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Prepared for The CEI on behalf of Wagga Wagga City Council

Biodiversity Assessment Report

North Wagga Flood Levee

Wagga Wagga, NSW

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Table of Contents

Acronyms and abbreviations ..... **iii**

Executive Summary ..... **v**

1. Introduction **1**

1.1. Proposal background 1

1.2. The Proposal 1

1.2.1. Development footprint 4

1.3. Legislative context 5

2. Methodology **7**

2.1. Desktop assessment 7

2.2. Field assessment 7

2.3. Hollow Bearing Tree Inventory 7

3. Results **8**

3.1. Desktop assessment 8

3.2. Field assessment 14

3.2.1. Native vegetation 14

3.2.2. Exotic vegetation 14

3.2.3. Planted native vegetation 15

3.2.4. Threatened Ecological Communities 15

3.2.5. Terrestrial habitat 19

3.2.6. Aquatic habitat 21

3.2.7. Threatened flora 21

3.2.8. Threatened Fauna 21

3.2.9. Priority weeds 23

3.2.10. Hollow bearing trees 23

4. Assessment of Impacts **26**

4.1. Vegetation 26

4.2. Threatened species 27

4.2.1. Terrestrial flora 27

4.2.2. Terrestrial fauna 27

4.2.3. Threatened ecological communities 29

4.2.4. Aquatic species 29

4.3. Priority weeds 29

5. Biodiversity Offset Scheme evaluation table **30**

6. Key threatening processes **32**
7. Mitigation measures **33**
8. Conclusion **36**
9. References **38**
Appendix A Protected Matter Search Tool Report ..... **A-I**
Appendix B Species habitat evaluation table ..... **B-II**
Appendix C Hollow-bearing tree inventory ..... **C-I**
Appendix D Tests of Significance ..... **D-I**

Figures

Figure 1-1 Map of proposal including development footprint and excavation areas location. 3
Figure 3-1 Map showing NSW BioNet search results, Biodiversity Values mapped land and State Vegetation Type Mapping surrounding the development footprint. 11
Figure 3-2 Map showing Groundwater Dependent Ecosystems surrounding the development footprint. 12
Figure 3-3 Map showing Modelled Wetlands, Key Fish Habitat and Threatened Freshwater Species Map surrounding the development footprint. 13
Figure 3-4 Plant Community Type map 18
Figure 3-5 Hollow-bearing trees being impacted and retained by the proposed works 25

Table

Table 1-1 Proposed works locations and details 4
Table 3-1 Results summary of database searches and mapping 8
Table 3-2 Results of step point method survey for assessing native groundcover 14
Table 3-3 BC Act Box Gum Woodland TEC assessment for PCT 74 and 796 15
Table 3-4 EPBC Act Box Gum Woodland TEC assessment for PCT 796 16
Table 3-5 Terrestrial habitat identified within the development footprint 19
Table 3-6 Hollow-bearing trees to be removed 24
Table 4-1 Vegetation impacts 26
Table 4-2 Tests of Significance Summary 28
Table 5-1 Summary of results of 5-part Tests of Significance. 30
Table 5-2 Biodiversity Offset Scheme Evaluation 31
Table 6-1 Table showing KTPs relevant to the proposal 32
Table 7-1 Safeguards and mitigation measures 33

Acronyms and abbreviations

AEP	Annual Exceedance Probability
AOBV	Areas of Outstanding Biodiversity Value
BA	Biodiversity Assessment
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	*Biosecurity Act 2015* (NSW)
BOM	Australian Bureau of Meteorology
BOS	Biodiversity Offset Scheme
BV	Biodiversity Values
CEEC	Critically Endangered Ecological Community
DPE	Department of Planning and Environment
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment (NSW)
EA	Excavation Area
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
FR	Flood Runner
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Groundwater Dependent Ecosystems
ha	hectares
HBT	Hollow Bearing Tree
KFH	Key Fish Habitat
km	kilometres
KTP	Key Threatening Process
LGA	Local Government Area
LLS	Local Land Services
m	metres
MNES	Matters of National Environmental Significance
NSW	New South Wales

OEH	Office of Environment and Heritage (NSW)
OLA	Off Leash Area
PCT	Plant Community Type
PMST	Protected Matters Search Tool
REF	Review of Environmental Factors
sp./spp.	Species/multiple species
TEC	Threatened Ecological Community
TISEPP	*Transport and Infrastructure State Environmental Planning Policy 2021*
WWCC	Wagga Wagga City Council
Wagga Wagga LEP	*Wagga Wagga Local Environment Plan 2010*

Executive Summary

This Biodiversity Assessment will assess the potential direct and indirect impacts of the proposal on any threatened species or communities, Maters of National Environmental Significance and Areas of Outstanding Biodiversity Value that occur within the study area. The outcome of this assessment will help guide the proposal towards the most appropriate planning approval pathway. The proposal is located in the North Wagga suburb of Wagga Wagga in NSW.

The proposal involves the raising of existing levee banks and the installation of a raised road and bridge connecting North Wagga to the Wagga Wagga town centre via Hampden Bridge. The development footprint includes four distinguishable areas:

- Two existing levees that surround residential areas of North Wagga.
- Two areas where excavation is proposed.

The total area being assessed is 20.53 hectares (ha). The proposal is located within 50m and 1,600m of the Murrumbidgee River main channel with roadway crossings also proposed.

The proposal is being assessed under Part 5 of the *NSW Environmental Planning and Assessment Act* (EP&A act). Wagga Wagga City Council (WWCC) is the proponent and determining authority.

Database searches were completed for records of Commonwealth and State listed threatened species, populations, and ecological communities. Searches were conducted on 24 July 2023 and included the use of Protected Matters Search tool and review of NSW BioNet Atlas records. Relevant literature was reviewed, which included DPIE, OEH and EPBC Threatened Species Profiles. Further desktop assessment was conducted using geospatial information software and publicly available data from State and Federal government organisations.

A preliminary site assessment was completed on 10 February 2023 by an NGH Ecologist to assess the biodiversity constraints within the proposed development footprint. Field survey methodology for assessing vegetation included gathering rapid assessment points and using the LLS endorsed step point method for assessing native groundcover.

A total of 19.99 ha of vegetation would be impacted by the proposal through removal or disturbance. A total of 18.19ha of native vegetation would be removed by the proposal. This includes vegetation in Plant Community Types 5, 9, 47, 74 and 796. The largest impact to vegetation would be in the plant community type 796 – Derived Grassland of the NSW South Western Slopes. No threatened ecological communities will be impacted by the proposal.

No Areas of Outstanding Biodiversity value are present within the development footprint. A total of 16 threatened species were considered likely to occur within the development footprint. These species were assessed using the NSW Biodiversity Conservation Act (BC Act) Test of Significance to determine if impacts to these species would be significant. These tests revealed that the proposal will significantly impact on the habitat of Barking Owl, Superb Parrot, Squirrel Glider in the Wagga Wagga Local Government Area - Endangered population and Squirrel Glider.

Hence, under the NSW BC Act further assessment is required for these species through either a Biodiversity development Assessment Report (BDAR) or Species Impact Statement (SIS).

The proposal is likely to increase impacts from and form part of two key threatening processes, clearing native vegetation and the removal of hollow bearing trees. Mitigation measures have been recommended to minimise impacts by the proposal.

1. Introduction

The purpose of this Biodiversity Assessment report (BA) is to assess the potential direct and indirect impacts of the proposal on any threatened species or communities, Maters of National Environmental Significance (MNES) and Areas of Outstanding Biodiversity Value (AOBV) that occur within the study area.

The proposal is being assessed and determined under Part 5 of the *Environmental Protection and Assessment Act 1979* (EP&A Act). Wagga Wagga City Council (WWCC) is the proponent and determining authority under Part 5 of the EP&A Act. Division 5.1 of the EP&A Act requires that the significance of the impact of the proposal on terrestrial and aquatic threatened species, populations and threatened ecological communities be assessed. A significant impact on threatened entities is defined under Section 7.2 of the *Biodiversity Conservation Act* (BC Act). For Part 5 activities, this includes an assessment of whether an activity is likely to affect a threatened entity according to the NSW Test of Significant (ToS) or impact a declared area of Outstanding Biodiversity Value (AOBV).

The outcome of this BA will guide the proposal towards the most appropriate planning approval pathway and determine if further assessment is required.

The following definitions are used in this report:

- **Proposal:** All works involved in the construction and operation of the proposed flood management works.
- **Development footprint:** Area of land directly impacted by the construction of the proposal.
- **Study Area:** Area of land within a 10km buffer applied to the development footprint.

1.1. Proposal background

Wagga Wagga City Council (WWCC) completed a review of the Murrumbidgee River Floodplain Risk Management Study and Plan (WMA Water, 2018) focusing on the areas of Wagga Wagga impacted by riverine flooding. Most of the recent flood damage in urban parts of Wagga Wagga occur in the suburb of North Wagga and surrounds. This review resulted in investigations into upgrading the North Wagga Levee to 5% Annual Exceedance Probability (AEP) level of protection. Equivalent upgrades are also proposed to Hampden Bridge, Hampden Avenue (as embankment) and conveyance improvements through Wilks Park to connect Wagga Wagga town centre to North Wagga during a flooding event.

North Wagga is located within the Wagga Wagga Local Government Area (LGA). Wagga Wagga is the largest inland town in New South Wales, with Sydney approximately 380km northeast. North Wagga is located in the NSW South Western Slopes IBRA region and the Lower Slopes IBRA subregion.

1.2. The Proposal

The proposal is to raise the existing levee banks surrounding North Wagga and install a raised road and bridge connecting North Wagga to the Wagga Wagga town centre via Hampden Bridge. Soil for the works is proposed to be excavated from excavation areas 1 and 2 (EA1, EA2) and the Flood Runner (FR) – an anabranch which flows during periods of high flow in the Murrumbidgee River (See Figure 1-1 and Figure 1-1 Map of proposal including development footprint and excavation areas location.

Table 1-1 Proposed works locations and details below). The FR is a straight depression that occasionally conveys flood waters and tends to have a relatively uniform morphology.

The works would include the following activities:

- Geotechnical investigation and survey of the preferred alignment.
- Excavation of soil from EA1, EA2 and the Flood runner (FR) to provide the soil for the construction of the levees to a 1 in 20-year event (soil would be sourced from areas within Wilks Park and Wilks Park Off-Leash Area (Wilks Park OLA) on the northeastern side of Hampden Avenue).
- Construction/raising of levee.
- Establish laydown areas including amenities, temporary fencing, and signage.
- Establish environmental controls.
- Vegetation trimming and removal where required.

Figure 1-1 Map of proposal including development footprint and excavation areas location.

Table 1-1 Proposed works locations and details

ID	Location	Length (m)	Structure
Levee 1 (L1)	Existing Levee ring around North Wagga	4,500m	Earthen Bank
Levee 2 (L2)	Existing Levee surrounding limited number of houses East of North Wagga	1,262m	Earthen Bank
Flood Runner (FR)	Adjacent to Wilks Park	400m x 200m	Excavation of soil for proposed works 50m wide x 800m long x 2.5m deep
Excavation Areas EA1 and EA2	Wilks Park and cleared area between Hampden Avenue and Parken Pragan Lagoon - Wilks Park OLA	500m**	Excavation points for proposed works to a depth between 2.5–5m
Flood Management Structure	Hampden Avenue	700m	Bridge/raised road/embankment

**Maximum extent

1.2.1. Development footprint

The development footprint includes four distinguishable areas:

- Two existing levees that surround residential areas of North Wagga.
- Two areas where excavation is proposed (see Figure 1-1.)

The total area being assessed is 20.53 ha. The proposal is located within 50m and 1,600m of the Murrumbidgee River main channel with roadway crossings also proposed.

The associated soil landscapes of the subject land are Farnham and Kurrajong Plain (DPIE, 2023). Annual rainfall is 500–550mm. Soils are moderately moist to moist during winter and spring but dry in summer and early autumn (DPIE, 2023).

The Murrumbidgee River varies in flow and river heights, determined in the summer months by dam releases due to planned water delivery to the environment and irrigators (DPI Water, 2017). Water quality over the summer months tends to be high (DPI Water, 2017). The main water quality issues, include turbidity, variable nutrient flushes from adjoining farming land and salt load (DPI Water, 2017). Turbidity is strongly related to rainfall and surface runoff from cultivated areas of the catchment (DPI Water, 2017).

1.3. Legislative context

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The objects of this Act are:

a) *To provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance,*

b) *To promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources,*

c) *To promote the conservation of biodiversity, and*

d) *To provide for the protection and conservation of heritage,*

e) *To promote a co–operative approach to the protection and management of the environment including governments, the community, landholders and indigenous peoples,*

f) *To assist in the co–operative implementation of Australia's international environmental responsibilities,*

g) *To recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity, and*

h) *To promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co–operation with, the owners of the knowledge.*

Approval by the Commonwealth environment minister is required if an action is likely to have a significant impact on a MNES or if it listed as a matter of national significance.

There are listed Wetlands of International importance, Threatened Ecological Communities, Threatened Species, Listed Migratory Species and Listed Marine Species noted in the Protected Matters Search that would need consideration within the BA.

State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP)

TISEPP aims to facilitate the effective delivery of infrastructure across the state, including for roads and road infrastructure facilities. Division 7 of TISEPP permits development for the purpose of flood mitigation work (including levees) to be carried out on by, or on behalf of, a public authority without consent on any land.

Given the proposal involves the construction of a levee, being carried out by WWCC, the provisions of the TISEPP apply and the proposal is permissible without development consent under Part 5 of the EP&A Act. However, in section 5.5 and 5.7 of the EP&A Act and section 171 of the EP&A Regulation 2021 contains and obligation to consider the likely impact of an activity on the environment and to prepare an EIA demonstrating how the environmental factors were taken into consideration in an EIA.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under the State Environmental Planning policy (Resilience and Hazards) 2021 and State Environmental Planning Policy (Planning Systems) 2021.

Biodiversity Conservation Act 2016 (BC Act)

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

The BC Act regulates the clearing of native vegetation in NSW. Under Part 7 of the BC Act, an assessment of the potential impacts of the proposed activity on threatened species, populations, ecological communities

and critical habitat listed in the BC Act must be undertaken. This includes assessment of the potential for a significant impact under section 7.3 (Test of Significance) and whether an impact is likely on an AOBV.

Biosecurity Act 2015

The objects of this Act are the following:

a) *To promote biosecurity as a shared responsibility between government, industry and communities,*
b) *To provide a framework for the timely and effective management of the following:*
    i. *Pests, disease, contaminants and other biosecurity matter that are economically significant for primary production industries.*
    ii. *threats*
    iii. *community activities and infrastructure,*
c) *to provide a framework for risk–based decision–making in relation to biosecurity,*
d) *to give effect to intergovernmental biosecurity agreements to which the State is a party, to provide the means by which biosecurity requirements in other jurisdictions can be met, so as to maintain market access for industry.*

Any person who deals with biosecurity matter or a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, carrier or dealing has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised. The proposal may pose biosecurity risk for ecological communities in the vicinity through introduction of invasive flora or pathogens, these can be transported on machinery or within materials.

Wagga Wagga Local Environmental Plan 2010 (Wagga Wagga LEP)

This Plan aims to make local environmental planning provisions for land in Wagga Wagga in accordance with the relevant standard environmental planning instrument under section 3.2 of the Act.

The particular aims of this Plan are as follows:

a) *To protect, enhance and conserve agricultural land through the proper management, development and conservation of natural and man-made resources,*
b) *To encourage a range of housing, employment, and recreational and community facilities to meet the needs of existing and future residents of Narrandera,*
c) *To promote the efficient and equitable provision of public services, infrastructure and amenities,*
d) *To conserve environmental heritage.*

The study area includes zoning such as RE1 Public Recreation, RU5 Village, C2 Environmental conservation and RU1 Primary Production under the Wagga Wagga LEP 2010.

According to part 2 division 7 of the TISEPP, flood mitigation work is a development permitted without consent. Levees fall under the definition of flood mitigation works; therefore, the proposal is permitted without consent.

2. Methodology

2.1. Desktop assessment

Database searches were completed for records of Commonwealth and NSW listed threatened species, populations, and ecological communities. Searches were conducted on 24 July 2023 and included the following:

- EPBC Act Protected Matters Search tool records within Study Area (EPBC Act listed entities)
- NSW BioNet Atlas Search within the Study Area (BC Act listed entities)
- DPI NSW WeedWise database was searched to identify any Priority Weeds relevant to the Wagga Wagga LGA listed under the Biosecurity Act 2015.
- Register of Areas of Outstanding Biodiversity Value (DPE, 2023)

Relevant literature was reviewed, which included DPIE, OEH and EPBC Threatened Species Profiles. Further desktop assessment was conducted using geospatial information software and publicly available data from State and Federal government organisations. Information was used from the following databases:

- NSW Biodiversity Values (BV) Map (Department of Planning and Environment, 2018)
- Department of Primary Industries (DPI) Key Fish Habitat and Threatened Fish Distributions (DPI, 2016)
- NSW DPE Vegetation Information System, State Vegetation Mapping (NSW Department of Planning and Environment, 2022)
- Bureau of Meteorology's (BOM) National Atlas of Groundwater Dependent Ecosystems (GDEs). (Bureau of Meterology, 2017)

2.2. Field assessment

A preliminary site assessment was completed on 10 February 2023 by an NGH Ecologist to assess the biodiversity constraints within the proposed development footprint.

This site assessment aimed to:

- Identify any areas of suitable habitat for threated flora or fauna.
- Record habitat features i.e., hollow-bearing trees, woody debris, watercourses etc.
- Determine Plant Community Types (PCTs) according to the Department of Planning and Environment (DPE) BioNet Vegetation Classification (DPE, 2022).
- Assess the percentage of native ground cover in grassland areas via the Local Land Services (LLS) endorsed step point method (Office of Environment and Heritage, 2015).

