat.	No

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
	non-flying prey - especially caterpillars and beetles - and will even hunt on the ground. Mating takes place in autumn with one or two young born in late spring to early summer.			
<i>Petaurus norfolcensis</i> Squirrel Glider TSC - V	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	Present	Possible The nearest record is about 25 kms south east within the Koondrook State Forest	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
Koala <i>Phascolarctos cinereus</i> (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) TSC - V EPBC - V	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. It was briefly historically abundant in the 1890s in the Bega District on the south coast of NSW, although not elsewhere, but it now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands.	Present	Possible	No - Given the small area of the proposal the possible impact would be mitigated by appropriate safeguards
<i>Saccolaimus flaviventris</i>	The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There	Present	Possible	No - Given the small area of the proposal the possible

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
Yellow-bellied Sheath-tail-bat TSC - V	<p>are scattered records of this species across the New England Tablelands and North West Slopes.</p> <p>Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.</p> <p>When foraging for insects, flies high and fast over the forest canopy, but lower in more open country.</p> <p>Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.</p> <p>Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.</p>			impact would be mitigated by appropriate safeguards
FISH				
Silver Perch Bidyanus bidyanus FM-V	<p>Silver perch are a moderate to large freshwater fish native to the Murray-Darling river system. Silver perch are oval shaped with a small head that can become beak-like in larger fish. Silver perch were once widespread and abundant throughout most of the Murray-Darling river system. They have now declined to low numbers or disappeared from most of their former range. Silver perch seem to prefer fast-flowing, open waters, especially where there are rapids and races, however they will also inhabit warm, sluggish water with cover provided by large woody debris and reeds. They are omnivorous, feeding on small aquatic insects, molluscs, earthworms and green algae. Males reach sexual maturity at three years of age, when around 25 cm in length, and females at five years, when around 29 cm. Adults migrate upstream in spring and summer to spawn. Juveniles also sometimes move upstream in response to rising water temperatures and levels. Females can shed 300,000 or more semi-buoyant eggs of about 2.75 mm in diameter. The eggs develop in a few days to become feeding larvae that drift downstream.</p>	<p>Marginal - Species is known to inhabit slow flowing rivers, however, cover is absent for this species within the study area.</p>	<p>Possible - This species may occupy areas within the Murray River; however the study area provides limited habitat due to the absence of in-stream vegetation cover. The species is likely to migrate</p>	<p>Yes Assessment of significance completed</p>

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
			through the study area.	
Craterocephalus fluviatilis Murray Hardyhead FM-CE	Murray hardyhead is a species of small freshwater fish, native to inland parts of south-eastern Australia. They were once widespread and abundant in the Murray and Murrumbidgee river systems in southern NSW and northern Victoria; however, they have suffered a serious population decline, and now seem to be limited to a few sites, mainly in northern Victoria. There are very few recent records of Murray hardyhead in NSW. Murray hardyhead grow to about 72mm in length. Murray hardyheads live along the edges of slow-flowing lowland rivers and in lakes, billabongs and backwaters. They are often found amongst aquatic weeds, in both fresh and quite saline waters. They probably feed on aquatic insects, crustaceans and some plant material. Further research is needed to confirm this. Spawning occurs in the warmer months from about October to February. The eggs are randomly dispersed amongst aquatic vegetation.	Marginal - General habitat is present (slow flowing river) however specific aquatic vegetation is not present at the site.	Unlikely - Proposal site does not provide the in-stream vegetation for this species.	No - No aquatic vegetation would be impacted
Macquarie Perch Macquaria australasica EPBC-E FM-E	Macquarie perch are found in both river and lake habitats; especially the upper reaches of rivers and their tributaries. They are quiet, furtive fish that feed on aquatic insects, crustaceans and molluscs. Sexual maturity occurs at two years for males and three years for females. Macquarie perch spawn in spring or summer in shallow upland streams or flowing parts of rivers. Females produce around 50,000-100,000 eggs which settle among stones and gravel of the stream or river bed. Occurs in lakes and flowing streams usually in deep holes with rock or gravel substrates. Inhabits cool, clear water of rivers, lakes and reservoirs.	No - River bed is predominately silty with scattered rock but no deep rock pools.	Unlikely - Species typically occupies upper reaches of rivers around rocky areas.	No
Murray Cod Maccullochella peelii peelii EPBC - V	The Murray Cod is the largest freshwater fish found in Australia. It is a long lived predator species that is highly territorial and aggressive. It occurs naturally in the waterways of the Murray-Darling Basin in a wide range of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers and billabongs. The upper reaches of the Murray and Murrumbidgee Rivers are considered too cold to contain suitable habitat. Murray Cod spawn in spring.	Present - Limited cover over the river. Limited snags and overhanging vegetation in the study area.	Possible - This species may occupy areas within the Murray River; however the aquatic habitat attributes in the	Yes EPBC Assessment of significance completed