Field survey methodology for assessing vegetation included gathering rapid assessment points and using the LLS endorsed step point method for assessing native groundcover.

2.3. Hollow Bearing Tree Inventory

WWCC provided NGH with a Hollow Bearing Tree (HBT) Inventory for the whole of Wilks Park that had been surveyed previously in 2023 by WWCC staff. This HBT inventory provided GPS locations of HBTs, along with size and number of hollows.

Limitations

The following are factors that limited the field survey:

- No targeted threatened species surveys were undertaken. Likelihood of threatened species presence were undertaken by database records and habitat assessments.
- Due to the timing and duration of the survey, not all fauna and flora species would have been visible or present within the study area. Absence of any fauna or flora species during survey, including threatened species, may not rule them out of requiring further survey effort.
- Two step point method assessments were completed, one at Wilks Park and one in the Wilks Park OLA. Vegetation condition was extrapolated based on having a similar condition to these step point assessment.
- HBTs have been identified from the ground based on apparent entrances and no hollows were inspected to confirm internal dimensions.

3. Results

3.1. Desktop assessment

Database searches were completed for records of Commonwealth and NSW listed threatened species, populations, and ecological communities. The databases used and results are outlined in Table 3-1. A habitat evaluation table was compiled using the results of the BioNet records and Commonwealth PMST searches to evaluate the possible impacts of the proposed works on threatened entities (Appendix A).

Table 3-1 Results summary of database searches and mapping

Database	Date	Search Area	Results
Protected Matters Search Tool (PMST)	24/07/2023	Study Area	The search results returned the following threatened entities that *have the potential* to occur within the study area: • 3 ecological communities • 8 flora spp. • 19 bird spp. (3 migratory spp.) • 4 mammal spp. • 1 reptile sp. • 1 insect sp. • 6 fish spp. • 2 amphibians spp.
BioNet Atlas	24/07/2023	Study Area	The search returned records of the following threatened species within a 10km radius of the Development Footprint: • 10 ecological communities • 6 flora spp. • 40 bird spp. (8 migratory spp.) • 4 mammal spp.

			• 1 reptile sp. • 1 insect sp. • 6 fish spp. • 2 amphibian spp. See Figure 3-1 Map showing NSW BioNet search results, Biodiversity Values mapped land and State Vegetation Type Mapping surrounding the development footprint. below
Biodiversity Values Mapping	V.15 16/05/2023	Development Footprint	No Biodiversity Values (BV) mapped land occurs in the Development Footprint. Areas of BV mapped land occur within the study area including biodiverse riparian land along the Murrumbidgee River. (see Figure 3-1 Map showing NSW BioNet search results, Biodiversity Values mapped land and State Vegetation Type Mapping surrounding the development footprint. below)
State Vegetation Type Mapping	01/12/2022	Development Footprint	A total of three (3) plant community types (PCTs) are mapped within the Development Footprint including vegetation formations such as forested wetlands, freshwater wetlands, grasslands and grassy woodlands. Communities include: • **PCT 5** - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion. • **PCT 9** - River Red Gum - wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion • **PCT 74** - Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion See Figure 3-1 Map showing NSW BioNet search results, Biodiversity Values mapped land and State Vegetation Type Mapping surrounding the development footprint. below.
Groundwater Dependent Ecosystems (GDEs)	15/07/2019	Development Footprint	Two (2) terrestrial GDEs occur within the Development Footprint. These are:

			1. River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion. 2. Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion. One Aquatic GDE occurs within the Development Footprint: 1. Floodplain Waterbody See Figure 3-2 below.
Key Fish Habitat/Wetlands	28/07/2017	Development Footprint	The Development Footprint intersects areas of Key Fish Habitat (KFH). The Development Footprint also intersects two mapped wetlands both of which are floodplain wetlands. See Figure 3-3 below.
NSW WeedWise	24/07/2023	LGA	Search revealed 94 species (groups of species I.e. genera) that are: • Prohibited matters. • Prohibited on certain dealings. • Excluded from local government areas. • Subject to Biosecurity Zone controls. • Subject to a Control Order.
Areas of Outstanding Biodiversity Value (AOBV)	24/07/2023	Development Footprint	No declared AOBV or areas identified as having high biodiversity value as listed under the BC Act are present within the Development Footprint.

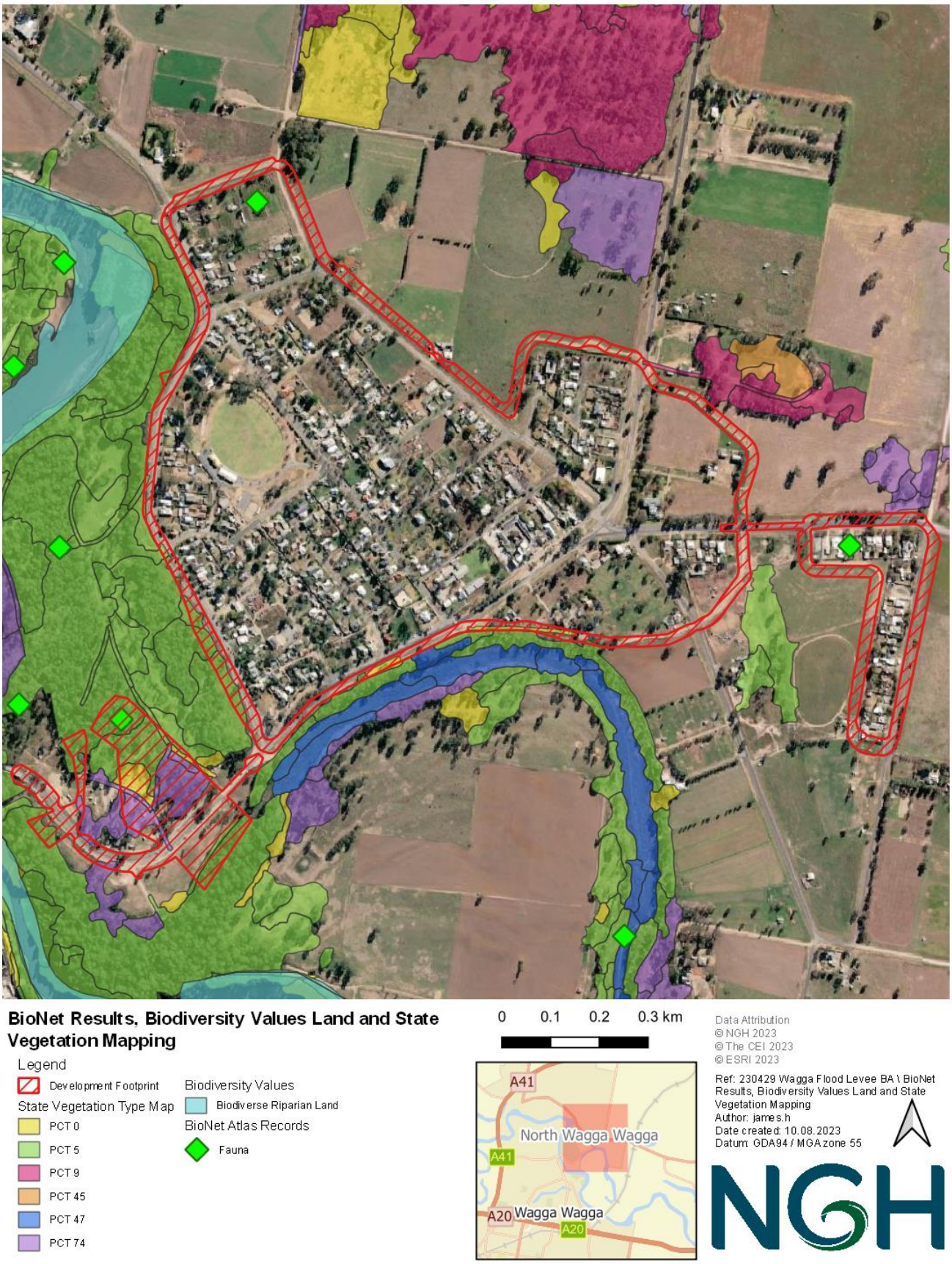


Figure 3-1 Map showing NSW BioNet search results, Biodiversity Values mapped land and State Vegetation Type Mapping surrounding the development footprint.

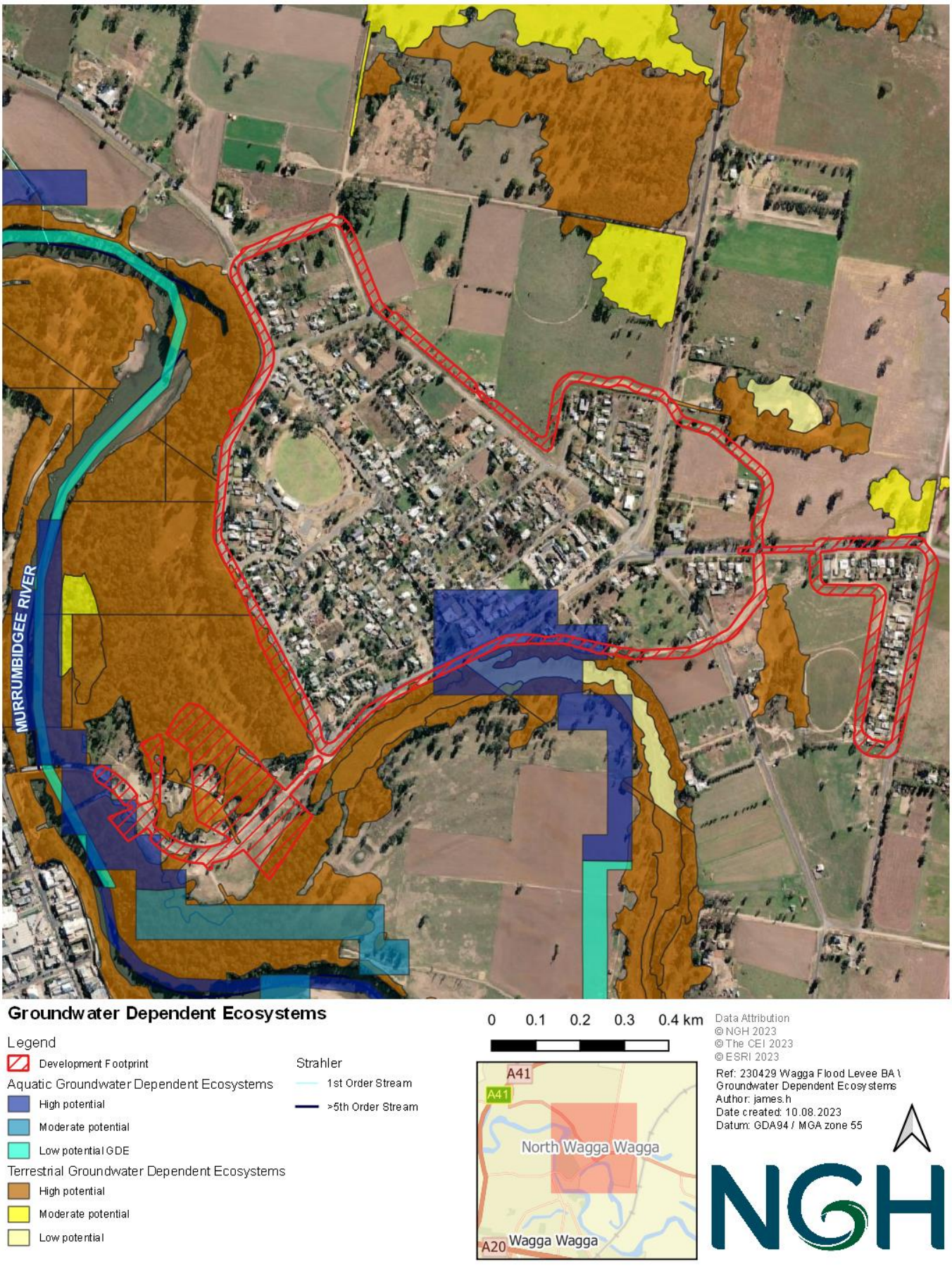


Figure 3-2 Map showing Groundwater Dependent Ecosystems surrounding the development footprint.

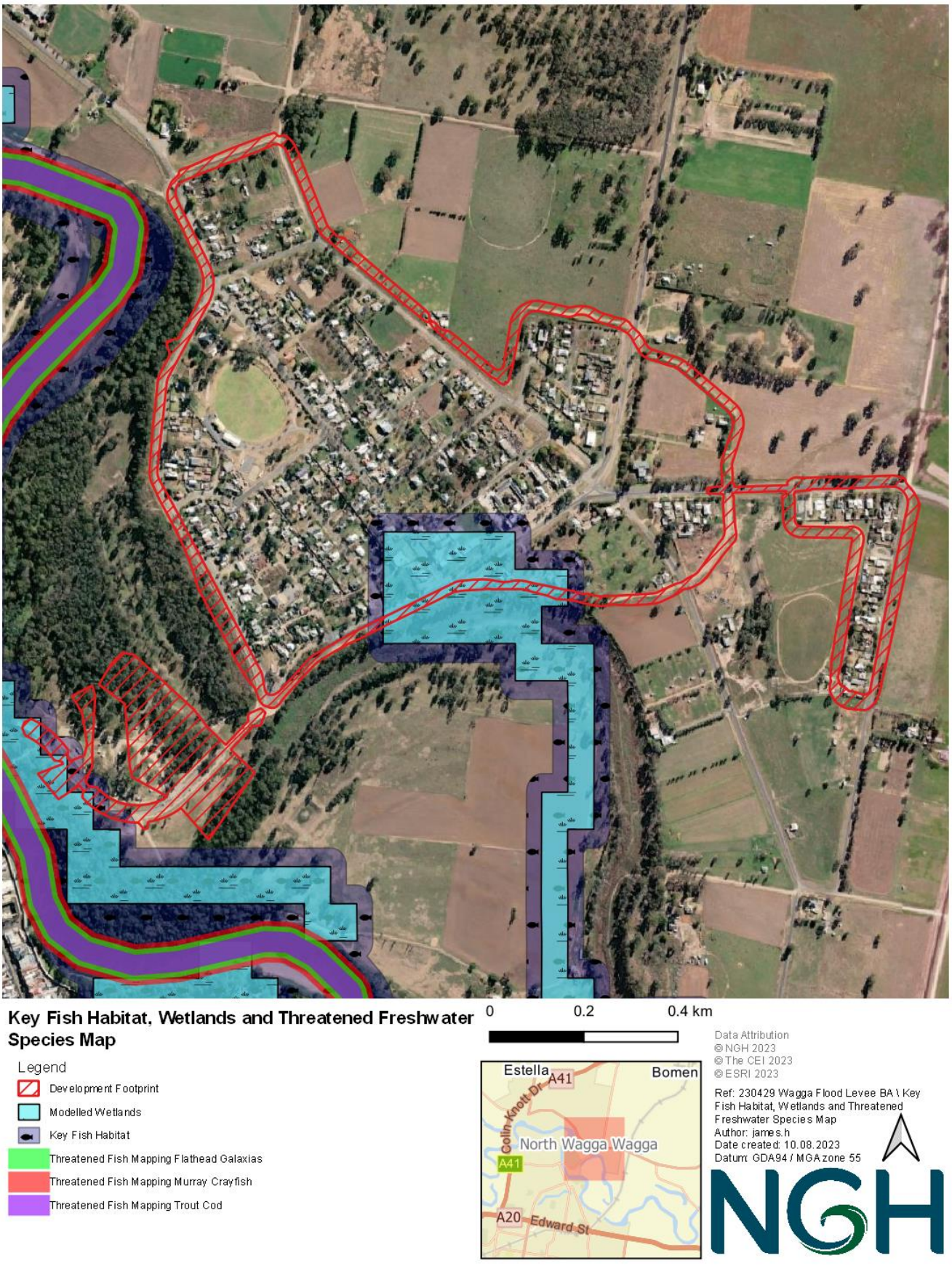


Figure 3-3 Map showing Modelled Wetlands, Key Fish Habitat and Threatened Freshwater Species Map surrounding the development footprint.

3.2. Field assessment

A preliminary site assessment was completed on 10 February 2023. The site is most comprised of derived grasslands along roadsides and existing levees. A portion of the southwestern area of the development footprint occurs within Wilks Park (see Figure 1-1), a 33 hectare moderate to good condition woodland with a diversity of plant communities and riparian woodland along 1.5 km of the Murrumbidgee River. Wilks Park contains 141 hollow bearing trees with a recorded total of 968 hollows from small to extra-large in size. The area surrounds the largely urban/rural suburb of North Wagga with mostly residential land and some recreational and rural land uses.

Ecologists were faced with limitations including access based (due to flooding) and time based (due to survey duration).

3.2.1. Native vegetation

Four (4) PCTs were identified within the development footprint during the field visit. These are shown in Figure 3-4 below. The communities include the following:

- PCT 5 – *River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.*
- PCT 9 - *River Red Gum - wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion*
- PCT 74 - *Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion*
- PCT 796 - *Derived grassland of the NSW South Western Slope*s.

Two step point method assessments were taken at Wilks Park. The assessments confirmed the grassland and woodlands included native composition. Step point method results are displayed in Table 3-2 below.

Table 3-2 Results of step point method survey for assessing native groundcover

Cover type	Native (%)	Exotic (%)	Bare Ground (%)	Litter (%)
Woodland Survey	51	23	3	23
Grassland Survey	49	51	0	0

3.2.2. Exotic vegetation

Various compositions of exotic vegetation occurred within the study area. These areas are dominated by the species Annual Meadow Grass (**Poa annua*), **Paspalum sp.*, and Wireweed (**Polygonum aviculare*). Areas of exotic grassland are estimated to contain roughly 15% native species (*Cynodon dactylon.* and *Chloris truncata*).

NOTE: Rapid assessments were undertaken for exotic areas by the NGH ecologist on site. No step point method assessments were taken in these zones. Step point method assessments will be required if exotic vegetation needs to be mapped at a more refined scale.

3.2.3. Planted native vegetation

Planted native vegetation identified within the study area consisted of Couch Grass (*Cynodon dactylon*). This grass was evident on the on the pre-existing levee. A row of around 8 planted Yellow Box (*Eucalyptus melliodora*) occurred to the south of Hampden Avenue. These trees were included as part of PCT 74.

3.2.4. Threatened Ecological Communities

The following two Critically Endangered Ecological Communities (CEECs) were identified to be associated with PCTs 74 and 796 recorded within the Development Footprint:

- (**BC Act**) *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* (Box-gum Woodland).
- (**EPBC Act**) *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box-gum Woodland).

PCT 74 and PCT 796 are both associated with the BC Act Box-gum Woodland Threatened Ecological Community (TEC) and the EPBC Act Box-gum Woodland TEC. An assessment of these PCTs against the BC Act listing criteria and EPBC Act listing criteria are shown below in Table 3-3 and Table 3-4 respectively.

These PCTS were found not to meet the criteria for Box-Gum Woodland TEC under the BC Act and EPBC Act.

Table 3-3 BC Act Box Gum Woodland TEC assessment for PCT 74 and 796

BC Act Requirement	PCT 74	PCT 796
1. **Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?**	No. River Red Gum (*E. camaldulensis*) is the most common overstorey species with abundant large remnant trees. Yellow Box (*E. melliodora*) is present but in low numbers and is not in considered to be dominant. The site is on the floodplain of the Murrumbidgee River which typically is characterised by River Red Gum and it is unlikely to have supported dominance of White Box, Yellow Box or Blakely's Red Gum in the past.	No. The dominant surrounding species are remnant and regenerating River Red Gum (*E. camaldulensis*). The site is on the floodplain of the Murrumbidgee River which typically is characterised by River Red Gum and it is unlikely to have supported dominance of White Box, Yellow Box or Blakely's Red Gum in the past.
2. **The site is in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands or NSW**	N/A - Initial canopy species criteria not met; further assessment not required.	N/A - Initial canopy species criteria not met; further assessment not required.

South Western Slopes Bioregions		
3. The site has a mainly grassy ground layer.	N/A - Initial canopy species criteria not met; further assessment not required.	N/A - Initial canopy species criteria not met; further assessment not required.
4. The site contains the listed characteristic species (including as part of the seedbank)	N/A - Initial canopy species criteria not met; further assessment not required.	N/A - Initial canopy species criteria not met; further assessment not required.
5. Or, If the site has been degraded, is there potential for assisted natural regeneration of the tree layer or understory.	N/A - Initial canopy species criteria not met; further assessment not required.	N/A - Initial canopy species criteria not met; further assessment not required.
Conclusion	**Does not form part of Box-gum Woodland TEC**	**Does not form part of Box-gum Woodland TEC**

Table 3-4 EPBC Act Box Gum Woodland TEC assessment for PCT 796

EPBC Requirement	PCT 796
Is, or was previously, at least one of the most common overstory species White Box, Yellow Bo or Blakely's Red Gum.	No. The dominant surrounding species are remnant and regenerating River Red Gum (*E. camaldulensis*). The site is on the floodplain of the Murrumbidgee River which typically is characterised by River Red Gum and it is unlikely to have supported dominance of White Box, Yellow Box or Blakely's Red Gum in the past.
Does the patch have a predominantly native understory	N/A - Initial canopy species criteria not met; further assessment not required.
Is the Patch 0.1ha or greater in size	N/A - Initial canopy species criteria not met; further assessment not required.
There are 12 or more native understory species (excluding grasses).	N/A - Initial canopy species criteria not met; further assessment not required.
Is the Patch 2 ha or greater in size	N/A - Initial canopy species criteria not met; further assessment not required.
Does the patch have an average of 20 or more mature trees per hectare (mature trees at least 125cm DBH)	N/A - Initial canopy species criteria not met; further assessment not required.
Is there natural regeneration of Yellow Box	N/A - Initial canopy species criteria not met; further

plus mature trees at least 125cm DBH	assessment not required.
Conclusion	Does not form part of Box-gum Woodland TEC

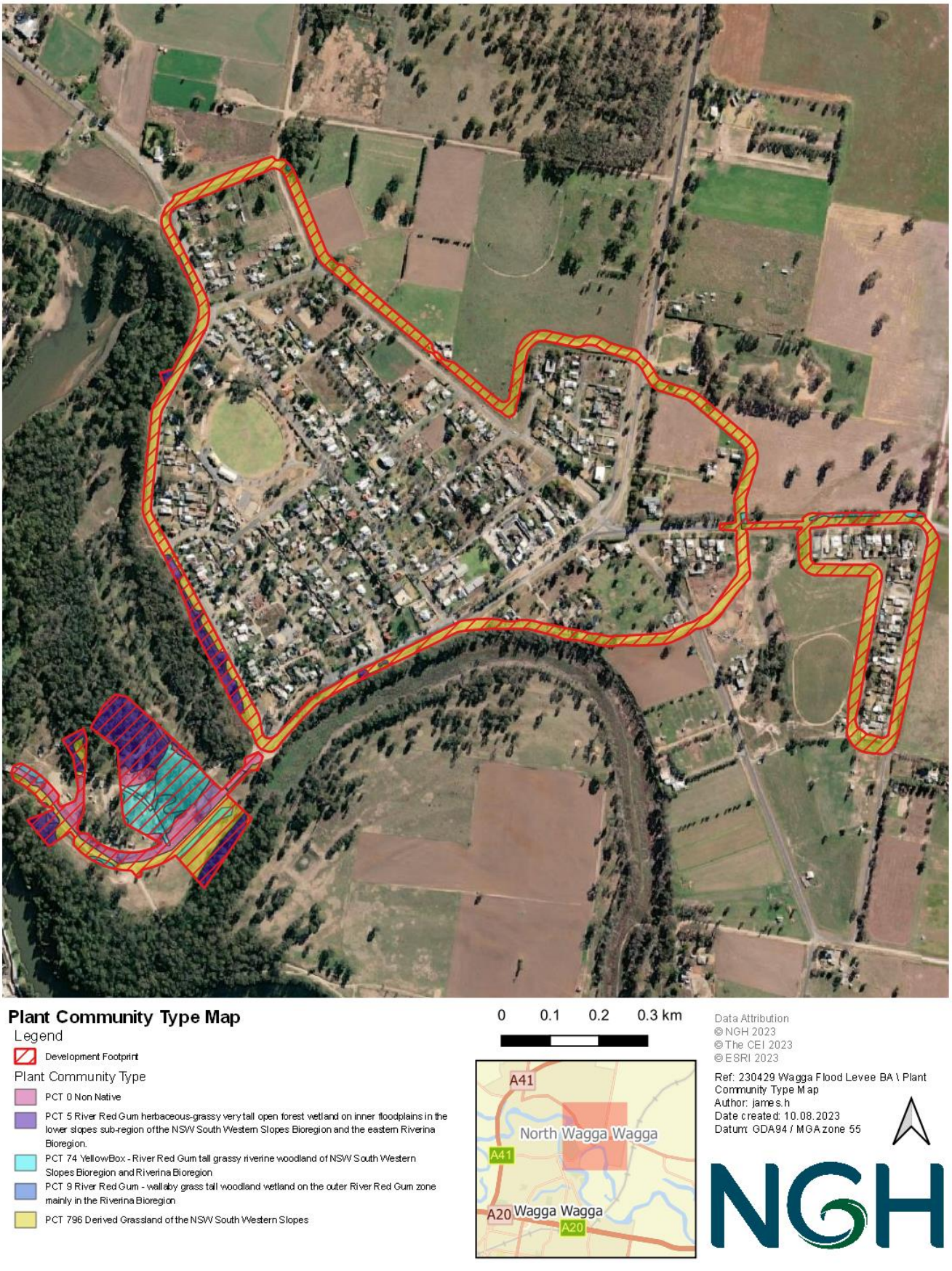


Figure 3-4 Plant Community Type map

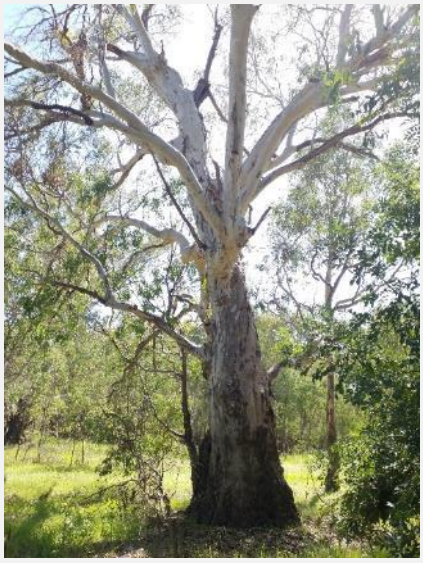
3.2.5. Terrestrial habitat

The flora and fauna habitat recorded in the development footprint consists of:

- Woodland, Riparian Woodland
- Floodplain transition Forest.
- Grassland.

Table 3-5 Terrestrial habitat identified within the development footprint

Habitat / feature	Description	Image
Woodland (PCT 5, 9, 74)	Remnant woodland was identified in the study area. This woodland occurred in both large and small stands. Woodland provides valuable foraging and breeding habitat for native fauna. Remnant trees had numerous large hollows and are important habitat for threatened squirrel glider, superb parrot and other threatened species breeding in the area. PCT 5 - The Inland Riverine Forests is found within this forested wetland that will be impacted by the proposed works. This PCT will provide suitable habitat for threatened species and will be the most impacted. PCT 74 - Floodplain Transition Woodlands with weed dominated ground cover but native trees present. Large amounts of HBTs found within this PCT.	
Grassland (PCT 796)	The vegetation present is largely non-native but is mapped as native as a precautionary approach. This makes up a majority of the vegetation mapped within the development footprint and would provide limited habitat for threatened species. Native grasses did occur in low to moderate densities. Native grasses provide foraging resources for native species. Most of the site was dominated by exotic perennial grasses - exotic grasses provide a low resource for foraging and refuge. Grasses within the development footprint at the time of the site assessment provided a very low foraging and refuge resource due to the recent mowing of the site.	

Woody debris	Fallen timber was observed in a few disturbed locations throughout the study area. One area contained timber piles from pushed up vegetation. Fallen timber provides shelter and foraging resources for several native fauna species including small reptiles and ground-foraging birds.	
Hollow-bearing trees (HBTs)	HBTs occurred within the survey area. HBTs are an increasingly rare resource for fauna. HBTs take up to 100 years to start forming, many fauna species are dependent on hollow-bearing trees for breeding, nesting and roosting including a number of threatened species. HBTs within townships are generally low density and therefore provide a high-level of biodiversity value.	

3.2.6. Aquatic habitat

The Parken Pregan Lagoon is an ephemeral man-made tributary of the Murrumbidgee River. The edges of this waterway are likely to impacted by the proposed works. This area was flooded during the field survey. As such information about aquatic habitat type and condition was not collected. Impacts to aquatic habitat have not been thoroughly assessed and may require further investigation. Impacts to aquatic habitat may be exacerbated if a flood event coincides with construction works around Parken Pregan Lagoon. Mitigation measures have been outlined in Section 7.

The Murrumbidgee River and Parkan Pregan lagoon is listed as Key Fish Habitat (Figure 3-3). A search of the NSW threatened fish distributions (DPI, 2016) identified three threatened aquatic species and one EEC listed under the NSW Fisheries Management Act (FM Act) occur within the locality. These are;

- Murray Crayfish (*Euastacus armatus*)
- Flathead Galaxia (*Galaxias rostratus*)
- Trout Cod (*Maccullochella macquariensis*)
- Murray River EEC -*The aquatic ecological community in the natural drainage system of the lower Murray River catchment*

A habitat evaluation was completed for these species and is presented in Appendix A. None of these species are considered to be directly impacted by the proposal however there may be indirect impacts related to sedimentation or works being undertaken during a flooding event.

3.2.7. Threatened flora

No threatened flora species were identified during the site inspection; however, no targeted threatened species survey were undertaken. A search of the NSW BioNet Atlas found records of the following 3 flora species within 2km of the development footprint:

- Claypan Daisy *Brachyscome mulleriodes* (1889)
- Small Purple-pea *Swainsona recta* (1900)
- Woolly Ragwort *Senecio garlandii* (2008)

A habitat evaluation was completed for these species and is presented in Appendix A. Two of the three flora species are records more than 100 years old and were located in areas that are now suburban areas. The Woolly Ragwort record from 2008 is also situated in an area of urban Wagga Wagga however suitable rocky habitat for this species does not occur in the development footprint. No threatened flora are considered to occur within the development footprint.

3.2.8. Threatened Fauna

No threatened species were identified during the site inspection; however, no targeted threatened species survey were undertaken. A search of the NSW BioNet Atlas found records of the following 21 fauna species within 2km of the development footprint:

- Barking Owl *Ninox connivens* (2000)
- Bilby *Macrotis lagotis* (1912)
- Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae* (2019)
- Dusky Woodswallow *Artamus cyanopterus cyanopterus* (2011)
- Flame Robin *Petroica phoenicea* (2019)
- Freckled Duck *Stictonetta naevosa* (2003)

- Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis temporalis* (2016)
- Grey-headed Flying-fox *Pteropus poliocephalus* (2019)
- Latham's Snipe *Gallinago hardwickii* (1977)
- Little Eagle *Hieraaetus morphnoides* (2018)
- Little Lorikeet *Glossopsitta pusilla* (2015)
- Regent Honeyeater *Anthochaera Phrygia* (1977)
- Scarlet Robin *Petroica boodang* (1978)
- Sharp-tailed Sandpiper *Calidris acuminata* (1999)
- Southern Myotis *Myotis Macropus.* (2000)
- Spotted Harrier *Circus assimilis* (2013)
- Superb Parrot *Polytelis swainsonii* (2018)
- Squirrel Glider *Petaurus norfolcensis* (2017)
- Turquoise Parrot *Neophema pulchella* (2014)
- White-bellied Sea-Eagle *Haliaeetus leucogaster* (2019)
- White-throated Needletail *Hirundapus caudacutus* (2019)

A habitat evaluation was completed for these species and is presented in Appendix A.

Based on this assessment, the following species were considered to potentially occur within the development footprint and have the potential to be impacted by the proposed works.

- Parrots
    - Superb Parrot (*Polytelis swainsonii*): BC-V, EPBC-V
    - Turquoise Parrot *(Neophema pulchella):*BC-V
    - Little Lorikeet (*Glossopsitta pusilla*): BC-V.
- Passerine Birds
    - Varied Sittella (*Daphoenositta chrysoptera*):
    - Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*): BC-V, EPBC-V
    - Hooded Robin *(south-eastern form*): BC-V, EPBC-E
    - Scarlet Robin (*Petroica boodang*): BC-V
    - Diamond Firetail *(Stagonopleura guttata)*: BC-V, EPBC-V
- Raptors
    - Little Eagle (*Hieraaetus morphnoides*): BC-V
    - Black Falcon (*Falco subniger*: BC-V
    - Barking Owl (*Ninox connivens*): BC-V.
- Arboreal Mammals
    - Squirrel Glider (*Petaurus norfolcensis*): BC-V
    - Squirrel Glider in the Wagga Wagga Local Government Area: BC-E
- Bats
    - Grey-headed Flying-fox (*Pteropus poliocephalus*): BC-V, EPBC-V
    - Inland Forest Bat (*Vespadelus baverstocki)*: BC-V
    - Southern Myotis (*Myotis macropus*): BC-V.

Tests and Assessments of Significance have been completed for these groups of species. Refer to Section 4.1

3.2.9. Priority weeds

Plants restricted in trade and movement due to the potential to cause harm to the NSW environment, economy and community under the NSW Biosecurity Act are called 'Priority Weeds'. Weeds of National Significance are weeds that are considered 'the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts.' (DPI, 2022).

Several Priority Weeds for the Riverina were identified during the site assessment including Caltrop (**Tribulus terrestris*), Khaki weed (**Alternanthera pungens*), Horehound (**Marrubium vulgare*), and Lippia (**Phyla canescens*). In NSW, reasonable steps must be undertaken to prevent, eliminate or minimise any biosecurity risk or threat from priority weeds (DPI, 2019).

3.2.10. Hollow bearing trees

A total of 141 hollow bearing trees (HBTs) are recorded within and surrounding the development footprint (See Figure 3-5 and Appendix C). The proposed works will result in the removal of 17 HBTs. All HBTs being impacted contain multiple hollows, with a large portion between the medium and large size (Table 3-6). A total of 83 hollows will be destroyed as a result of the proposed works. There are 124 HBTs to be retained within the area, containing a total of 885 hollows.