Species & Listing*	Ecology	Presence of Habitat	Likelihood of Occurrence	Possible Impact?
			proposal site are poor.	
Trout Cod Maccullochella macquariensis FM-E EPBC-E	The trout cod is a large, elongated, deep-bodied fish which is very similar in appearance to the Murray cod. Features which distinguish it from the Murray cod include an overhanging upper jaw, a long, broad, rounded snout, a straight head profile, and relatively large eyes. Trout cod are often found close to cover and in relatively fast currents, especially in fairly deep water close to the bank, and often congregate around snags. They tend to remain at the one site and to have small home ranges. They are carnivores, preying mainly on other fishes as well as crustaceans and aquatic insects.	No - Limited cover along the river in the study area and water was slow flowing.	None - Study area does not support suitable habitat for this species	No
Murray-Darling Population of Eel Tailed Catfish	<p>Eel Tailed Catfish are naturally distributed throughout the Murray-Darling Basin and in the Eastern drainages NSW north of Newcastle. Eel Tailed Catfish numbers in the Murray-Darling Basin have declined due to a range of factors including invasive species, habitat degradation, cold water pollution and fishing pressures and are now virtually absent from the Murray, Murrumbidgee and Lachlan catchments</p> <p>Tandanus tandanus is non migratory and lives in a wide range of habitats including rivers, creeks, lakes, billabongs and lagoons, and although it inhabits flowing streams, prefers sluggish or still waters. It can be found in clear to turbid waters, and over substrates ranging from mud to gravel and rock. It is rare in natural riverine habitats but can be found in farm dams through-out inland NSW and southern Queensland. Moderate remnant populations occur in the Macquarie catchment upstream of Warren, the Castlereagh catchment upstream of Mendooran, the Namoi catchment upstream of Wee Waa, the Gwydir catchment upstream of Moree and the Border Rivers catchment upstream of Goondiwindi.</p> <p>Catfish are now rare or absent from all rivers and creeks in Victoria as well as many of the major tributaries in NSW including the Murray, Darling, Murrumbidgee and Lachlan rivers. No T. tandanus were recorded from the Murray Region and only 58 from the Darling in the NSW Rivers Survey. There has been a significant and rapid decline in the abundance of Tandanus tandanus in riverine habitats in the Murray/Darling Basin.</p>	Present - Limited cover over the river. Limited snags and overhanging vegetation in the study area.	Unlikely - This species may occupy areas within the Murray River; however the species are now virtually absent from the Murray, Murrumbidgee and Lachlan catchments	No - Suitable controls would be implemented to ensure minimal impact on water quality and fish passage would not be blocked in any way.

* Listings

TSC-V	Listed as Vulnerable under the Threatened Species Conservation Act
TSC-E	Listed as Endangered under the Threatened Species Conservation Act
EPBC-V	Listed as Vulnerable under the Environment Protection and Biodiversity Conservation Act
EPBC-E	Listed as Endangered under the Environment Protection and Biodiversity Conservation Act
EPBC-CE	Listed as Critically Endangered under the Environment Protection and Biodiversity Conservation Act
FM-V	Listed as Vulnerable under the Fisheries Management Act
FM-E	Listed as Endangered under the Fisheries Management Act
FM-CE	Listed as Critically Endangered under the Fisheries Management Act

Migratory

EPBC Act listed migratory and overfly species, ecology, likelihood of presence and likelihood of impact from the proposed bridge rehabilitation work. Unless otherwise indicated, information on ecology is sourced from the Department of Environment Species Profiles and Threats Database (SPRAT). Due to the location of the Proposal site exclusively marine species were not considered in the assessment.

Species Listing*	& Ecology	Presence of Habitat	Nearest Records	Likelihood of Occurrence	Possible Impact?
Migratory Terrestrial Species Birds					
White Bellied Sea Eagle Haliaeetus leucogaster EPBC-MT Vic - V	White-bellied Sea-Eagles are a common sight in coastal and near coastal areas of Australia. In addition to Australia, the species is found in New Guinea, Indonesia, China, south-east Asia and India. White-bellied Sea-Eagles are normally seen perched high in a tree, or soaring over waterways and adjacent land. Birds form permanent pairs that inhabit territories throughout the year. The White-bellied Sea-Eagle feeds mainly off aquatic animals, such as fish, turtles and sea snakes, but it takes birds and mammals as well. It is a skilled hunter, and will attack prey up to the size of a swan. Sea-Eagles also feed on carrion (dead prey) such as sheep and fish along the waterline. They harass smaller birds, forcing them to drop any food that they are carrying. Sea-Eagles feed alone, in pairs or in family groups. White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession. The nest can be located in a tree up to 30 m above the ground, but may also be placed on the ground or on rocks, where there are no suitable trees. At the start of the breeding season, the nest is lined with fresh	No - Study area outside species distribution.	N/A	None - No habitat would be affected.	No

Species Listing*	& Ecology	Presence of Habitat	Nearest Records	Likelihood of Occurrence	Possible Impact?
	green leaves and twigs. The female carries out most of the incubation of the white eggs, but the male performs this duty from time to time.				
White Throated Needletail Hirundapus caudacutus EPBC-MT	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. They are aerial birds and for a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity. The White-throated Needletail feeds on flying insects, such as termites, ants beetles and flies. They catch the insects in flight in their wide gaping beaks. Birds usually feed in rising thermal currents associated with storm fronts and bushfires and they are commonly seen moving with wind fronts. White-throated Needletails are non-breeding migrants in Australia.	No - Possible vagrant or occasional visitor to the area but unlikely to use habitats in the study area.	N/A	None - Highly mobile migratory species which would not be reliant upon any of the habitats to be impacted by the proposal.	No
Rainbow Bee-eater Meropus ornatus EPBC-MT	The Rainbow Bee-eater is found throughout mainland Australia, as well as eastern Indonesia, New Guinea and, rarely, the Solomon Islands. In Australia it is widespread, except in desert areas, and breeds throughout most of its range, although southern birds move north to breed. The Rainbow Bee-eater is most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites such as quarries, cuttings and mines to build its nesting tunnels. Southern populations	Yes - Species prefers areas near water such as rivers and creek lines.	N/A	Unlikely - Highly mobile migratory species which would not be reliant upon any of the habitats to be impacted by the bridge rehabilitation work.	No