Table 3-6 Hollow-bearing trees to be removed

HBT ID	Small <6cm	Medium 6–12cm	Large 12–18cm	Extra Large >18cm	Total
HBT 116	0	2	2	2	6
HBT 115	0	2	2	1	5
HBT 114	0	3	2	1	6
HBT 113	0	2	1	0	3
HBT 112	0	3	1	0	4
HBT 98	0	2	3	0	5
HBT 97	3	4	2	0	9
HBT 25	0	2	0	0	2
HBT 24	0	2	1	0	3
HBT 23	0	2	1	2	3
HBT 22	0	2	2	2	6
HBT 20	0	0	2	2	4
HBT 13	0	3	2	2	7
HBT 6	2	4	1	0	7
HBT 5	1	2	0	0	3
HBT 3	2	3	1	0	6
HBT 2	2	2	0	0	4

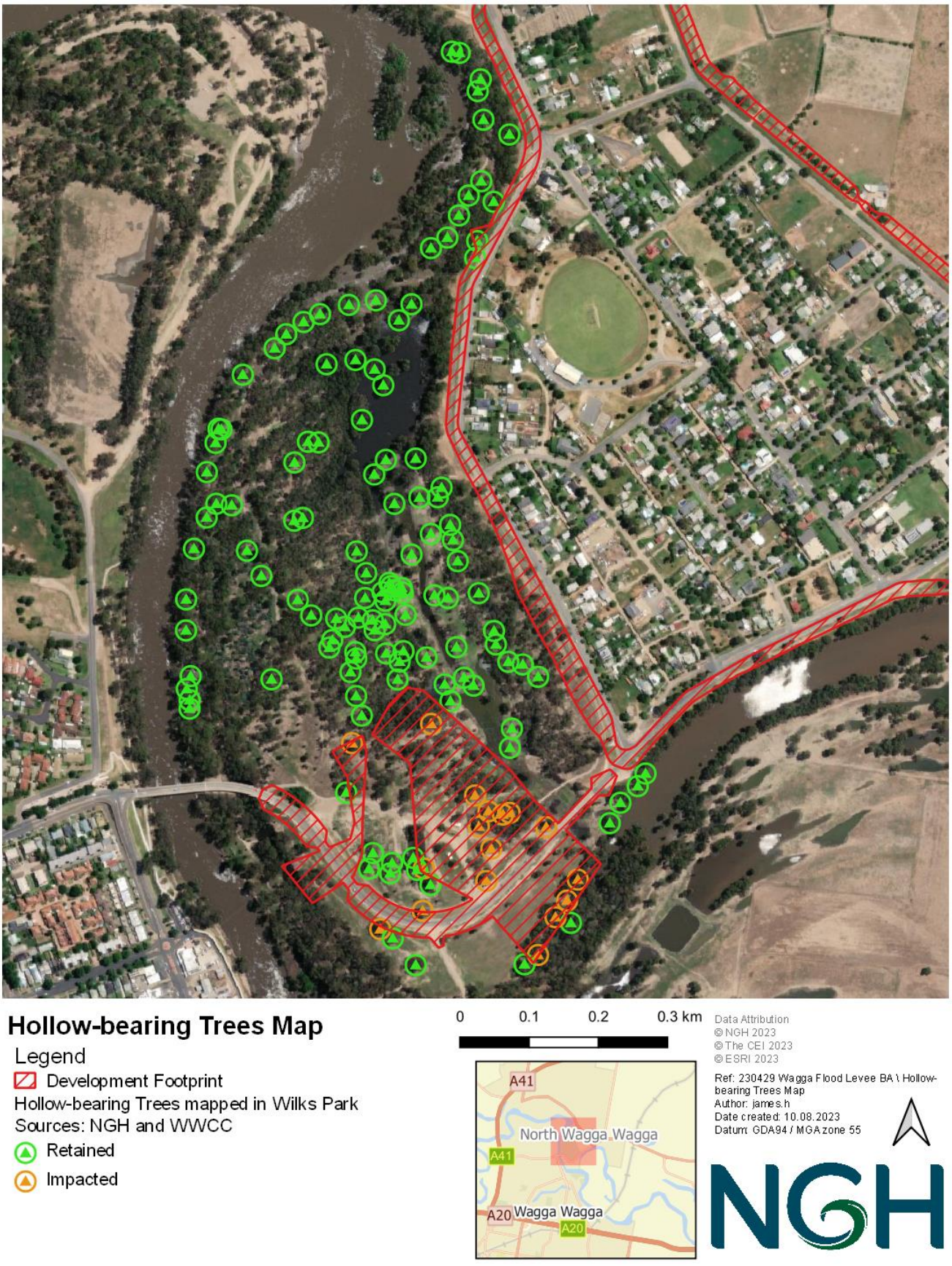


Figure 3-5 Hollow-bearing trees being impacted and retained by the proposed works

4. Assessment of Impacts

4.1. Vegetation

The total area being assessed is 20.53 hectares. A total of 19.98 ha of vegetation will be impacted by the proposal through removal or disturbance. A total of 18.19 ha of native vegetation will be removed by the proposal. The breakdown by PCT of these impacts can be found below in Table 4-1.

The majority of impacts occur to PCT 796 low condition derived grasslands which is mostly comprised of areas along the existing levee or roadsides. 5.71 ha of moderate - good condition Riparian Woodland habitat (PCTs 5, 9 and 74) would be impacted by clearing or soil excavation works. The surrounding patch of woodland within Wilks Park covers an area of 33 ha and the removal of 5.71ha of vegetation results in impacts to around 17.3% of this woodland patch. The proposed works would also increase fragmentation through Wilks Park. At its greatest extent a 393 m wide clearing of vegetation could occur through the centre of suitable woodland habitat. Wilks Park is an isolated remnant of Riverine Woodland within a cleared urban and semi-rural landscape and further fragmentation of isolated patches can lead to direct habitat loss, habitat fragmentation and habitat degradation.

A total of 17 HBTs will be removed as a result of the proposal out of a total 141 within the patch of Wilks Park, which equates to 12.1% removed within the patch. All HBTs being impacted contain multiple hollows, with a large portion between the medium and large size. A total of 83 hollows would be impacted as a result of the proposed works representing 11.6% of hollows present within Wilks Park. HBTs are an important resource for breeding habitat for many threatened fauna species. A decrease in the availability of hollows can lead to significant loss of hollow-dependent animal species diversity and abundance (NSW Scientific Committee, 2021)

Table 4-1 Vegetation impacts

Vegetation	Zone	Development Footprint (ha)
PCT 74 - Yellow Box-River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate – good condition	2.48
PCT 9 - River Red Gum - wallaby grass tall woodland wetland on the outer River red Gum zone mainly in the Riverina Bioregion	Moderate – good condition	0.002
PCT 5 – River Red Gum herbaceous - grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion	Moderate – good condition	3.23
PCT 796 – Derived Grassland of the NSW South Western Slopes	Low Condition	12.48
Exotic Dominated	Bare ground	1.80
TOTAL VEGETATION REMOVAL		19.99

4.2. Threatened species

4.2.1. Terrestrial flora

No threatened flora entities were recorded during survey, and none are considered likely to occur within the development footprint or be impacted by the proposed works.

4.2.2. Terrestrial fauna

Sixteen threatened fauna species were considered to occur and rely on the habitat within the development footprint (Section 3.2.8). 17 HBTs would be removed by the proposed works along with 5.71 ha of Riverine Woodland and thus may impact the hollow dependent fauna residing in the area.

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

> *a. in the case of a threatened species, whether the proposed development or activity 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,*
>
> *b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*
>
> > *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,*
>
> *c. in relation to the habitat of a threatened species or ecological community:*
>
> > *i.the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*
> >
> > *ii.whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*
> >
> > *iii.the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,*
>
> *d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),*
>
> *e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.*

A Test of Significance was undertaken for the 16 fauna species considered to occur within the habitats in the development footprint (Appendix D). A summary of the results of the ToS are shown in Table 4-2.

The removal of native vegetation is considered to have a significant impact on four entities;

- Squirrel Glider (*Petaurus norfolcensis*)
- Squirrel Glider in the Wagga Wagga Local Government Area
- Superb Parrot (*Polytelis swainsonii*)
- Barking Owl (*Ninox connivens*)

Table 4-2 Tests of Significance Summary

Threatened Species	Significant impact questions -					Likely Significant Impact?
	a	*b*	*c*	*d*	*e*	
Superb Parrot	**Yes**	**n/a**	**Yes**	**No**	**Yes**	**Yes**
Turquoise Parrot	No	n/a	Partially	No	Yes	No
Little Lorikeet	No	n/a	No	No	Yes	No
Varied Sitella	No	n/a	No	No	Yes	No
Brown Treecreeper	No	n/a	Yes	No	Yes	No
Hooded Robin	No	n/a	No	No	Yes	No
Scarlet Robin	No	n/a	No	No	Yes	No
Diamond Firetail	No	n/a	No	No	Yes	No
Little Eagle	No	n/a	No	No	Yes	No
Black Falcon	No	n/a	No	No	Yes	No
Barking Owl	**Yes**	**n/a**	**No**	**No**	**Yes**	**No**
Squirrel Glider	**Yes**	**n/a**	**Yes**	**No**	**Yes**	**Yes**
Squirrel Glider in the Wagga Wagga LGA	**Yes**	**n/a**	**Yes**	**No**	**Yes**	**Yes**
Grey-headed Flying Fox	No	n/a	No	No	Yes	No
Inland Forest Bat	No	n/a	No	No	Yes	No
Southern Myotis	No	n/a	No	No	Yes	No

4.2.3. Threatened ecological communities

No TECs were recorded within the development footprint, and none are considered likely to occur within the development footprint or be impacted by the proposed works.

4.2.4. Aquatic species

The waterways surrounding the development footprint provide habitat for threatened fish species listed in section 3.2.6. No aquatic species are considered to be directly impacted by the proposal however there may be indirect impacts related to sedimentation or works being undertaken during a flooding event. Erosion and sediment control measures should be implemented, and physical barriers and sediment traps would be required to mitigate impacts on aquatic biodiversity. An emergency erosion and sediment plan should be developed in case of a flood event coinciding with proposed works.

4.3. Priority weeds

Several Priority Weeds for the Riverina were identified during the site assessment including Caltrop (*Tribulus terrestris*), Khaki weed (*Alternanthera pungens*), Horehound (*Marrubium vulgare*), and Lippia (*Phyla canescens*). Further inspection will be required to confirm absence of other priority weeds throughout the development footprint, and map extent of the priority species identified during the site inspection.

The proposed works have the potential to introduce priority weeds or spread weed seeds from other exotic weed species within and out of the development footprint.

The Biosecurity Act dictates that all priority weeds are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any land managers or authorities who deal with any priority has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Other exotic flora species that were identified within the study area are common within the region and are often encountered within disturbed areas.

Mitigation measures have been recommended to control the spread of weed seed species by the proposed works and are outlined in Section 33.

5. Biodiversity Offset Scheme evaluation table

Under the BC Act, a Part 5 assessment must determine if the proposed activity is likely to significantly affect threatened species, populations or communities. Further assessment is required if the activity is likely to affect a threatened entity according to the NSW Test of Significant (ToS) or impact a declared area of Outstanding Biodiversity Value (AOBV). Further assessment can either be prepare a Species Impact Statement (SIS) or opt into the Biodiversity Offset Scheme (BOS) and prepare a Biodiversity Development Assessment Report (BDAR). A BDAR must be prepared under the Biodiversity Assessment Methodology (BAM) by an accredited BAM Assessor.

A summary of the results of the assessments are provided in Table 5-1 below.

Table 5-1 Summary of results of 5-part Tests of Significance.

Species	Significant Impact (yes/no)
Superb Parrot (*Polytelis swainsonii*)	YES
Turquoise Parrot *(Neophema pulchella)*	NO
Little Lorikeet (*Glossopsitta pusilla*)	NO
Varied Sittella (*Daphoenositta chrysoptera*)	NO
Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*)	NO
Hooded Robin *(south-eastern form*)	NO
Scarlet Robin (*Petroica boodang*)	NO
Diamond Firetail *(Stagonopleura guttata)*	NO
Little Eagle (*Hieraaetus morphnoides*)	NO
Black Falcon (*Falco subniger)*	NO
Barking Owl (*Ninox connivens*)	YES
Squirrel Glider (*Petaurus norfolcensis*)	YES
Squirrel Glider in the Wagga Wagga Local Government Area	YES
Grey-headed Flying-fox (*Pteropus poliocephalus*)	NO
Inland Forest Bat (*Vespadelus baverstocki)*	NO
Southern Myotis (*Myotis macropus*)	NO

Based on this BA, the proposal is considered likely to trigger a significant impact on the;

- Squirrel Glider
- Squirrel Glider in the Wagga Wagga Local Government Area
- Barking Owl
- Superb Parrot

Hence, under the NSW BC Act further assessment is required for these species through either a Biodiversity development Assessment Report (BDAR) or Species Impact Statement (SIS).

No EPBC Act assessments of significance were undertaken for Commonwealth listed species however these should be undertaken following further assessment. The outcomes of these assessments may also trigger an EPBC referral if a significant impact is identified.

Alternatively, investigations could occur to alter the proposal design to minimise impacts on native vegetation and HBTs. Reducing impacts on excavation within native vegetation areas could reduce the impacts to threatened entities and negate the need for a BDAR or a SIS.

Table 5-2 Biodiversity Offset Scheme Evaluation

Question		Answer	Result
1	Will it be carried out in a declared Area of Outstanding Biodiversity?	**No** – The development footprint does not occur within any declared Areas of Outstanding Biodiversity.	No Areas of Outstanding Biodiversity are present within the development footprint. Hence, this will not trigger the BOS.
2	Are threatened entities likely to be significantly impacted by the proposed works	**Yes –** Four threatened entities likely to be significantly impacted by the proposal.	BOS triggered by significant impact to threatened species, ecological communities and their habitats according to the test in section 7.3 of the BC Act.

6. Key threatening processes

A threat may be listed as a key threatening process (KTP) under the NSW BC Act if it; adversely affects threatened species or ecological communities or could cause species or ecological communities to become threatened. KTPs relevant to the proposal are discussed in Table 6-1 below.

Table 6-1 Table showing KTPs relevant to the proposal

KTP	Relevance
Clearing of native vegetation	The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the determination, the NSW Scientific Committee found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity'. Clearing can lead to direct habitat loss, habitat fragmentation and associated genetic impacts, habitat degradation and off–site impacts such as downstream sedimentation. The proposal will remove 18.19ha of native vegetation which will increase the impacts of this KTP. As such the proposed action is part of this KTP.
Invasion and establishment of exotic vines and scramblers	The proposal has the potential to spread exotic species from the development footprint to other parts of the study area through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site.
Invasion of native plant communities by exotic perennial grasses	The understorey in the development footprint is already dominated by exotic vegetation, however, weed spread would need to be minimised off-site by following mitigation measures.
Loss of Hollow-bearing Trees	The density of hollow-bearing trees required to sustain viable populations of vertebrates is controlled by the diversity of competing fauna species at a site, population densities, number of hollows required by each individual over the long-term, and the number of hollows with suitable characteristics occurring in each tree. The presence, abundance and species richness of hollow-using fauna are correlated with the density of hollow-bearing trees; suggesting that the availability of hollows is often a limiting environmental factor. In some instances, it is the prey species of a threatened predator that is limited by hollow availability. The distribution and abundance of hollow-bearing trees in NSW has been reduced and fragmented by extensive clearing of native vegetation during the past two centuries, primarily for agriculture. The proposal would increase the impacts of this KTP through the removal of 17 HBTs, which have abundant hollows. These biodiversity features are a rare and limited resource within the existing landscape.

7. Mitigation measures

These safeguards are a tool to assist with minimising the impacts on biodiversity during the proposed works.

Table 7-1 Safeguards and mitigation measures

Impact	*Environmental safeguards*	*Responsibility*	*Timing*
Spread of weeds	All weed material containing seed heads, weeds that contain toxins, and weeds that are able to reproduce vegetatively should be disposed of at an appropriate waste management facility or otherwise properly treated to prevent weed growth.	WWCC	Construction Operation
	All herbicides should be used in accordance with the requirements on the label. Any person undertaking pesticide (including herbicide) application should be trained to do so and have the proper certificate of completion/ competency or statement of attainment issued by a registered training organisation.	WWCC	Construction
	Plant equipment and machinery should be cleaned of all biological matter prior to entering the site and prior to leaving the site. Implementation of designated washdown area.	WWCC	Prior to construction Prior to leaving site
Unexpected threatened species finds.	The site induction should include measures to make employees aware of potential threatened flora and fauna during works and understand the procedures if threatened fauna are detected, this will be recorded as a part of the induction procedure and toolbox talks: ○ Stop work, ○ Alert an Ecologist or suitably qualified person for assessment and possible re–location during works.	WWCC	Construction
Removal of hollow-bearing trees	17 HBTs will be removed as a result of the proposed works. Pre-clearance checks are to be undertaken where all hollows are to be inspected by a suitably qualified	WWCC	Prior to

	fauna spotter catcher. Where arboreal fauna are identified hollows will be cleared appropriately. All HBTs in the development footprint must be inspected before excavation/removal can commence.	Subcontractor	construction
	Clearing works to avoid the breeding season of threatened parrots between May and January.	WWCC Subcontractor	Prior to construction
	Salvage and appropriate relocation of any large hollows to trees without hollows	WWCC	Prior to construction
	Suitable artificial nest boxes to be installed at a ratio of 1:1 for hollows removed for microbats, threatened birds and squirrel glider.	WWCC	Prior to construction
Fallen timber removal	All fallen timber within the proposal area is to be remain within the proposal area	WWCC	Construction
Vegetation clearing	All woodland to be impacted is to be surveyed by an ecologist or suitably qualified person to record the presence of any nesting fauna.	WWCC	Prior to construction
	Vegetation to be retained within the proposal area is to be clearly marked.	WWCC	Prior to construction
	Exclusion zones at the extent of the works corridor to limit works encroachment on remnant vegetation.	WWCC	Prior to construction
	Revegetation of groundcover and midcover habitat with endemic native plants representative of PCT 5 and PCT 74 in strategic areas to enhance foraging habitat.	WWCC	Prior to leaving site
Erosion and sedimentation	Clearing of vegetation within the riparian/floodplain zone is likely to result in excess sedimentation or erosion and will require physical barriers and sediment traps to mitigate impacts on aquatic biodiversity. An emergency erosion and	WWCC	Construction and operation

	sediment plan should be developed in case of a flood event coinciding with proposed works.		

8. Conclusion

The proposal will impact on a total of 19.99 ha of vegetation through removal or disturbance. Of this, 18.19 ha is native vegetation and is comprised mostly of derived grasslands but includes some areas of moderate to good condition riparian woodland. The largest impacts to vegetation will be within PCT 796 derived grasslands, a total of 12.48 ha. This PCT is mostly comprised of areas along existing levees or roadsides.

The excavation works surrounding Hampden Avenue will impact 5.71 ha of moderate - good condition riparian woodland habitat (PCTs 5, 9 and 74 are those affected). The proposed works would increase fragmentation through Wilks Park and impact around 17.3% of the riparian woodland patch. The landscape is historically fragmented from the existing road reserve and further vegetation clearing can lead to direct habitat loss, habitat fragmentation and habitat degradation for threatened species.

The proposed works will result in the removal of 17 HBTs out of a total 141 within the patch of Wilks Park, which equates to 12.1% removed within the patch. All HBTs being impacted contain multiple hollows, with a large portion between the medium and large size. A total of 83 hollows would be impacted as a result of the proposed works representing 11.6% of hollows present within Wilks Park.

No TECs were recorded within the development footprint, and none are considered likely to occur within the development footprint or be impacted by the proposed works. Threatened species tests of significance were undertaken for 16 entities with the results indicating a significant impact likely for the following four entities:

- Squirrel Glider (*Petaurus norfolcensis*)
- Squirrel Glider in the Wagga Wagga Local Government Area
- Superb Parrot (*Polytelis swainsonii*)
- Barking Owl (*Ninox connivens*)

No EPBC Act assessments of significance were undertaken for Commonwealth listed species however these will be undertaken following further assessment. The outcomes of these assessments may also trigger an EPBC referral if a significant impact is identified.

Based on this BA, the proposal is considered to incur significant impacts on threatened species. Hence, under the NSW BC Act further assessment is required for these species through either a Biodiversity development Assessment Report (BDAR) or Species Impact Statement (SIS).

An alternative to requiring a BDAR or SIS would be to redesign or alter the location of excavation to avoid impacts on native vegetation and HBTS. Mitigation measures have been recommended to minimise impacts by the proposal.

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Appendix A Protected Matter Search Tool Report

Appendix B Species habitat evaluation table

The tables in this appendix present the habitat evaluation for threatened species, ecological communities, and endangered populations listed within 10km of the development footprint in the Atlas of NSW Wildlife[1] and those identified as potentially occurring in the area according to the Commonwealth EPBC Protected Matters Search Tool (PMST).[2]

The likelihood of occurrence is based on presence of habitat, proximity of nearest records, and mobility of the species (where relevant).

The assessment of potential impact is based on the nature of the proposal, the ecology of the species, and its likelihood of occurrence. The following classifications are used:

Presence of habitat

Present: Potential or known foraging, roosting, nesting, refuge, movement corridor (including movement of genetic material) or other habitat is present within the study area.

Marginal: Limited habitat with some features that may be used by species within the study area.

Absent: No potential foraging, roosting, nesting, or other habitat is present within the study area.

Likelihood of occurrence

Low: It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (10km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (i.e. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area, or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.

Moderate: Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however, may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (i.e. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.

High: It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (i.e. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration.

Recorded: Species was recorded during the field investigations or has recorded previously.

[1] The NSW Bionet Atlas is administered by the Department of Planning and Environment (DPE) and is an online database of fauna and flora records that contains over four million recorded sightings.
[2] This online tool is designed for the public to search for matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is managed by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW).

Potential to be Impacted

Low	The proposal would not impact this species or its habitats. No Test of Significance (ToS) or Assessment of Significance (AoS) is necessary for this species.
Moderate	The proposal could impact this species or its habitats however the impacts are considered manageable such that no direct or indirect impacts are likely. Test of Significance (ToS) or Assessment of Significance (AoS) may be required for this species.
High	The proposal is likely to impact this species or its habitats. A ToS has been applied to these entities.

Key: V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory

A.1 FLORA

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Flora								
Austrostipa wakoolica **A Spear-grass**	-	E	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.	PMST	Marginal	Low	Low	Silty clays present onsite although no lignum swamp or open cypress pine forest present.
Brachyscome muelleroides **Claypan Daisy**	V	V	Grows in damp areas on the margins of claypans in moist grassland with Pycnosorus globosus, Agrostis avenacea and Austrodanthonia duttoniana. Also recorded from the margins of lagoons in mud or water, and in association with Calotis anthemoides. Victorian collections have generally come from open positions on the Murray River floodplain, swampy River Red Gum (Eucalyptus camaldulensis) Forest and damp depressions. Occurs in the Wagga Wagga, Narranderra, Tocumwal and Walbundrie areas. Also occurs in north-central Victoria	1 (1889) PMST	Present	Low	Low	No current records within locality. Historic record (pre 1900 within suburban area) is no longer present. The habitat present is suitable however understory is highly disturbed and it is unlikely that the species is present onsite.

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			(only along the Murray from Tocumwal to the Ovens River)					
Caladenia arenaria **Sand-hill Spider-orchid**		E	Occurs in woodland with sandy soil, especially that dominated by White Cypress Pine (*Callitris glaucophylla*).	PMST	Absent	Low	Low	No suitable habitat will be impacted.
Lepidium aschersonii **Spiny Peppercress**	V	V	Found on ridges of gilgai clays dominated by Brigalow (Acacia harpophylla), Belah (Casuarina cristata), Buloke (Allocasuarina luehmanii) and Grey Box (Eucalyptus B-IIIagittateB-III). In the south has been recorded growing in Bull Mallee (Eucalyptus behriana). Often the understorey is dominated by introduced plants. The species grows as a component of the ground flora, in grey loamy clays. Vegetation structure varies from open to dense, with sparse grassy understorey and occasional heavy litter. Occurs in the marginal central-western slopes and north-western plains regions of NSW (and potentially the southwestern plains).	PMST	Absent	Low	Low	No suitable habitat will be impacted.
Lepidium monoplocoides	E	E	Collected from widely scattered localities, with large numbers of historical records but	PMST	Marginal	Low	Low	Some suitable tree species in the

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Winged Pepper-cress			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 300-500mm. Predominant vegetation is usually an open woodland dominated by *Allocasuarina luehmannii* (Bulloak) and/or eucalypts, particularly *Eucalyptus largiflorens* (Black Box) or *Eucalyptus populnea* (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses. Recorded in a wetland-grassland community comprising *Eragrostis australasicus, Agrostis avenacea, Austrodanthonia duttoniana, Homopholis proluta, Myriophyllum crispatum, Utricularia dichotoma* and *Pycnosorus globosus*, on waterlogged grey-brown clay. Also recorded from a *Maireana pyramidata* shrubland.					floodplain area being impacted although the site is mainly dominated by alluvial clays and the species has not been recorded within the area.

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Senecio garlandii **Woolly Ragwort**	V	-	Woolly Ragwort occurs on sheltered slopes of rocky outcrops.	2 (2001–2008)	Absent	Low	Low	No rocky outcrops will be impacted by the proposed works.
Swainsona murrayana **Slender Darling-pea, Slender Swainson, Murray Swainson-pea**	V	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 *Maireana* species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	PMST	Marginal	Low	Low	Site is dominated by River Red gum woodland and a swampy grassland. Limited levels of bladder saltbush or blackbox. The soil is mainly silty and alluvial clay rather than the brown cracking clays required by the species.
Swainsona recta **Small Purple-pea**	E	E	It has been recorded previously at Carcoar, Culcairn and Wagga Wagga but is thought to be extinct from these areas. Populations are still present in Queenbeyan, the ACT and Wellington–Mudgee areas. Plants are	2 (1900) PMST	Absent	Low	Low	No current records within locality. Historic records (pre 1900 within suburban area) are no longer present

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			commonly found on railway easements. It occurs in the grassy understory of woodlands, and open–forests dominated by Blakely's Red Gum Eucalyptus blakelyi, Yellow Box E. melliodora, Candlebark Gum E. rubida and Long–leaf Box E. goniocalyx. They are found in dry sclerophyll forests, grasslands, and grassy woodlands.					Species habitat is within dry sclerophyll forests, grasslands and grassy woodlands. A floodplain riparian area will be impacted.
Threatened Ecological Communities								
Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South Western Slopes and South Eastern Highlands Bioregions	E	-	Vegetation growing on soils derived form serpentinite in the Coolac-Tumut area Coolac-Tumut Serpentinite Shrubby Woodland consists of an overstorey of drooping sheoak (*Allocasuarina B-VlagittateB-VIB-VIe*) with the shrubs hickory wattle (*Acacia implexa*), grasstrees (*Xanthorrhoea glauca*) and *Ricinocarpos bowmanii.*The groundlayer is consists of a range of native grasses and herbs, often including kangaroo grass (*Themeda australis*), wiregrasses (*Aristida* spp.), wallaby grasses (*Rytidosperma* spp.), *Senecio quadridentatus*, rock fern (*Cheilanthes seiberi*) and *Carex breviculmis*. Scattered	Bionet	Absent	Low	Low	No associated PCTs

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			trees of white box (*Eucalyptus albens*) and bundy (*Eucalyptus nortonii*) can occur.					
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	E	-	Community occurs on brown loam or clay, alluvial or colluvial soils on prior streams and abandoned channels or slight depressions on undulating plains or flats of the western slopes. Community often occurs upslope from River Red Gum communities above frequently inundated areas of the floodplain. It also occurs on colluvium soils on lower slopes and valley flats. Less than 5% of the original extent is estimated to remain. Shrubs include Wilga, Deane's Wattle, Hop Bush, Cassia, Water Bush and Sifton Bush.	Bionet	Absent	Low	Low	No associated PCTs
Grey Box (Eucalyptus B-VIIagittateB-VII) Grassy Woodlands and Derived Native Grasslands of	-	E	The Grey Box (Eucalyptus B-VIIagittateB-VII) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia predominantly occurs on the drier edge of the temperate grassy eucalypt woodland belt and ranges from central New South Wales through northern and central Victoria into South Australia. Patches that are disjunct	PMST	Absent	Low	Low	No associated PCTs

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
South-eastern Australia			from the main belt of the ecological community occur to the south of the Great Dividing Range in Victoria, around Melton and Sunbury to the west of Melbourne (Oates and Taranto, 2001), and also to the west of the Murray River coastal plain in South Australia, around the Flinders and Mount Lofty Ranges near Adelaide (Robertson, 1998). The Grey Box (E. B-VIIIagittateB-VIII) Grassy Woodlands and Derived Native Grasslands of SouthEastern Australia ecological community is relatively less well studied and understood in comparison with other grassy woodland systems in south-eastern Australia. The ecological community also occupies a complex position in the landscape.					
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt	E	-	Inland Grey Box Woodland occurs on fertile soils of the western slopes and plains of NSW. The community generally occurs where average rainfall is 375- 800 mm pa and the mean maximum annual temperature is 22- 26°C. There is a correlation between the distribution of Eucalyptus B-VIIIagittateB-VIII communities and soils of Tertiary and	Bionet	Absent	Low	Low	No associated PCTs

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
South Bioregions			Quaternary alluvial origin, largely corresponding with the Red Brown Earths. The majority of remnant patches of Inland Grey Box Woodland survive with trees largely intact but with the shrub or ground layers degraded to varying degrees through grazing or pasture modification. Some species that are part of the community appear intolerant to heavy grazing by domestic stock and are confined to the least disturbed remnants.					
Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion	CE	-	The variant of the community dominated by Bull Mallee and White Mallee tends to occur on plains to the east and north of West Wyalong on red earths including the aeolian soil known as parna. The variant dominated by Blue Mallee – Bull Mallee – Green Mallee tends to occur on low hills and rises in sandy loam soils over substrates including gravel ferricrete (ironstone) and mixed sedimentary, metamorphic and granitic substrates The third variant, Broombush - Green Mallee – Blue Mallee, occurs in loamy sands on rocky rises of sandstone and other	Bionet	Absent	Low	Low	No associated PCTs

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			sedimentary rock types, mainly to the south west of West Wyalong.					
Murray River EEC-The aquatic ecological community in the natural drainage system of the lower Murray River catchment.	FM listed – E		The lower Murray River endangered 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 River (also known as the River Murray) downstream of Hume Weir, the Murrumbidgee River downstream of Burrinjuck Dam, the Tumut River downstream of Blowering Dam and all their tributaries anabranches and effluents including Billabong Creek, Yanco Creek, Colombo Creek, and their tributaries, the Edward River and the Wakool River and their tributaries, anabranches and effluents, Frenchmans Creek, the Rufus River and Lake Victoria.	FM	Present	Low	Low	The EEC is present within the area. Although the proposed works are unlikely to have a significant impact on the EEC based on the type of works. Impact of waterways will be limited if standard erosion and sedimentation controls are implemented.
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar	E	-	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	Bionet	Absent	Low	Low	No associated PCTs

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions			woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes *Acacia pendula* (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs. The structure and composition of the community varies, particularly with latitude, as chenopod shrubs are more prominent south of the Lachlan River district, while other woody species and summer grasses are more common further north. In some areas the shrub and canopy stratum may have been reduced or eliminated by clearing or heavy grazing, leaving derived grassland that may still constitute this community.					
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and	E	-	I n the Riverina bioregion and the far south-western portion of the NSW South Western Slopes bioregion, the community is typically associated with prior streams and aeolian source-bordering dunes, which are scattered	Bionet	Absent	Low	Low	No associated PCTs

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
NSW South Western Slopes bioregions			within an extensive alluvial clay plain dominated by chenopod shrublands. Sandhill Pine Woodland typically occupies red-brown loamy sands with alkaline sub-soils on the alluvial plain of the Murray River and its tributaries, and on parts of the sandplain in south-western NSW. The structure of the community varies depending on past and current disturbances, particularly clearing, logging, grazing and soil erosion, with species composition of sites being influenced by their size, recent rainfall or drought conditions and by their disturbance history, including grazing, land clearing and fire. The number and relative abundance of species will change with time since fire, and may also change in response to changes in fire frequency or grazing regime. At any one time, above-ground individuals of some species may be absent, but the species may be represented below ground in soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. At any one time, above-ground individuals of some species may be absent, but the					

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			species may be represented below ground in soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. Sandhill Pine Woodland shares a number of species with another endangered ecological community listed under the Threatened Species Conservation Act 1995: *Allocasuarina luehmannii* Woodland in the Riverina and Murray-Darling Depression bioregions. These two ecological communities inhabit similar soils and landforms and have similar geographic distributions. They may be distinguished on the basis of the relative abundance of their tree species and subtle differences in composition of their understorey. When tree abundance is assessed at the hectare scale, White Cypress Pine is the most abundant tree species in Sandhill Pine Woodland, whereas in *Allocasuarina luehmannii* Woodland, Buloke (*A. luehmannii*) is the most abundant tree species.					

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland / ***White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner***	CE	CE	Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum and a generally grassy understorey. The trees may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles. Commonly co-occurring eucalypts include Apple Box (*E. bridgesiana*), Red Box (*E. polyanthemos*), E. macrorhyncha), Coastal Grey Box (*E. moluccana*), Candlebark (*E. rubida*), Bundy (*E. goniocalyx*), Broad-leaved Stringybark (*E. goniocalyx*), Youman's Stringybark (*E. youmanii*) and others. The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include Kangaroo Grass (*Themeda australis*), Poa Tussock (*Poa sieberiana*), wallaby grasses (*Rytidosperma* spp.), spear-grasses (*Austrostipa* spp.), Common Everlasting (*Chrysocephalum apiculatum*), Scrambled Eggs (*Goodenia pinnatifida*), Small St John's Wort (*Hypericum gramineum*), Narrow-leafed New Holland Daisy (*Vittadinia muelleri*) and blue-bells (*Wahlenbergia* spp.)	PMST / Bionet	Absent – Some Yellow Box present however River Red Gum is the dominant overstory species and based on the age of the trees and landscape formation, River Red Gum has likely been the dominant overstory species historically.	Low	Low	No characteristic vegetation and landscape.

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Weeping Myall Woodlands	-	E	Species assemblage Weeping Myall trees often occur in monotypic stands, however other vegetation may also occur in the ecological community, though not as dominant species. These include: Western Rosewood (Alectryon oleifolius subsp. Elongatus); Poplar Box (Eucalyptus populnea); or Black Box (Eucalyptus largiflorens) (NSW Scientific Committee 2005; Keith 2004). Grey Mistletoe (Amyema quandang) commonly occurs on the branches of Weeping Myall trees throughout the ecological community's range (NSW Scientific Committee 2005). Other species commonly present in the community are listed in Appendix 1. Weeping Myall goes through regular cycles of senescence (aging and death) and regeneration. Weeping Myall trees are also susceptible to defoliation by Bag-shelter Moth (Ochrogaster lunifer) caterpillars and are often lopped for domestic stock fodder. Therefore, the ecological community can be dominated by Weeping Myall trees that are in a living, defoliated or dead state. The understorey of Weeping Myall Woodlands often includes an open layer of shrubs above an open ground	PMST	Absent	Low	Low	No associated PCTs

Species	Listing		Habitat	No. of Records within 10km	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			layer of grasses and herbs, though the ecological community can exist naturally either as a shrubby or a grassy woodland (Beadle 1948; Keith 2004). In many areas, however, the shrub layer has disappeared through overgrazing and dieback events and the woodland now has a primarily grassy understorey (Beadle 1948). The ground layer includes a diversity of grasses and forbs, and varies in species composition and cover depending on past and current grazing regimes, and the occurrence of recent rain (NSW Scientific Committee 2005). In the southern part of the distribution of Weeping Myall Woodlands (south of the midLachlan region), chenopods, such as saltbushes, native cotton bushes, bluebushes, goosefoots and copperburrs, were originally an important component of the understorey. As chenopods are generally highly palatable, they have largely disappeared in areas that have been grazed by stock and/or feral animals for substantial periods of time. In the northern parts of the ecological community, chenopod shrubs are a less prominent component of the understorey					

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Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Amphibians (3)								
Crinia sloanei **Sloane's Froglet**	E	E	This species is typically associated with periodically inundated areas in grassland, woodland and disturbed habitats. Sloane's Froglet lives and breeds in temporary and permanent waterbodies including oxbows off creeks and rivers, farm dams, large and small natural wetlands, constructed frog ponds and temporary puddles. It prefers wetlands that contain riparian and aquatic vegetation. Most often it has been found in waterbodies that contain grasses and reeds that are of medium height and have small stem diameters, such as couch (Elymus repens), watercouch (Paspalum pasplodes) or the Common Spikerush (Eleocharis acuta). Waterbodies containing this type of vegetation are essential for Sloane's Froglet as it lays its eggs attached to vegetation (Knight 2013b). Gilgai and other depressions are favoured habitat on clay plains, while elsewhere they are generally restricted to temporary ponds in	PMST	Present	Moderate	Low	There are no recent records of the species in the area. Species unlikely to be impacted by the proposed works.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			the river valley and up to 8km on either side of large rivers.					
Litoria raniformis **Southern Bell Frog**	E	V	Currently, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. Breeding occurs during the warmer months and is triggered by flooding or a significant rise in water levels. During the breeding season animals are found floating amongst aquatic vegetation (especially cumbungi or Common Reeds). Tadpoles require standing water for at least 4 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	PMST	Present	Low	Low	Species habitat is present although the species is known to only exist in isolated populations not within the Wagga Wagga region. Hence, it is unlikely the species is present in the area..