Species Listing*	& Ecology	Presence of Habitat	Nearest Records	Likelihood of Occurrence	Possible Impact?
	<p>move north, often in huge flocks, during winter; northern populations are present year round. Rainbow Bee-eaters eat insects, mainly catching bees and wasps, as well as dragonflies, beetles, butterflies and moths. They catch flying insects on the wing and carry them back to a perch to beat them against it before swallowing them. Bees and wasps are rubbed against the perch to remove the stings and venom glands.</p>				
<p>Regent Honeyeater Xanthomyza Phrygia EPBC-MT Vic - CE</p>	<p>The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region although breeding has been observed outside these areas. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years non-breeding flocks converge on flowering coastal woodlands and forests. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. The Regent Honeyeater is a generalist forager,</p>	<p>No – Species prefers areas of river sheak and Box-Ironbark Woodland.</p>	<p>Species has been recorded twice within a 5km radius of the proposal site.</p>	<p>Unlikely - Species may use the vegetation along the river for movement.</p>	<p>No - Work would require some tree removal but this would not affect movement corridors for mobile species.</p>

Species Listing*	& Ecology	Presence of Habitat	Nearest Records	Likelihood of Occurrence	Possible Impact?
	<p>which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises : <i>E. microcarpa</i>, <i>E. punctata</i>, <i>E. polyanthemos</i>, <i>E. mollucana</i>, <i>Corymbia robusta</i>, <i>E. crebra</i>, <i>E. caleyi</i>, <i>Corymbia maculata</i>, <i>E.mckieana</i>, <i>E. macrorhyncha</i>, <i>E. laevopinea</i>, and <i>Angophora floribunda</i>. Nectar and fruit from the mistletoes <i>A. miquelii</i>, <i>A. pendula</i>, <i>A. cambagei</i> are also eaten during the breeding season. When nectar is scarce lerp and honeydew comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings. A shrubby understorey is an important source of insects and nesting material. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak.</p>				
Migratory Wetland Species - Birds					
Great Egret <i>Ardea alba</i> EPBC-MW EPBC-MM Vic - V	<p>Great Egrets occur throughout most of the world. They are common throughout Australia, with the exception of the most arid areas. Great Egrets prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands. Great Egrets can be seen alone or in small flocks, often with other egret species, and roost at night in groups. The Great Egret usually feeds alone. It feeds on molluscs, amphibians, aquatic insects, small reptiles, crustaceans and</p>	<p>Marginal – Species typically occurs in shallow water and may forage along the river bank, although suitable nesting habitat is</p>	N/A	<p>Unlikely - Species may occur as a vagrant at the site but would not be reliant upon any of the habitats to be impacted by the</p>	No

Species Listing*	& Ecology	Presence of Habitat	Nearest Records	Likelihood of Occurrence	Possible Impact?
	occasionally other small animals, but fish make up the bulk of its diet. The Great Egret usually hunts in water, wading through the shallows, or standing motionless before stabbing at prey. Birds have also been seen taking prey while in flight. The Great Egret breeds in colonies, and often in association with cormorants, ibises and other egrets. Both sexes construct the nest, which is a large platform of sticks, placed in a tree over the water. The previous years' nest may often be re-used. Both sexes also incubate the eggs and care for the young (usually two or three).	not present within the proposal site.		bridge rehabilitation work.	
Cattle Egret Ardea ibis EPBC-MW EPBC-MM	Originally found in Africa, Europe and Asia, the Cattle Egret is now found on nearly every continent, with birds in Australia originating from Asia. In Australia it is most widespread and common in north-eastern Western Australia across the Top End, Northern Territory, and in south-eastern Australia from Bundaberg, Queensland to Port Augusta, South Australia, including Tasmania. The Cattle Egret is found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor. Will also forage at garbage dumps, and is often seen with cattle and other stock. The Cattle Egret is partially migratory, moving during winter. The Cattle Egret prefers grasshoppers, especially during breeding season, but eats many other invertebrates. It also eats frogs, cane toads, lizards and some small mammals. Its sharp bill is used in a lunging and stabbing manner. It often feeds by following large animals such as cattle, grabbing insects and worms that they disturb with their feet. They also will sit on cattle to look out for insects. Cattle Egret pairs are monogamous for the breeding season, and they breed	No - Foraging habitat is not present in the study area.	N/A	None - No suitable habitats would be impacted by the proposal.	No