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			fallen timber and bark, rocks, grass clumps and in deep soil cracks.					
Aves (24)								
Anthochaera B-Ilagitta **Regent Honeyeater**	CE	CE	The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. 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	1 (1980) PMST	Absent	Low	Low	The species inhabits dry open forest and woodland and the area being impacted is River Red Gum riverine woodland. Only one historic record.
Aphelocephala leucopsis **Southern Whiteface**	-	V	Southern Whiteface forage almost exclusively on the ground, favouring habitat with low tree densities and an herbaceous understory litter cover. Birds mainly feed on insects, spiders, and seeds, largely gleaned from the bare ground or leaf litter (Higgins & Peter 2002; Antos & Bennett 2006; Antos et al. 2008).	PMST	Absent	Low	Low	Large tree densities within the development footprint. No records within the area.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Artamus cyanopterus cyanopterus **Dusky Woodswallow**	V	-	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	57 (1977-2017)	Absent	Low	Low	Inhabits mainly dry, open woodlands and farmland on the edge of forest. Most records are outside of the township with the closest record over 1km away. Floodplain area is unlikely to provide suitable habitat for the species.
Botaurus poiciloptilus **Australasian Bittern**	E	E	In NSW, this species occurs along the coast and is frequently recorded in the Murray–Darling Basin, notably in floodplain wetlands of the Murrumbidgee, Lachlan, Macquarie and Gwydir Rivers. Occurs in permanent freshwater wetlands with tall, dense vegetation. Favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and/or reeds (e.g. Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, , Bolboschoenus) or cutting grass (Gahnia) growing over muddy or peaty substrate. Breeding occurs in summer from October to January; nests are	PMST	Marginal	Low	Low	No species sightings in Area. The habitat is not a wetland area. It will be of low quality for the species although may be opportunistically used if the species is in the area.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			built in secluded places in densely–vegetated wetlands on a platform of reeds.					
Burhinus grallarius **Bush Stone-curlew**	E	-	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Nest on the ground in a scrape or small bare patch.	5 (1979–2010) PMST	Marginal	Moderate	Low	Records are located on the other side of town with the closest being approximately 7km away. The site is unlikely to provide suitable habitat for the species.
Callocephalon fimbriatum **Gang-gang Cockatoo**	V	E	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands,particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (Eucalyptus pauciflora) woodland and occasionally in temperate rainforests. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 7cm in diameter or larger in	3 (1979) PMST	Marginal	Moderate	Low	Three historic records in the area. Suitable foraging and breeding habitat will be impacted. Species has not been recorded in the area for over 40 years.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			eucalypts and 3 metres or more above the ground.					
Calyptorhynchus lathami lathami **South-eastern Glossy Black-Cockatoo**	V	V	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, Allocasuaraina diminuta, and A. gymnathera. Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (*Casuarina cristata*). Feeds almost exclusively on the seeds of several species of she-oak (*Casuarina* and *Allocasuarina* species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May.	4 (2005-2007) PMST	Present	Moderate	Moderate	Suitable foraging and breeding habitat will be impacted. No hills or rocky rises are present on site. Species is likely to use habitat but not rely on the habitat.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Chthonicola sagittata **Speckled Warbler**	V	-	The Speckled Warbler has a patchy distribution throughout south–eastern Queensland, the eastern half of NSW and into Victoria. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant, often among fallen branches and other litter. A side entrance allows the bird to walk directly inside.	2 (1977-2020)	Marginal	Low	Low	Records are over 7km away from the development footprint. The species does inhabitant Eucalyptus dominated woodlands. Although no rocky ridges or gullies are present within the development footprint.
Circus assimilis **Spotted Harrier**	V	-	Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland,	6 (1977–2019)	Present	High	High	Species record within 1.5km of the proposal area. Species is found to occur within inland riparian woodlands on the

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.					edge of wetlands. The species may be impacted by the proposed works and AOS is required.
Climacteris picumnus victoriae **Brown Treecreeper (eastern subspecies)**	V	V	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	37 (1978–2019) PMST	Present	High	High	Records within the impact area suitable habitat present. The species will be impacted by the proposed works. An AOS and TOS will be required.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Daphoenositta chrysoptera **Varied Sittella**	V	-	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland.	3 (1985–2021)	Present	High	High	Suitable habitat present in proposal area. Recent records within the area. Both breeding and foraging habitat will be impacted.
Epthianura albifrons **White-fronted Chat**	V	-	Usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	8 (1977–1992)	Absent	Low	Low	Avoids largely wooded habitat. Records are over 30 years old. Species is unlikely to inhabit the proposal area.
Falco hypoleucos **Grey Falcon**	V	V	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.	PMST	Absent	Low	Low	No records in the area. Wagga is not arid or semi-arid. The species is unlikely to be present.
Falco subniger **Black Falcon**	V	-	The Black Falcon inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses and agricultural land with scattered remnant trees.	13 (1978–2019)	Present	High	High	Closest record is approximately 1.5km away from the proposal area in similar vegetation. Species is likely to use the proposal area and may be impacted by the

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
								proposed works a ToS is required.
Glossopsitta pusilla **Little Lorikeet**	V	-	NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability. Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth–barked Eucalypts. Entrance is small (3cm) and usually high above the ground (2–15m). These nest sites are often used	49 (1979–2015)	Present	High	High	The species has been recorded Within 1km of the proposal area and is known to inhabit riparian areas. A ToS is required.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like Allocasuarina. Nesting season extends from May to September.					
Grantiella picta **Painted Honeyeater**	V	V	Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*.	PMST	Marginal	Low	Low	Limited box gum woodlands will be impacted No mistletoe was recorded on site). No records within the area. Species unlikely to be impacted by proposed works.
Haliaeetus leucogaster **White-bellied Sea-Eagle**	V	-	White–bellied Sea–Eagles are a common sight in coastal and near coastal areas of Australia. Birds form permanent pairs that inhabit territories throughout the year. Their loud "goose–like" honking call is a familiar sound, particularly during the breeding season. Birds are normally seen, perched high in a tree, or soaring over waterways and adjacent land. 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 30m above the ground,	1 (2019)	Marginal	Low	Low	Woodland Present. Unlikely to be dependant on habitat.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			but may be also be placed on the ground or on rocks, where there are no suitable trees.					
Hieraaetus morphnoides **Little Eagle**	V	-	The Little Eagle occurs as a single population throughout NSW. It occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	28 (1978–2019)	Present	High	High	Numerous records with records within 1km. Riparian woodlands present.
Lathamus discolor **Swift Parrot**	E	CE	Migrates to the Australian south-east mainland between February and October. 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 *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*	21 (1996–2021) PMST	Present	Moderate	Moderate	Suitable foraging habitat and nearby records.
Leipoa ocellata **Malleefowl**	E	V Check	Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich	PMST	Absent	Low	Low	No suitable habitat and no nearby records.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			mallee found in higher rainfall (300–450mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated by Mulga or native Cypress Pine species.					
Lophochroa leadbeateri **Major Mitchell's Cockatoo**	V	-	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. Normally found in pairs or small groups, though flocks of hundreds may be found where food is abundant. Nesting, in tree hollows, occurs throughout the second half of the year; nests are at least 1km apart, with no more than one pair every 30 square kilometres.	2 (1998–1999) PMST	Present	Moderate	Moderate	Historic records and potentially suitable foraging and breeding habitat. Habitat is present species is only moderately likely to be present.
Melanodryas cucullata cucullata	V	E	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee,	13	Present	High	High	Suitable habitat present. Multiple records In the area.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Hooded Robin (south-eastern form)			often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	(1979–2007) PMST				Species is likely to be impacted by the proposed works.
Petroica boodang **Scarlet Robin**	V	-	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	9 (1977–2017)	Present	High	High	Suitable habitat present. Multiple records In the area. Species is likely to be impacted by the proposed works.
Melithreptus gularis gularis **Black-chinned Honeyeater (eastern subspecies)**	V	-	The subspecies is widespread, from the tablelands and western slopes of the Great Dividing Range to the north–west and central–west plains and the Riverina. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark, White Box, Grey Box, Yellow Box and Forest Red Gum. Also inhabits open	3 (1977–2007)	Present	Low	Low	Suitable habitat present. Multiple records In the area. Species is likely to be impacted by the proposed works. Incidental reports also show a decline in the occurrence of birds with the species now only occasionally recorded at a site near Moree

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			forests of smooth–barked gums, stringybarks, ironbarks and tea–trees. Feeding territories are large making the species locally nomadic.					where once they were regular, and an apparent 10 year absence from a once regular recording site near Wagga Wagga. Absent from area.
Neophema chrysostoma **Blue-winged Parrot**	-	V	Foraging and staging habitats found from coastal, sub-coastal and inland areas, right through to semi-arid zones including grasslands, grassy woodlands, and semi-arid chenopod shrubland with native and introduced grasses, herbs and shrubs. Wetlands both near the coast and in semi-arid zones used for foraging and staging. Eucalypt forests and woodlands within the eastern South Australia and southern Victoria.	PMST	Marginal	Low	Low	Woodland Present. Unlikely to be dependent on habitat. No records in the area.
Neophema pulchella **Turquoise Parrot**	V	-	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals. Prefers to feed in the shade of a tree and spends most of the day on the	5 (2007–2020)	Present	High	High	Suitable habitat present. Multiple records In the area. Species is likely to be impacted by the proposed works.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			ground searching for the seeds or grasses and herbaceous plants or browsing on vegetable matter. Forages quietly and may be quite tolerant of disturbance. However, if flushed it will fly to a nearby tree and then return to the ground to browse as soon as the danger has passed. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.					
Ninox connivens **Barking Owl**	V	-	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils.	4 (1984–2004)	Present	High	High	Present suitable woodland with hollow bearing trees.
Oxyura australis **Blue-billed Duck**	V	-	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the	4 (1999–2001)	Marginal	Moderate	Low	Waterbody habitat will only be subject to indirect impacts. Water habitat has limited aquatic vegetation.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached					
Pachycephala inornata **Gilbert's Whistler**	V	-	Sparsely distributed over much of the arid and semi-arid zone of inland southern Australia, from the western slopes of NSW to the Western Australian wheatbelt. Occurs in a range of habitats within NSW, preferring a dense shrub layer. Widely recorded in mallee shrublands, box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests, though at this stage it is only known to use this habitat along the Murray, Edwards and Wakool Rivers. Found in association with an understorey of spinifex and low shrubs including wattles, hakeas, sennas and hop-bushes. In woodland habitats, the understorey comprises dense patches of shrubs, particularly thickets of regrowth Callitris. Parasitic 'cherries' (Exocarpus species) appear to be an important habitat component in Belah and Red Gum communities, though in the latter case other dense shrubs, such as Lignum and wattles, are also utilised. Forages on or near the ground in shrub thickets and in tops	5 (1979–1995)	Marginal	Low	Low	No dense shrub layer. Historic records. River red gum forest is present, but habitat quality may not be suitable.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			of small trees. Food consists mainly of spiders and insects such as caterpillars, beetles and ants, and occasionally, seeds and fruits are eaten. Breeding is August-November. Nests are usually built below about 2.5m (but up to 6m) above the ground in the fork of dense foliage of plants such as wattles or cypress pines.					
Petroica phoenicea **Flame Robin**	V	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgelands at high altitudes.	18 (1977–2007)	Present	Moderate	Moderate	Winter foraging habitat present. No breeding habitat present. Records Within 1km of proposed works.
Polytelis swainsonii **Superb Parrot**	V	V	The Superb Parrot is found throughout eastern inland NSW. On the South–western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly	187 (1986–2020)	Present	High	High	Suitable habitat is present in the proposal area. Records within 500m of proposal area. Species may be impacted by the proposed works. ToS and Aos Required.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. Inhabits Box–Gum, Box–Cypress–pine and Boree Woodlands and River Red Gum Forest.					
Pomatostomus temporalis temporalis **Grey-crowned Babbler (eastern subspecies)**	V	-	Inhabits open Grey Box Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions. 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.	5 (2008–2020)	Marginal	Moderate	Moderate	Species has been recorded within 1km of the proposal area. The habitat is lacking in breeding habitat for the species in the form of dense shrub cover.
Rostratula australis **Australian Painted Snipe**	E	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	PMST	Absent	Low	Low	No mudflats or swamps. A river is present but not suitable habitat for the species.
Stagonopleura guttata **Diamond Firetail**	V	-	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary	19 (1979–2007)	Present	High	High	Closest record is over 3km from the proposal area. Suitable habitat will be impacted. Multiple records in

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Areas critical to survival are those with low tree density, few large logs, and little litter cover but high grass cover for foraging, roosting and breeding.					the area. Species may be impacted. ToS required.
Stictonetta naevosa **Freckled Duck**	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Generally rest in dense cover during the day, usually in deep water.	1 (2003)	Marginal	Low	Low	The flowing river is unlikely to provide suitable habitat for the species.
Fish								
Bidyanus bidyanus **Silver Perch, Bidyan**	**V**	CE	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. Only one remaining secure and self-sustaining population occurs in NSW in the central Murray River	PMST	Absent	Low	Low	Outside of existing self-sustaining population range.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			downstream of Yarrawonga weir, as well as several anabranches and tributaries.					
Murray Crayfish ***Euastacus armatus***	V	-	Murray Crayfish prefer cool, flowing water that is well oxygenated. The species is tolerant of water temperatures up to 27°C and moderate salinities, but are intolerant to low dissolved oxygen concentrations. They create burrows that vary in complexity, from deep burrows with multiple entrances to simple burrows under a rock or log	PMST	Absent	Low	Low	Indirect impacts of removing riparian vegetation and soil. May impact the fish in the area if standard erosion and sediment control measures are not followed.
Galaxias rostratus **Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow**	CE	CE	Flathead Galaxias are found in still or slow moving water bodies such as wetlands and lowland streams. The species has been recorded forming shoals. They have been associated with a range of habitats including rock and sandy bottoms and aquatic vegetation. Flathead Galaxias spawn in spring and lay slightly adhesive demersal eggs.	PMST	Present	Moderate	Moderate	Indirect impacts of removing riparian vegetation and soil. May impact the fish in the area if standard erosion and sediment control measures are not followed.
Maccullochella macquariensis **Trout Cod**	-	E	In the Murray River below Yarrawonga Weir, Trout Cod inhabit a large (60–100m wide), deep (>3m) flowing river section with a sand, silt and clay substrate that contains abundant snags and woody debris. Trout Cod are often	PMST	Present	Moderate	Moderate	Indirect impacts of removing riparian vegetation. May impact the fish in the area if standard erosion and