Species Listing*	& Ecology	Presence of Habitat	Nearest Records	Likelihood of Occurrence	Possible Impact?
	<p>in colonies, usually with other waterbirds. Their shallow platform nests are made in wetland areas in trees and bushes, usually as high up as possible. Both parents build the nest and incubate the eggs, with one brood per season being raised.</p>				
<p>Latham's Snipe Gallinago hardwickii EPBC-MM</p>	<p>Latham's Snipe is a non-breeding migrant to the south east of Australia including Tasmania, passing through the north and New Guinea on passage. Latham's Snipe breed in Japan and on the east Asian mainland. Latham's Snipe are seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration. They also use crops and pasture. Latham's Snipe is a migratory wader, moving to Australia in our warmer months. Birds may fly directly between Japan and Australia, stopping at a few staging areas. They leave their breeding areas from August to November, arriving in Australia mainly in September. They leave the south-east by the end of February, moving northwards along the coast. Most have left Queensland by mid-April. Latham's Snipe feed by thrusting their long bill into mud with an up and down 'sewing machine' action in soft mudflats or shallow water. They roost in the day and feed at night, early morning or evening. They are omnivorous, eating seeds and plant material, worms, spiders and insects, some molluscs, isopods and centipedes. Latham's Snipe breeds in Japan and on the East Asian mainland, on dry ground such as grassy hillsides and forest clearings.</p>	<p>No – prefers wetland areas close to the coast.</p>	<p>N/A</p>	<p>None - No habitats would be affected by the bridge rehabilitation work.</p>	<p>No</p>

Species Listing* &	Ecology	Presence of Habitat	Nearest Records	Likelihood of Occurrence	Possible Impact?
Painted Snipe Rostratula benghalensis EPBC-MM Vic - CE	The Painted Snipe is small freshwater wader, with a long bill that droops slightly at the tip. The female has a chestnut-black hood with a bold white eye-patch and a cream stripe along the middle of the crown. 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. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	No – This species prefers fringes of swamps and marshes where there is a cover of vegetation.	N/A	None - No habitats would be affected by the bridge rehabilitation work.	No
Migratory Wetland Species - Birds					
Fork tailed Swift Apus pacificus EPBC-MM	Low to very high airspace over varied habitat, rainforest to semi-arid desert. Most active just ahead of summer storm fronts. Stays on the wing day and night, sleeping in high, circling flocks.	No - This species may fly overhead or occasionally land on or near the study area.	N/A	None - A highly mobile species which would not be affected by the proposal.	No

* Listing:

EPBC-MT: Environmental Protection and Biodiversity Conservation Act-Migratory terrestrial species

EPBC-MM: Environmental Protection and Biodiversity Conservation Act-Migratory marine species, listed as a marine overfly species.

EPBC-MW: Environmental protection and Biodiversity Conservation Act – Migratory wetland species

Koala Habitat Score under the EPBC Act

Attribute	Score	Inland
Koala occurrence	0 (low)	None of the above.
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.
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape \geq 1000 ha.
Key existing threats	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, OR Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.
Recovery value	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.

APPENDIX D THREATENED SPECIES ASSESSMENTS OF SIGNIFICANCE

D.1 THREATENED SPECIES CONSERVATION ACT SEVEN-PART TEST

Section 5A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) specifies seven 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 *Threatened Species Conservation Act 1995*.

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

- Southern Myotis – (*Myotis macropus*)

a) 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.

Myotis macropus

The Southern Myotis generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, and storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. Females have one young each year usually in November or December.

The study area provides suitable habitat for this species both for roosting and foraging as there is an abundance of tree hollows along the Murray River. The Southern Myotis was recorded during Anabat surveys.

The bridge structure did not show any signs of bats inhabiting areas of the southern abutment or pier four. Also there were no signs of insect casings or guano present (signs of habitation). The individuals detected by the Anabat may have been foraging under and around the bridge. The natural vegetation surrounding the bridge provides ample roosting habitat (including decorticated bark and small hollows).

The bridge is unlikely to constitute important breeding habitat. The proposed work is likely to take approximately one year to complete. The Southern Myotis is a highly mobile species and there is an abundance of suitable habitats present within the study area. Therefore it is unlikely that the proposed activity would have an adverse effect on the life cycle of this species.

b) 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.

Not Applicable

Southern Myotis is not an endangered population.

c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- 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**
- 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.**

Not Applicable

Southern Myotis is not an Endangered Ecological Community

- d) 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.**

Myotis macropus

- I. The proposal is unlikely to remove habitat that would increase the risk of extinction of the Southern Myotis. The proposed work includes the removal of approximately 0.2 hectares of River Red Gum woodland, and timber elements from the bridge. There is extensive habitat surrounding the site that is of vastly greater quality than that within the proposal site.
- II. The removal of the potential habitat within the existing bridge structure and 0.2 hectares of woodland is unlikely to fragment the existing habitat as connectivity for this species in the area would remain. There are significant areas of suitable habitat surrounding the Murray River.
- III. The habitat to be removed including habitat within the existing bridge is unlikely to be significant in the greater region as there are significant stands of River Red Gum woodland in the area surrounding the proposed work.

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

Myotis macropus

There is currently no critical habitat listed for the Southern Myotis.

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

Myotis macropus

There is currently no NSW Recovery Plan or Threat Abatement Plan for this species.

- g) 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.**

Myotis macropus

Degradation of native riparian vegetation along NSW water courses.

The Southern Myotis is known to inhabit riparian vegetation for roosting and breeding habitat such as hollows of River Red Gum trees. There was an abundance of River Red Gum trees present along the Murray River. This species is highly mobile, with an abundance of River Red gum trees present within the study area that supports roosting and breeding habitat, this species is unlikely to be impacted upon by the proposed work.

The removal of large woody debris from NSW rivers and streams

No significant in-stream habitats such as snags and fallen timber were noted near the bridge at the time of the survey. Some areas of fallen woody debris were noted further upstream and downstream of the bridge. Should any snags be located within the proposal area during the proposed work these would be relocated to adjacent areas of habitat, downstream of the bridge. No woody debris would be removed from the river as part of the work. The Southern Myotis is not dependant on fallen woody debris for roosting or breeding habitat, however it may provide foraging habitat as this bat is known to feed on small fish, prawns and aquatic insects in which these invertebrates may inhabit.

As such the proposal is not likely to contribute significantly to the operation of clearing as a threatening process.

D.1.1 Conclusion

The habitat which would be removed including elements of the existing bridge is unlikely to be significant for the survival of the species in the region. There are significant stands of River Red Gum in the area surrounding the proposed work that provide the preferred natural roosting habitat of the species. Given that individuals of the species use multiple roost sites, the bridge is likely to only provide opportunistic and intermittent habitat. Thus its removal would not place a population of the species at risk of extinction.

The Assessment of Significance has concluded that the proposal is not likely to significantly affect the Southern Myotis (*Myotis macropus*) that was recorded within the study area. Specifically, the proposal would be unlikely to:

- Reduce the long-term viability of any local population of threatened species, populations or ecological communities
- Accelerate the extinction of a species, population or ecological community or place it at risk of extinction
- Adversely affect critical habitat.

It is concluded that a Species Impact Statement is not required for the proposal.

D.2 FISHERIES MANAGEMENT ACT 1994 SEVEN-PART TEST

Section 5A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) specifies seven 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 *Threatened Species Conservation Act 1995* and the *Fisheries Management Act 1994*.

This *Seven-part Test* characterises the significance of likely impact associated with the proposal on the following fauna species and ecological communities, listed under the *Fisheries Management Act 1994* (FM Act):

- Eel-tailed Catfish endangered population in the Murray Darling Basin (*Tandanus tandanus*)
- Silver Perch (*Bidyanus bidyanus*)
- Ecological Community
 - The aquatic ecological community in the natural drainage system of the lower Murray River catchment - Endangered

a) 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.

Ecological Community (The aquatic ecological community in the natural drainage system of the lower Murray River catchment)

Eel-tailed Catfish endangered population in the Murray Darling Basin

Not Applicable

Silver Perch

The habitat on site provides potential feeding habitat for this species. There is a known population of Silver Perch in the Murrumbidgee River. Whilst it is believed that this species prefers fast-flowing, open waters, especially where there are rapids and races, they are also known to inhabit warm, sluggish water with cover provided by large woody debris and reeds. Silver Perch are a migratory species, with adults migrating upstream to spawn in spring and summer. Juveniles have also been recorded migrating upstream in response to rising water temperatures and levels.

Installation of coffer dams has the potential to cause impacts to water quality as a result of disturbance of bottom sediments and rise in turbidity levels. These impacts would be localised and a silt curtain would be used to minimise downstream impacts.

Individuals may be caught within the cofferdam and would need to be relocated outside the cofferdam prior to dewatering.

Given the time of year that action is being undertaken and the maintenance of flows throughout the works to maintain downstream habitat, it is not expected that the proposed action will place a viable local population of this species at risk of extinction.

Construction of the proposal has the potential to cause impacts to water quality as a result of increased soil runoff during construction into the local aquatic environment. A decrease in

water quality could potentially impact upon the floating eggs and hatchlings of this species. Strict erosion and sediment controls will be in place to minimise water quality impacts.

The proposal would cause impacts to the waterway as a movement corridor for this species. Works would be undertaken during the migratory period of the Silver Perch.

The proposed works are not likely to have an adverse effect on the lifecycle of the 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 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.

Ecological Community (The aquatic ecological community in the natural drainage system of the lower Murray River catchment)

Not Applicable

Eel-tailed Catfish

The Eel-tailed Catfish was not recorded during the 1996 NSW Rivers survey in the Murray catchment (Harris and Gehrke 1997). The closest record found on a search of the DPI Fisheries record viewer was at Billabong Creek north east of Barham in 2005. However, it is known to have previously had a relatively extensive distribution throughout the Murray-Darling basin. Eel-tailed Catfish inhabit a wide range of waterways including rivers, creeks, lakes, billabongs and lagoons, and although it inhabits flowing streams it prefers sluggish or still waters. They utilise clear through to turbid waters, over substrates ranging from mud to gravel and rock. They are non-migratory and build nests in still water in which to breed. Breeding occurs in spring and summer. This species feeds on benthic zooplankton, crustaceans, small fish and insects. Preferred habitat includes coarse substrate such as gravel beds.

Potential habitat is likely to occur within the vicinity of the proposed works.

Disturbance to habitat features such as large woody debris and the substrate have the potential to occur during construction activities. Localised water quality impacts including rise in turbidity levels also are possible. Management measures (such as the realignment of snags as opposed to removal from the waterway), and installation of a silt curtain would be put in place to minimise impacts to such habitats during construction activities. The species is also known to occur in turbid waters.

Individuals may be caught within the cofferdam and would need to be relocated outside the cofferdam prior to full dewatering.

The installation of a coffer dam to facilitate works would not provide a barrier to fish passage throughout the course of the works. The eel-tailed catfish is a sedentary species and shows very limited movement along a waterway (Lintermans 2007).