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			angled from within, under or adjacent to snags, branch piles, and steep clay banks, usually in areas of relatively fast current .Trout Cod were only found in snag piles that were typically opposite sandy beaches or on outside bends. There is a degree of overlap with the habitat requirements of Murray Cod and therefore competition between these two species is likely As a large proportion of the streams that the Trout Cod originally inhabited are now degraded, it is difficult to accurately determine the habitat requirements of the species.					sediment control measures are not followed..
Maccullochella peelii **Murray Cod**	-	V	Murray Cod are frequently found in the main channels of rivers and larger tributaries. The species is, therefore, considered a main-channel specialist. Murray Cod tend to occur in floodplain channels and anabranches when they are inundated but the species' use of these floodplain habitats appears limited. Juveniles less than one year old have been found in main river channels where it appears they settle at a late larval (newly born) stage.	PMST	Present	Moderate	Moderate	Indirect impacts of removing riparian vegetation. May impact the fish in the area if standard erosion and sediment control measures are not followed.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Macquaria australasica **Macquarie Perch**	FM listed	E	In the Murray-Darling Basin, the species was once typically found in the cool, upper reaches of drainage systems located in southern New South Wales, the Australian Capital Territory and northern Victoria. In east coast drainage systems, the species has been recorded naturally occurring in the Hawkesbury/Nepean, Georges and Shoalhaven rivers in New South Wales.	PMST	Absent	Low	Low	No suitable habitat will be impacted. Species is unlikely to be present within Wagga Wagga.
Nannoperca australis Murray-Darling Basin lineage **Southern Pygmy Perch (Murray-Darling Basin lineage)**	E FM listed	V	They are often found in small systems with a low flow rate and quiet vegetated areas in streams, billabongs, lakes. They prefer covered habitats and are not usually found in open water.	PMST	Absent	Low	Low	Proposal Area is outside of the DPI species distribution.
Migratory								
Actitis hypoleucos	-	M	The species utilises a wide range of coastal wetlands and some inland wetlands, with	PMST	Absent	Low	Low	No suitable habitat will be impacted.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Common Sandpiper			varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflat					
Apus pacificus **Fork-tailed Swift**	-	M	In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pine	10 (1980–2019) PMST	Marginal	Moderate	Low	Species is known to occur in riparian woodlands. Closest record over 4km away from proposal area. Species could utilise the habitat but is unlikely to rely on the habitat for survival.
Calidris acuminata **Sharp-tailed Sandpiper**	-	M	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and	23 (1977–2019) PMST	Absent	Low	Low	No suitable habitat will be impacted. Recorded within 1km of the proposal area at the sewage farm but unlikely to use the area impacted.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry.					
Calidris ferruginea **Curlew Sandpiper**	E	CE M	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed.	2 (1977–1988) PMST	Absent	Low	Low	No suitable habitat will be impacted.
Calidris ruficollis **Red-necked Stint**	-	M	the Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores. Occasionally they have been recorded on exposed or ocean beaches, and sometimes on stony or rocky shores, reefs or shoals. They also occur in saltworks and	5 (1977–1979)	Absent	Low	Low	No suitable habitat will be impacted.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			sewage farms; saltmarsh; ephemeral or permanent shallow wetlands near the coast or inland, including lagoons, lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in saltflats. They sometimes use flooded paddocks or damp grasslands. They have occasionally been recorded on dry gibber plains, with little or no perennial vegetation					
Calidris melanotos **Pectoral Sandpiper**	-	M	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	PMST	Marginal	Low	Low	Possibly suitable floodplain habitat will be impacted. Although no records in the area.
Gallinago hardwickii **Latham's Snipe, Japanese Snipe**	-	M	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2,000m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies)	19 (1977–2020) PMST	Absent	Low	Low	No suitable habitat will be impacted.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Hirundapus caudacutus **White-throated Needletail**	-	V M	In Australia, they mostly occur above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamp. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks. Non-breeding roosting habitat includes within dense foliage or hollows in forests and woodlands.	2 (1996–2019) PMST	Absent	Low	Low	No suitable habitat will be impacted.
Motacilla flava **Yellow Wagtail**	-	M	Various landscapes such as lowlands, where forests are located or forest-steppe belts, and it is also attracted by swampy meadows or river valleys. Marshland with grass and rare shrubs is also suitable for it as a habitat.	PMST	Absent	Low	Low	No suitable habitat will be impacted.
Myiagra cyanoleuca **Satin Flycatcher**	-	E M	Satin Flycatchers are mainly recorded in eucalypt forests, especially wet sclerophyll forest, often dominated by eucalypts such as Brown Barrel, *Eucalypt fastigata*, Mountain Gum, *E. dalrympleana*, Mountain Grey Gum,	PMST	Present	Low	Low	Species is known to occur in eucalypt forest. Species could utilise the habitat but is unlikely to rely on the habitat for survival.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			Narrow-leaved Peppermint, Messmate or Manna Gum, or occasionally Mountain Ash, *E. regnans*.					
Numenius madagascariensis **Eastern Curlew, Far Eastern Curlew**	-	CE M	It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts.	PMST	Absent	Low	Low	No suitable habitat will be impacted.
Tringa nebularia ***Common greenshank***	-	M	They are diurnal and nocturnal feeders that feed by picking from the surface, probing, sweeping, and lunging at the edges of mudflats or shallows. They may walk along the shoreline and even chase small fish in the shallow water. Common greenshank roost both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops	4 (1977–-1997)	Absent	Low	Low	No suitable habitat will be impacted.
Tringa stagnatilis **Marsh Sandpiper**	-	M	The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats	1 (1979)	Absent	Low	Low	No suitable habitat will be impacted.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			and also regularly at sewage farms and saltworks. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes. In north Australia they prefer intertidal mudflats (Higgins & Davies 1996), although surveys in Kakadu National Park recorded more birds around shallow freshwater lakes than in areas influenced by tide					
Mammals								
Dasyurus maculatus **Spotted-tailed Quoll**	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline	1 (2004) PMST	Present	Moderate	Low	Species typically occurs on flat rocks among boulder fields but is present within inland riparian zones. The species would have potential foraging and breeding habitat removed.
Macrotis lagotis **Bilby**	E	V	Once widespread in arid, semi-arid and relatively fertile areas, the Bilby is now restricted to arid regions and remains a threatened species. The Bilby prefers arid habitats because of the spinifex grass and acacia shrub. Bilbies are nocturnal omnivores	1 (1912)	Absent	Low	Low	No suitable habitat present

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			that do not need to drink water, as they get all their moisture requirements from their food, which includes insects and their larvae, seeds, spiders, bulbs, fruit, fungi, and very small animals. Most food is found by digging or scratching in the soil, and using their very long slender tongues. Unlike bandicoots, Bilbies are excellent burrowers and build extensive tunnel systems with their strong forelimbs and well-developed claws. A Bilby typically makes a number of burrows within its home range, up to about a dozen; and moves between them, using them for shelter both from predators and the heat of the day. The female Bilby's pouch faces backwards, which prevents her pouch from getting filled with dirt while she is digging. Bilbies have a very short gestation period of about 12–14 days, one of the shortest among mammals.					
Miniopterus orianae oceanensis **Large Bent-winged Bat**	V	-	Primary roost habitat are caves, also use mines, storm–water tunnels and other man–made structures. Young are also raised within caves. Maternity caves have specific temperature and humidity regimes. Outside of breeding season populations can disperse	1 (2007)	Marginal – no know roosting habitat.	Low	Low	No core breeding habitat impacted. Species may forage on occasions but not likely to rely on area for survival.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			up to 300m from maternity caves. Breeding colonies can reach numbers up to 150, 000 individuals. Foraging occurs within forests areas above treetops where insects are a primary food source.					
Myotis macropus **Southern Myotis**	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 100km 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.	2 (2000–2013)	Present	High	High	Suitable habitat will be impacted.
Nyctophilus corbeni **Corben's Long-eared Bat, South-eastern Long-eared Bat**	V	V	Inhabits a variety of vegetation types, including Mallee, Bulloke *Allocasuarina leuhmanni* and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the	PMST	Present	Low	Low	Species has no records in the area. Habitat is present although the species is unlikely to be in the area.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.					
Petaurus norfolcensis **Squirrel Glider in the Wagga Wagga Local Government Area**	E	-	Inhabits dry sclerophyll forest and woodland and is generally absent from rainforest and closed forest. In NSW, potential habitat includes Box–Ironbark forests and woodlands in the west, the River Red Gum forests of the Murray Valley and the eucalypt forests of the northeast. Requires abundant hollow–bearing trees and a mix of eucalypts, acacias and banksias. Smooth–barked eucalypts are preferred as these eucalypts form hollows more readily than rough–barked and support a greater diversity of invertebrates. Squirrel Glider's forage in the upper and lower forest canopies and in the shrub understorey.	138 (1977–2019)	Present	High	High	Suitable habitat will be impacted. Records within 1km of the proposal area.
Petaurus norfolcensis **Squirrel Glider**	V	-	Inhabits dry sclerophyll forest and woodland and is generally absent from rainforest and closed forest. In NSW, potential habitat includes Box–Ironbark forests and woodlands in the west, the River Red Gum forests of the Murray Valley and the eucalypt forests of the northeast. Requires abundant hollow–bearing	138 (1977–2019)	Present	High	High	Suitable habitat will be impacted. Records within 1km of the proposal area.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			trees and a mix of eucalypts, acacias and banksias. Smooth–barked eucalypts are preferred as these eucalypts form hollows more readily than rough–barked and support a greater diversity of invertebrates. Squirrel Glider's forage in the upper and lower forest canopies and in the shrub understorey.					
Phascolarctos cinereus **Koala**	E	E	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	4 (1965–2006) PMST	Present	Low	Low	Species has limited records in the area. Habitat is present although the species is unlikely to be in the area.
Pteropus poliocephalus **Grey-headed Flying-fox**	V	V	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	37 (2013–2019) PMST	Present	High	High	Suitable habitat will be impacted. Records within the proposal area.
Saccolaimus flaviventris **Yellow-bellied Sheathtail-bat**	V	-	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	1 (2013)	Present	Moderate	Low	Species is adaptable to a range of environments. Limited records in the area. Unlikely to be impacted by the proposed works.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
Vespadelus baverstocki **Inland Forest Bat**	V	-	Distribution of this species, particularly in NSW, is very poorly known. Believed to occur widely in all the mainland states, generally in areas with annual rainfall less than 400 millimetres. Roosts in tree hollows, abandoned buildings, and in very small hollows in stunted trees only a few metres high. Habitat requirements are poorly known but has been recorded from a variety of woodland formations, including Mallee, Mulga and River Red Gum. Most records are from drier woodland habitats with riparian areas. However, other habitats may be used for foraging and/or drinking. Colony size ranges from a few individuals to more than sixty. Bats fly rapidly and cover an extensive foraging area and are presumed to feed on flying insects	1 (2007)	Present	Moderate	High	Suitable habitat will be impacted. Roosting Habitat is present
Reptiles								
Aprasia parapulchella **Pink-tailed Worm-lizard, Pink-tailed Legless Lizard**	V	V	Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically	PMST	Marginal	Low	Low	Limited scattered rocks. No rock outcrops present within the proposal area. Understory not dominated by Kangaroo grass.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			well-drained, with rocky outcrops or scattered, partially buried rocks.					
Invertebrates								
Keyacris scurra **Key's Matchstick Grasshopper**	E	E	Typically found in native grasslands and grassy woodlands but it has also been recorded in other vegetation associations usually containing a native grass understory (especially kangaroo grass Themeda triandra) and known food plants (particularly Asteraceae). Has been observed to feed on a range of species including Aira caryophyllea (Silver hairgrass), Scirpus sp. (sedges), Wurmbea dioica (Early Nancy), Bulbine bulbosa (Native Leek), Calochilus paludosus (Red Beard Orchid), Rumex crispus (Curled Dock), Acetosella vulgaris/Rumex acetosella (Sorrel), Cerastium glomeratum (Mouse-ear Chickweed), Ranunculus lappaceus (Common Buttercup), Rosa rubiginosa (Sweet Briar), Acaena ovina (Orchid), Trifolium subterraneum (Subterranean Clover), Trifolium arvense (Haresfoot Clover), Poranthera microphylla, Stackhousia monogyna (Creamy Candles), Hibbertia	PMST	Absent – native understory low quality.	Low	Low	No suitable habitat will be impacted.

Species	Listing		Habitat	No. of Records Within 10km Locality	Presence of Habitat	Likelihood of Occurrence	Possible Impact	Justification
	BC Act	EPBC						
			sericea, Lavandula stoechas (Lavender), Salvia verbenaca (Vervain), Verbascum thapsus (Great Mullein), Sherardia arvensis (Field Madder), Galium tricornatum (Rough Fruited Bedstraw), Helichrysum apiculatum (Common Everlasting), Ozothamnus retusus or O. scaber (Helichrysum bilobum), Podolepis jaceoides (Podolepis acuminate) (Showy Copper-wire Daisy) and Craspedia uniflora.					

Appendix C Hollow-bearing tree inventory

ID	Easting	Northing	Small <6cm	Medium 6	Large 12-1	Extra Larg	Impact
Hbt 53	533939.5	6116040	1	3	1	1	No
Hbt 90	533857.3	6116019	3	4	3	2	No
Hbt 93	533794.8	6116024	3	3	2	3	No
Hbt 1	533944.1	6116899	6	3	1	1	No
Hbt 10	533943.2	6116664	6	4	2	2	No
Hbt 100	533553.9	6115951	2	3	2	1	No
Hbt 101	533549.8	6115980	0	3	2	2	No
Hbt 102	533555.4	6115998	0	2	1	2	No
Hbt 103	533548.7	6116064	2	4	1	0	No
Hbt 104	533548.9	6116109	0	5	2	2	No
Hbt 105	533560.3	6116182	0	4	4	2	No
Hbt 106	533578.5	6116228	0	1	0	0	No
Hbt 107	533614.8	6116245	1	1	0	0	No
Hbt 108	533636.8	6116180	1	0	0	0	No
Hbt 109	533657.5	6116143	0	3	1	1	No
Hbt 11	533926.4	6116632	2	4	5	1	No
Hbt 110	533672.3	6115994	0	3	1	0	No
Hbt 111	533780.1	6115830	2	3	0	1	No
Hbt 112	533971.9	6115781	0	3	1	0	Yes
Hbt 113	533985.9	6115803	0	2	1	0	Yes
Hbt 114	534006.7	6115798	0	3	2	1	Yes

ID	Easting	Northing	Small <6cm	Medium 6	Large 12-1	Extra Larg	Impact
Hbt 115	534016.4	6115801	0	2	2	1	Yes
Hbt 116	533966.5	6115826	0	2	2	2	Yes
Hbt 12	533969.5	6116627	4	4	0	0	No
Hbt 13	533902.7	6116617	4	4	0	0	No
Hbt 14	533874.5	6116536	0	3	0	1	No
Hbt 15	533856.4	6116512	3	2	1	1	No
Hbt 16	533833.8	6116419	2	2	0	0	No
Hbt 17	533803	6116368	0	3	2	1	No
Hbt 18	533821.3	6116442	0	3	1	0	No
Hbt 19	533793.6	6116455	2	4	2	0	No
Hbt 2	533932.9	6116901	9	10	2	0	No
Hbt 20	533784.1	6116535	3	2	0	0	No
Hbt 21	533823.1	6116541	2	3	1	0	No
Hbt 22	533966.6	6116603	6	4	2	0	No
Hbt 23	533918.1	6116271	4	3	2	3	No
Hbt 24	533912.4	6116257	0	4	2	1	No
Hbt 25	533880.7	6116313	0	5	3	2	No
Hbt 26	533837.5	6116311	2	3	1	2	No
Hbt 27	533820.8	6116290	0	3	3	1	No
Hbt 28	533886	6116256	3	3	1	0	No
Hbt 29	533849.8	6116247	2	3	1	0	No
Hbt 3	533974.5	6116861	8	5	1	0	No
Hbt 30	533902.5	6116204	2	3	0	0	No

ID	Easting	Northing	Small <6cm	Medium 6	Large 12-1	Extra Larg	Impact
Hbt 31	533934.5	6116195	0	3	2	0	No
Hbt 32	533930.4	6116217	3	1	0	0	No
Hbt 33	533941.3	6116164	0	5	0	0	No
Hbt 34	533971.7	6116118	3	2	1	0	No
Hbt 35	533993.8	6116064	0	4	2	2	No
Hbt 36	533996.5	6116044	0	3	2	1	No
Hbt 37	534014.5	6116019	0	5	2	0	No
Hbt 38	534035.3	6116015	2	4	1	0	No
Hbt 39	534057.5	6115997	0	2	2	2	No
Hbt 4	533978.5	6116802	4	5	6	2	No
Hbt 40	534019.7	6115923	0	4	1	0	No
Hbt 41	534016.8	6115895	2	0	2	1	No
Hbt 42	533930.8	6115962	2	2	1	0	No
Hbt 43	533964.3	6115985	0	2	2	0	No
Hbt 44	533950.4	6115996	0	2	0	1	No
Hbt 45	533922.6	6115986	0	2	1	0	No
Hbt 46	533896.3	6116025	0	0	3	0	No
Hbt 47	533865.9	6116087	0	4	0	2	No
Hbt 48	533861.9	6116119	0	3	3	1	No
Hbt 49	533860.5	6116126	2	0	0	1	No
Hbt 5	533970.3	6116844	4	2	1	0	No
Hbt 50	533874.6	6116174	3	2	0	0	No
Hbt 51	533907.7	6116115	3	2	0	0	No

ID	Easting	Northing	Small <6cm	Medium 6	Large 12-1	Extra Larg	Impact
Hbt 52	533927.2	6116111	0	4	1	0	No
Hbt 54	533742.4	6116521	1	3	1	0	No
Hbt 55	533718.7	6116510	4	7	1	2	No
Hbt 56	533751.8	6116449	2	2	1	1	No
Hbt 57	533740.3	6116336	4	4	2	1	No
Hbt 58	533725	6116337	2	4	2	2	No
Hbt 59	533705.4	6116307	0	3	1	1	No
Hbt 6	534015.9	6116781	7	5	4	0	No
Hbt 60	533717.6	6116227	0	0	0	3	No
Hbt 61	533705.1	6116223	0	3	4	2	No
Hbt 62	533693.6	6116492	0	2	2	0	No
Hbt 63	533676.8	6116472	3	3	0	0	No
Hbt 64	533630.8	6116434	2	2	1	0	No
Hbt 65	533599.9	6116355	4	2	0	0	No
Hbt 66	533595.7	6116356	0	3	1	0	No
Hbt 67	533591.5	6116335	2	2	0	0	No
Hbt 68	533578.8	6116293	0	3	0	0	No
Hbt 69	533592.5	6116247	2	0	0	0	No
Hbt 7	533975.3	6116713	4	3	4	0	No
Hbt 70	533710.2	6116109	4	3	1	2	No
Hbt 71	533729.6	6116086	2	2	2	0	No
Hbt 72	533755.9	6116039	0	2	2	3	No
Hbt 73	533760.1	6116050	0	2	1	0	No

ID	Easting	Northing	Small <6cm	Medium 6	Large 12-1	Extra Larg	Impact
Hbt 74	533778.2	6116069	2	4	2	3	No
Hbt 75	533765.8	6116081	0	3	3	2	No
Hbt 77	533818.6	6116079	0	7	0	0	No
Hbt 78	533821.3	6116065	2	4	2	0	No
Hbt 79	533836.7	6116073	4	2	2	0	No
Hbt 8	533957.2	6116693	5	3	5	2	No
Hbt 80	533836.8	6116107	0	4	2	1	No
Hbt 81	533845.2	6116128	0	3	2	0	No
Hbt 82	533832.7	6116120	0	3	4	2	No
Hbt 83	533849.4	6116122	0	4	3	2	No
Hbt 84	533842.4	6116133	0	3	3	1	No
Hbt 85	533807.6	6116111	0	2	2	0	No
Hbt 86	533809.1	6116147	4	4	2	2	No
Hbt 87	533795.3	6116178	0	3	5	1	No
Hbt 88	533862.9	6116034	0	3	2	0	No
Hbt 89	533837.9	6116031	0	3	4	2	No
Hbt 9	533993.3	6116684	2	6	0	2	No
Hbt 92	533786.3	6116004	3	3	2	1	No
Hbt 94	533793.4	6116033	0	3	3	0	No
Hbt 95	533794.6	6115970	0	3	3	2	No
Hbt 96	533802.8	6115941	10	6	4	3	No
Hbt 97	533788.7	6115901	3	4	2	0	Yes
Hbt 98	533902.9	6115929	0	2	3	0	Yes