The proposed works are not likely to have an adverse effect on the lifecycle 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.

Silver Perch

Not Applicable

c) 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.**

Ecological Community (The aquatic ecological community in the natural drainage system of the lower Murray River catchment)

- i. The proposal involves the rehabilitation of the Barham Bridge which is located over the Murray River at Barham/Koondrook. The work would require the removal of about 0.2 hectares of vegetation. The work would also require the excavation of the Victorian abutment, the installation of a temporary cofferdam and instream piling work for the temporary bridge and including the installation of a temporary rock platform within the Murray River for the purposes of a crane pad. These activities have the potential to impact upon the community by disturbing the river flow, introducing flow vortices and reducing water quality.

The proposed work also includes the installation of a temporary crossing upstream of the existing bridge. Proposed work includes minor vegetation removal and earthwork to allow for the approach. It is expected that two instream piers would be inline with that of the existing bridge.

Given the small area of work, it is considered unlikely that the work would affect the community to the point that its local occurrence would be placed at risk of extinction.

- ii. The proposed work would not modify the composition of the ecological community. The work would require the removal of some River Red Gums and the excavation of the embankment around the Victorian abutment. Batter protection and erosion protection would also be installed around the Victorian abutment which would assist with stabilising the embankment which is currently heavily eroded and at risk of collapsing. Safeguards would be implemented to ensure no impact occurs to water quality. In addition, the work is unlikely to significantly reduce in-stream resources such as snags throughout the waterway area due to the presence of similar resources further upstream and downstream from the work area. The work is likely to result in some soil disturbance which could lead to the spread or introduction of additional exotic species; it is considered unlikely that this would change the composition of the community to the point where its local occurrence would be placed at risk of extinction.

Eel-tailed Catfish

Not Applicable

Silver Perch

Not Applicable

- d) 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.**

Ecological Community (The aquatic ecological community in the natural drainage system of the lower Murray River catchment)

- i. A small area of habitat would be removed or otherwise disturbed during installation and decommissioning of coffer dams and instream piles in order to complete the work. Submerged woody debris may be exposed immediately adjacent to the pier. This would be reinstated when the coffer dam is decommissioned. Minimal habitat within the work area would be removed or modified as a result of the proposed work.
- ii. The vegetation to be removed is located within 30 metres of the road/bridge edge and within a mown parkland area and is therefore already fragmented and edge effects such as weed invasion are evident. The work may have a slight impact upon the connectivity of vegetation along the riverbank on the Victorian side however this is considered minor given that the corridor is likely to be only utilised by more mobile species due to the presence of a busy road. The instream work would not impede fish passage.
- iii. The Murray River is considered Key Fish Habitat by the NSW Department of Primary Industries (DPI Fisheries). This habitat is fundamental to the sustainability and maintenance of fish populations in general, and the survival and recovery of threatened species (DPI 2011). This habitat is unlikely to be significantly impacted by the proposed work. Work would not impact the long term survival of this community.

Eel-tailed Catfish

Silver Perch

- i. The Silver Perch occupies areas of fast-flowing, open water, especially where there are rapids or races, however they will also inhabit warm, sluggish water with cover provided by large woody debris and reeds (NSW DPI, 2005). Instream features such as woody debris, undercut banks and large boulders contribute to prime habitat for this species as they provide structural complexity and habitat diversity for both fish and invertebrate populations

- ii. A small area of habitat will be disturbed during installation and decommissioning of coffer dams in order to complete the works. Submerged woody debris may be exposed immediately adjacent to the proposal site; these will be relocated. Minimal habitat within the works area would be removed or modified as a result of the proposed works.
- iii. The Murray River is considered Key Fish Habitat by the NSW Department of Primary Industries (Fisheries). This habitat is fundamental to the sustainability and maintenance of fish populations in general, and the survival and recovery of threatened species (DPI 2011). This habitat is unlikely to be significantly impacted by the proposed works. Works would not impact the long term survival of this species.

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

Ecological Community (The aquatic ecological community in the natural drainage system of the lower Murray River catchment)

No critical habitat had been established for this community at the time of writing

Eel-tailed Catfish

Silver Perch

No critical habitat had been established for this community at the time of writing

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

Ecological Community (The aquatic ecological community in the natural drainage system of the lower Murray River catchment)

Not Applicable Six recovery strategies have been identified by the NSW Department of Primary Industries:

- Remediate barriers to fish passage
- Protect and reinstate large woody debris
- Restore riparian vegetation
- Pest species eradication and control
- Advice to consent and determining authorities
- Recovery plan preparation.

Eel-tailed Catfish

Silver Perch

A Recovery Plan for the Silver Perch has been prepared. The overall objective of this recovery plan is to prevent the extinction and ensure the recovery of Silver Perch populations in NSW. The specific objectives of the Silver Perch Recovery Plan (DPI 2006) are as follows:

- Increase awareness of the current status of silver perch throughout its range.

- Increase scientific knowledge of the current distribution, ecological and habitat requirements and population genetics of silver perch.
- Protect and enhance remaining natural populations of silver perch.
- Ameliorate the impacts of known major threats to silver perch.
- Minimise any fishing impacts on natural populations through enhanced compliance with fishing regulations and involvement of recreational fishers.
- Improve management of aquaculture and stocking programs.
- Encourage and support the involvement of indigenous communities in the implementation of recovery actions.
- Establish a program to monitor the status of silver perch and evaluate the effectiveness of recovery actions.

The proposal would not interfere with these objectives of the recovery plan.

g) 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.

Ecological Community (The aquatic ecological community in the natural drainage system of the lower Murray River catchment)

Not Applicable The **removal of large woody debris from New South Wales rivers and streams** is considered a key threatening process (KTP) under the FM Act and could potentially be triggered during installation of the coffer dam. No large woody debris was identified in the immediate vicinity of the site during a site assessment, however, these could be present below the water's surface.

Where woody debris is in the proximity of the work and access, it would be realigned to accommodate. Realignment involves rotating a snag from its existing position around so that there is little movement of its placement within the waterway. No woody debris would be lopped, realigned or removed from the waterway as a result of the proposed work, without prior consultation with NSW Fisheries to ensure the most appropriate measures are taken.

A further KTP under the FM Act is the **Degradation of native riparian vegetation along New South Wales water courses**. There is the potential for the operation of machinery and the placement of materials to damage riparian vegetation during the proposed activity. It is not expected that the work would significantly affect the survival of this ecological community at the site through degradation of riparian vegetation, however, all measures should be undertaken to reduce the impact on this vegetation.

Predation by the Plague Minnow (*Gambusia holbrooki*) is also listed key threatening processes under the NSW TSC Act. It is not considered that the proposed action would promote or increase predation by Plague Minnow on fish species within this community.

Eel-tailed Catfish

Silver Perch

The **removal of large woody debris from New South Wales rivers and streams** is considered a key threatening process (KTP) under the FM Act and could potentially be triggered during installation of coffer dams. No large woody debris was identified in the immediate vicinity of the site during a site assessment undertaken 16th August 2011, however, as woody debris was sighted downstream, woody debris could potentially be swept into the proposed works area prior to commencement of works.

Where woody debris is in the proximity of the works and access, it would be realigned to accommodate. Realignment involves rotating a snag from its existing position around so that there is little movement of its placement within the waterway. No woody debris would be lopped, realigned or removed from the waterway as a result of the proposed works, without prior consultation with NSW Fisheries to ensure the most appropriate measures are taken.

A further KTP under the FM Act is the **Degradation of native riparian vegetation along New South Wales water courses**. There is the potential for the operation of machinery and the placement of materials to damage riparian vegetation during the proposed activity. It is not expected that the works will significantly affect the survival of Silver Perch at the site through degradation of riparian vegetation, however, all measures should be undertaken to reduce the impact on this vegetation.

Predation by the Plague Minnow (*Gambusia holbrooki*) is also listed as a key threatening processes under the NSW TSC Act. It is not considered that the proposed action would promote or increase predation by Plague Minnow on Silver Perch. Any fish trapped within the cofferdam would be relocated outside the cofferdam prior to full dewatering

D.2.1 CONCLUSION

Based on the information outlined in the assessment of significance, the proposed activities are not anticipated to have a significant detrimental effect on the lower Murray endangered ecological community, and as such it is not considered that a species impact statement is required for the proposed activity.

The assessment has concluded that the proposal is not likely to significantly affect the threatened fauna species or endangered populations considered likely to occur in the study area, either directly or indirectly. A Species Impact Statement is not required for the proposal.

Based on the information outlined in the assessment of significance, the proposed activities are not anticipated to have a significant detrimental effect on the endangered Murray-Darling population of Eel-tailed Catfish, and as such it is not considered that a species impact statement is required for the proposed activity.

Based on the information outlined in the assessment of significance, the proposed activities are not anticipated to have a significant detrimental effect on the vulnerable Silver Perch, and as such it is not considered that a species impact statement is required for the proposed activity

D.2.2 References

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D.3 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT PRINCIPAL SIGNIFICANT IMPACT ANALYSIS

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) specifies factors to be taken into account in deciding whether a development is likely to significantly affect threatened species listed at the Commonwealth level.

The following analysis of significance identifies likely impacts associated with the proposed action upon:

- Murray Cod (*Maccullochella peelii*) – Vulnerable

Vulnerable Species

a) Will the action lead to a long-term decrease in the size of an important population of a species?

Murray Cod

The population of Murray Cod within the Murray River and its major tributaries, is listed as an important population of Murray Cod (Koehne & Clunie 2010). The proposal involves installation of a temporary coffer dam to facilitate the proposed work. Downstream water level and localised fish passage would be maintained. The proposed action has the potential to cause temporary localised impacts to water quality during construction as a result of erosion and sedimentation. The works would be undertaken under strict erosion and sedimentation controls.

The Murray Cod prefers to congregate around large woody debris (snags). No snags have recently been observed at the site, however in the event that snags are found at the site during the establishment of the coffer dam, woody debris would be realigned and placed as close to its original location within the waterway as possible. No snags would be removed out of the waterway. Management measures would be put in place to make sure large woody debris is realigned instead of removed in line with DPI (fisheries) guidelines.

b) Will the action reduce the area of occupancy of an important population?

Murray Cod

Minor temporary habitat removal or modification could potentially occur during installation of the coffer dams to facilitate works. Management measures would be put in place to minimise impacts to such habitats during construction activities. This would include measures to prevent increasing turbidity or sedimentation through use of silt curtains, and realignment any large woody debris instead of removing them.

No area of occupancy for an important population of this species would be reduced as a result of these works.

c) Will the action fragment an existing important population into two or more populations?

Murray Cod

The important population of Murray Cod is known to exist within the Murray River and its tributaries. The installation of a coffer dam to facilitate works would not provide a barrier to fish passage throughout the course of the works.

Regardless, these impacts would be temporary and therefore habitat is unlikely to become fragmented or isolated from other areas of habitat for this species. The Murray Cod is known to undertake upstream migration in late winter and early spring when river levels are high. This species then returns downstream soon after spawning (Lintermans, 2007). It is unlikely that Murray Cod would undertake substantial upstream or downstream movements during the period of which the works are proposed.

Therefore it is unlikely that the proposed works would fragment a population into two or more populations.

d) Will the action adversely affect habitat critical to the survival of a species?

Murray Cod

The Register of Critical Habitat established under s207a of the EPBC Act does not list critical habitat for the Murray Cod.

e) Will the action disrupt the breeding cycle of an important population?

Murray Cod

Murray Cod undertake upstream spawning migrations between late winter and early spring (Lintermans 2007) when water temperatures are between 16 and 21°C. After hatching, the larvae drift downriver and settle in suitable habitat (Keaney & Kildea 2001).

This species would be most sensitive to changes in water quality during the breeding season, and during the larval drift stage. The proposed action has the potential to cause impacts to water quality as a result of increased soil runoff into the local aquatic environment during construction. Safeguards to avoid impacts as a result of erosion, would see the potential for such impacts to occur, and substantially reduced.

The proposed works could potentially see the relocation of snags within proximity to the proposal site as a result of the proposed works. This species is known to deposit eggs onto logs and solid woody debris during spawning. In the event that snags are encountered within the area of the placement of the coffer dam, and they are relocated within the waterway, given the timing of the works (outside the breeding season) it is unlikely that relocation of snags would disrupt the breeding cycle of this important population.

Disruptions to the breeding cycle of this important population are unlikely as a result of the proposed works. The timing and temporary nature of the works would not impact upon migration, health or breeding behaviour of the murray cod. There would be no impacts as a result of the operational phase of the works.

f) Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Murray Cod

The Murray Cod is found in a wide range of warm water habitats, from clear, rocky streams to slow-flowing turbid rivers and billabongs (McDowall 1996). Generally, they are found in waters up to 5 m deep and in sheltered areas with cover from rocks, timber or overhanging banks (Kearney & Kildea 2001). The species is highly dependent on woody debris (snags) for habitat, using it to shelter from fast-flowing water (Koehn 1997).

The proposed works could potentially see the relocation of snags within proximity to coffer dam and crane pad as a result of the proposed works.

In the event that snags are encountered within 5m of either side of the regulator, they would be relocated a minimum distance within the waterway to allow for the establishment of the coffer dam. Therefore the location of the habitat feature would be modified however it would not be to a point where it becomes inaccessible for this species. No habitat would be destroyed, removed, isolated or decreased as a result of the proposed works.

The relocation of snags within the waterway would see such habitat remain available for this species both during and upon completion of the works. Management measures would be put in place to make sure large woody debris is realigned instead of removed in line with DPI (fisheries) guidelines.

g) Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

Murray Cod

The proposed works are unlikely to result in invasive species that are harmful to this vulnerable species becoming established in the vulnerable species' habitat.

A number of pest fish species could potentially inhabit the Murray River including Carp, Gambusia, Goldfish and Redfin Perch. As the proposed works would not be altering current fish passage, no opportunities for new species of invasive fish would be made as a result of the proposed works.

It is unlikely that other invasive species such as invasive aquatic plants will become established as a result of the proposed action, providing appropriate measures are undertaken to ensure all materials and equipment entering the site are free of plant propagules as identified in the safeguards of the REF.

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

Murray Cod

The proposed works are unlikely to introduce disease that may cause this species to decline.

Diseases and pathogens of particular concern to Murray Cod include:

- Epizootic Haematopoietic Necrosis (EHN) virus
- Viral Encephalopathy and Retinopathy (VER)
- Goldfish Ulcer Disease (GUD)
- Asian Fish Tapeworm, *Bothriocephalus acheilognathis*
- Parasitic copepod Anchorworm, *Lernaea cyprinacea*.

To ensure that diseases or pathogens are not introduced as a result of the proposed action, all materials and equipment would be thoroughly cleaned prior to use, as identified in the safeguards in the REF.

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

Murray Cod

The National Recovery Plan for the Murray River Cod has identified a number of objectives which would support the aim of the plan to have self-sustaining Murray Cod populations managed for conservation, fishing and culture:

- Determine the distribution, structure and dynamics of Murray Cod populations across the MDB.
- Manage river flows to enhance recruitment to Murray Cod populations.
- Evaluate the risks of threats and benefits of recovery options on Murray Cod populations for each management unit.
- Determine the habitat requirements of Murray Cod life stages and populations.
- Manage the recreational fishery for Murray Cod in a sustainable manner while recognising the social, economic and recreational value of the fishery.
- Encourage community ownership for Murray Cod conservation.
- Manage Recovery Plan implementation.

A review of The National Recovery Plan for the Murray Cod did not identify any proposed recovery actions that would be substantially interfered with by the proposed works.

D.3.1 Conclusion

The Assessment of Significance has concluded that the proposal is not likely to significantly affect Murray Cod, either directly or indirectly.

The proposed works do not need to be referred to the DoE.

D.3.2 References

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