ID	Easting	Northing	Small <6cm	Medium 6	Large 12-1	Extra Larg	Impact
Hbt 99	533553.9	6115964	2	3	2	2	No
Hbt76	533797.8	6116083	0	3	3	1	No
Hbt91	533854.4	6115993	5	3	4	2	No
Hbt 21	533902	6115697	0	2	2	2	No
Hbt 19	533877.1	6115736	0	2	2	0	No
Hbt 18	533882.6	6115718	0	2	2	1	No
Hbt 17	533843.7	6115713	0	2	1	1	No
Hbt 16	533846.5	6115728	0	2	2	2	No
Hbt 15	533813.1	6115720	0	2	1	0	No
Hbt 14	533818.7	6115743	0	3	2	1	No
Hbt 12	533847.5	6115619	0	0	2	3	No
Hbt 11	533880.7	6115581	0	0	1	3	No
Hbt 10	534212.7	6115858	0	3	2	2	No
Hbt 9	534201.6	6115839	2	2	3	2	No
Hbt 8	534176.4	6115815	0	0	2	3	No
Hbt 7	534161	6115786	2	2	0	0	No
Hbt 4	534104.8	6115642	2	1	0	0	No
Hbt 1	534037.9	6115582	3	0	0	3	No
Hbt 25	533982.7	6115702	0	2	0	0	Yes
Hbt 24	534069.2	6115780	0	2	1	0	Yes
Hbt 23	533989.8	6115749	0	2	1	2	Yes
Hbt 22	533890.7	6115659	0	2	2	2	Yes

ID	Easting	Northing	Small <6cm	Medium 6	Large 12-1	Extra Larg	Impact
Hbt 20	533892.4	6115720	0	0	2	2	Yes
Hbt 13	533829.5	6115633	0	3	2	2	Yes
Hbt 6	534114.8	6115704	2	4	1	0	Yes
Hbt 5	534099.4	6115674	1	2	0	0	Yes
Hbt 3	534082.6	6115650	2	3	1	0	Yes
Hbt 2	534057.4	6115595	2	2	0	0	Yes

Appendix D Tests of Significance

D.1 Squirrel Glider

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

This *Test of significance* (ToS) characterises the significance of likely impacts associated with the proposal on the listed species:

- Squirrel Glider (*Petaurus norfolcensis*): BC-V
- Squirrel Glider (*Petaurus norfolcensis*) in the Wagga Wagga Local Government Area - Endangered population

a) In the case of a threatened species, whether the proposed development is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Squirrel Glider population in the Wagga Wagga LGA is listed as an endangered population (DPE, 2021). The NSW Scientific Committee Determination for the endangered population listing specifically lists Wilks Park as habitat where Squirrel Gliders are known to occur with five sightings between 1996 and 1998 (DPE, 2021). Wilks Park covers an area of 33 ha; 4.72 ha of this occurs within the development footprint consisting of River Red Gum Woodland that provides suitable breeding and foraging habitat for the Squirrel Glider. Numerous BioNet records (4) of Squirrel Glider records occur within Wilks Park, with records dating from 1996 to as recently as 2019. WWCC records also indicate Squirrel Glider has been detected in Wilks Reserve 2022 and 2023 (pers. comm.). The closest record occurs within 200 m of the development footprint. The population density of the Wilks Park Squirrel Glider population is not known, however based on the number and frequency of sightings a viable population is considered present. No targeted surveys were completed for this species within this study.

The Wagga Wagga LGA Squirrel Glider population has been listed as endangered in part due to the small, scattered remnants of habitat remaining in the Wagga Wagga LGA. Wilks Park is an isolated remnant of woodland, being surrounded by urban landscape (North Wagga and Wagga Wagga in the East and West) and semi-rural cleared landscapes to the North and South. There is some habitat connectivity to Wiradjuri reserve (where Squirrel Glider are also recorded (DPE, 2021) to the Northwest via a 60m leap across the Murrumbidgee River (within the upper limit of glide range for Squirrel Glider - NSW Scientific Committee, 2008) as well as a thin linear corridor along the banks of the Murrumbidgee River through the Wagga Wagga township to the South.

The home range of the Squirrel Glider is generally around 3 – 9 ha depending on food resources, and foraging distances range from 400m to 2.5km also depending on food resources (NSW Scientific Committee, 2008).

The proposed works would require removal of 17 hollow bearing trees (HBTs) of the 141 HBTs present within Wilks Park. Note that the HBT have been identified from the ground based on apparent entrances and no hollows were inspected to confirm internal dimensions. All HBTs to be removed contain multiple hollows of a medium to large entrance size which may provide suitable nesting habitat for Squirrel Glider. This equates to 12.1% of the total HBTs present within Wilks Park proposed to be impacted.

It is expected that 5.71 ha of River Red Gum Woodland vegetation providing foraging, nesting and connectivity would be impacted by the proposal. This is 17.3% of the Wilks Park woodland habitat.

The estimated impact to HBTs and available hollows across the study area in a small fragmented landscape is considered to have an adverse effect on the breeding habitat of the Wagga Wagga LGA endangered population at Wilks Park. Considering the available habitat within the Wagga Wagga LGA for this population is sparse and scattered with few remnant areas left, the Wilks Park habitat is highly likely to be an important habitat area. Threats to the Squirrel Glider population in the Wagga Wagga LGA include a loss of habitat through clearing of regenerating River Red Gums, lack of regeneration of other native plants, inability to recruit individuals, and includes the vulnerability to local extinction via stochastic events and predation from red foxes and domestic or feral cats. This wider trend reinforces the importance of the Wilks Park population and the loss of 17.3% of its breeding habitat could place the population at risk of extinction.

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

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

Not applicable.

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

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

i. The proposed works would require removal of 17 hollow bearing trees (HBTs) of the 141 HBTs present within Wilks Park. All HBTs removed contain multiple hollows of a medium to large entrance size which may be suitable nesting habitat for Squirrel Glider. In total 12.7% of the total HBTs present within the study area are proposed to be impacted.

5.71 ha of River Red Gum Woodland vegetation providing foraging, nesting and movement would be impacted by the proposal. This is 17.3% of the Wilks Park woodland habitat.

ii. The proposed works would increase fragmentation through Wilks Park. At its greatest extent a 393 m wide clearing of vegetation could occur through the centre of suitable woodland habitat. Squirrel Gliders need trees closely connected for movement and have a movement range of 50 -70m for gliding between trees (NSW Scientific Committee, 2008). The increase of clearing widths to over 300m in some areas would impact on movement of the Squirrel Glider through their habitat and potentially create a barrier for movement between the north and south of Wilks Park

iii. Considering, the available habitat within the Wagga Wagga LGA for this endangered population is sparse and scattered with few remnant areas left, the Wilks Park woodland habitat is considered an important habitat area. Threats to the Squirrel Glider population in Wagga Wagga LGA include loss of habitat through clearing of River Red Gums, lack of regeneration of other native plants, inability to recruit individuals, and include a vulnerability to local extinction via stochastic events and predation from red foxes and domestic or feral cats (DPE 2021). The Squirrel Glider population in the Wagga Wagga LGA appears to be small and disjunct and is likely to be at the western limit of its NSW distribution. The removal of 17.3% of this habitat and increase of fragmentation to this habitat is likely to have an

adverse effect on the long-term survival of the Squirrel Glider population in the Wilks Park locality.

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

There are no declared areas of outstanding biodiversity value (AOBV) within or adjacent to the proposal area. There are no direct or indirect impacts considered to occur to an AOBV

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

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

- Clearing of native vegetation.
- Loss of Hollow-bearing Trees

Key Threatening processes (OEH, 2021)

Clearing of native vegetation.

The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the determination, the NSW Scientific Committee found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity'. Clearing can lead to direct habitat loss, habitat fragmentation and associated genetic impacts, habitat degradation and off–site impacts such as downstream sedimentation. Impacts to native vegetation from the proposed works would be very minor, the proposal would lead to a minor increase in this KTP.

Loss of Hollow-bearing Trees

The density of hollow-bearing trees required to sustain viable populations of vertebrates is controlled by the diversity of competing fauna species at a site, population densities, number of hollows required by each individual over the long-term, and the number of hollows with suitable characteristics occurring in each tree. The presence, abundance and species richness of hollow-using fauna are correlated with the density of hollow-bearing trees; suggesting that the availability of hollows is often a limiting environmental factor. In some instances, it is the prey species of a threatened predator that is limited by hollow availability. The distribution and abundance of hollow-bearing trees in NSW has been reduced and fragmented by extensive clearing of native vegetation during the past two centuries, primarily for agriculture. The proposal would increase this KTP through the removal of 17 HBT.

Conclusion

The impacts of the proposal on the vulnerable Squirrel Glider and the endangered Wagga Wagga population are considered significant and further assessment is required. A significant impact is considered based on the following conclusions:

- The magnitude of impact (12% of HBTs and 17% of River Red Gum woodland) is high particularly in the context of the endangered population of Wagga Wagga LGA
- The proposal would exacerbate fragmentation and isolation of habitat
- Clearing of HBTs is likely to increase the loss of hollow-bearing trees KTP

D.2 Parrots

This Test of Significance (ToS) characterises the significance of likely impacts associated with the proposal on the following listed species:

- Superb Parrot (Polytelis swainsonii) – BC-V, EPBC-V
- Turquoise Parrot (Neophema pulchella) – BC-V
- Little Lorikeet (Glossopsitta pusilla) – BC-V

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
a) In the case of a threatened species, whether the proposed development or activity 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?
Superb Parrot The Superb Parrot inhabits Box-Gum, Box-Cypress-pine and Boree woodlands and River Red Gum Forest. Specifically in the Riverina Superb Parrots' nest in hollows of large trees (dead and alive) in tall riparian River Red Gum forest or woodland (DCCEEW, 2023; Threatened Species Scientific Committee , 2016; DPE, 2017). They feed in trees and understorey shrubs and on the ground and their diet consists mainly of grass seeds and herbaceous plants (DCCEEW, 2023; Threatened Species Scientific Committee , 2016; DPE, 2017). The Superb Parrot has been recorded within the study area 187 times between 1993 and 2021. The species has been recorded in Wilks Park approximately 50 m from the development footprint as recently as 2012. The Murrumbidgee River and Wagga Wagga are identified as a key biodiversity area for the Superb Parrot in the National Recovery Plan (Commonwealth of Australia, 2021). The proposed works will affect 5.71 ha of River Red Gum Woodland providing suitable foraging and breeding habitat for the species. This represents 17.3% of the available habitat within the study area. Superb Parrots nest in tree hollows with an entrance diameter of 6 cm or wider, and that are at least 3.5 m above the ground (DCCEEW, 2023; Threatened Species Scientific Committee , 2016; DPE, 2017). The Superb Parrot breeds between September and January (DCCEEW, 2023; Threatened Species Scientific Committee , 2016; DPE, 2017). The development footprint contains 17 hollow-bearing trees (HBTs) that will be impacted by the proposed works. These trees contain over 60 potentially suitable tree hollows for the species. 141 HBTs have been mapped in Wilks Park. The proposal would remove 12.1% of hollows suitable for Superb Parrot breeding habitat within Wilks Park. The protection of not only large habitat trees, but groups of large habitat trees, may be critical for maintaining breeding Superb Parrot. The Superb Parrot also faces issues from nest competition from other breeding pairs and competitive species. In the Murray-Riverina, nest sites are usually located no further than 10 km from foraging habitat, and in the South-west Slope Region, breeding and foraging habitats may coincide at some sites, and are no further than 10 km away at other sites (DCCEEW, 2023; Threatened Species Scientific Committee , 2016; DPE, 2017). Over 90 percent of the suitable habitat has been cleared with remaining patches occurring mostly along roadsides or in small, scattered remnant patches on private land (DCCEEW, 2023; Threatened Species Scientific Committee , 2016; DPE, 2017). The loss of large hollow bearing trees will continue to decline into the future unless urgent action is takes (DCCEEW, 2023; Threatened Species Scientific Committee , 2016; DPE, 2017).

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats

Wilks Park is a 33 ha isolated remnant of River Red Gum Woodland within the urban environment of Wagga Wagga, surrounded by urban areas and fragmented rural landscapes. The proposed works are likely to have to have an adverse effect that could place the local population at risk of extinction due to the high proportion of suitable breeding habitat being impacted by the proposed works within Wilks Park.

Turquoise Parrot

The Turquoise Parrot lives in open woodland or riparian gum woodland, and often near ecotones between woodland and grassland, or coastal forest and heath (DPE, 2022; NSW Scientific Commitee , 2009). The Turquoise Parrot feeds mostly on seeds of grasses, forbs and native shrubs, taken on or near the ground; also on some flowers, nectar, fruits, leaves and scale-insects (DPE, 2022; NSW Scientific Commitee , 2009). The Turquoise Parrot has been recorded five times within the study area between 2007-2020. There are no records within the development footprint, the closest record is 1.9 km south (30 m spatial accuracy). The proposed works would impact 5.71 ha of River Red Gum Woodland that provides suitable breeding and foraging habitat for the species. The proposed activity will decrease the patch size of Wilks Park by 17.3%.

The Turquoise Parrot's nest is a cavity in a live or dead tree, stump, or log, often within 1-2 m of the ground. Hollows average entrance hole of 10 x 7 cm, with hollows being re-used (DPE, 2022; NSW Scientific Commitee , 2009). Breeding pairs of Turquoise Parrots defend a nest site and a small feeding area around the nest against members of their own species and breed between August and December (DPE, 2022; NSW Scientific Commitee , 2009). Breeding density can be four to seven pairs per hectare, with nests as little as 8 m apart. The Turquoise Parrot prefers to feed within 100 m of the nest but ranges up to 1.4 km away (DPE, 2022; NSW Scientific Commitee , 2009). It is non-migratory, with most movements of less than 10 km often along treed corridors (NSW Scientific Commitee , 2009). Wilks Park is an urban park with remnant woodland and is likely to provided suitable foraging habitat for Turquoise Parrot. Given that the species is gregarious, if Wilks Park supported a breeding population there would be a greater number of BioNet records. The species is inferred to be susceptible to habitat fragmentation. The proposed works will impact 17 HBTs, removing 61 suitable hollows for the species. 141 HBTs have been mapped in Wilks Park. The proposal would remove 12% of hollows suitable as breeding habitat for Turquoise Parrot within Wilks Park.

Wilks Park is a 33 ha isolated remnant of River Red Gum Woodland within the urban environment of Wagga Wagga, surrounded by urban areas and fragmented rural landscapes. It is likely that the removal of 17 trees and associated hollows or 17.3 % of woodland vegetation in Wilks Park will reduce the amount of breeding habitat for the species in the locality, however, it is unlikely that Wilks Park supports a breeding population of Turquoise Parrots, and the proposed works are unlikely to have significant adverse impacts that could place the local population at risk of extinction.

Little Lorikeet

The Little Lorikeet inhabits riparian habitats foraging primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora, Melaleuca* and other tree species (DPE, 2022). The Little Lorikeet has been recorded within the locality (10km from the proposal area) 49 times between 1970 and 2015. Despite this, it is not listed on the Wagga Birdwatchers group website as recorded in Wagga Wagga area between 2009-2011 (Wagga Wagga

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
Birdwatchers, 2011). No records occur within the development footprint with the closest being 600 m south. The proposed works will impact 5.71 ha of River Red Gum Woodland that provides suitable foraging and breeding habitat for the species. The Little Lorikeet nests in proximity to feeding areas, if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts (DPE, 2022). Entrance is small (3 cm) and usually high above the ground (2–15 m) (DPE, 2022). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited (DPE, 2022). The Little Lorikeet breeds between May and September (DPE, 2022). The Little Lorikeet has been recorded to participate in large scale and very large-scale movements, with movements of the species in the order of approximately 200km (French et al., 2018). The species local population is unlikely to be fragmented by the clearing of 5.71ha of suitable foraging habitat. The proposed works will remove 17 hollow-bearing trees (HBT) with five HBT's containing ten appropriately sized small tree hollows. Ten suitable hollows will be removed from Wilks Park, reducing the amount of potential breeding habitat for the species. Despite this, 204 suitably sizes hollows in 124 HBTs remain within the area and will not be impacted by the proposed works. The removal of 12% of potential breeding habitat (HBTs) within Wilks Park could affect the reproduction of the population of Little Lorikeets within the locality to a degree, however based on the large scale movement of these species and lack of known nests in the proposal area, a viable local population is unlikely to be placed at risk of extinction.
b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: 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
N/A
c) In relation to the habitat of a threatened species or ecological community: i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
I. The excavation works surrounding Hampden Avenue will impact 5.71 ha of moderate - good condition Riverine Woodland habitat. PCTs 5, 9 and 74 are those affected. The proposal will remove 17 hollow bearing trees. II. The Superb Parrot and Little Lorikeet are highly mobile and can disperse over large scale

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
areas. The proposed clearing of 18.18ha will not fragment the habitat or impede movement to the extent that will impact the Superb Parrot or Little Lorikeet. The Turquoise Parrot is more restricted in its movements, preferring to forage locally to nesting habitat (NSW Scientific Commitee , 2009). Fragmentation of habitat in Wilks Park would occur with the removal of 5.71 ha of woodland vegetation within the centre of Wilks Park. However, the proposal would not restrict movement or isolate the species. III. No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat. Wilks Park is an isolated remnant of woodland, being surrounded by urban landscape (North Wagga and Wagga Wagga in the East and West) and rural cleared landscapes to the North and South. The habitat being impacted is important to the long-term survival of the Superb Parrot as the trees act as crucial breeding ground for the species based on the area being a key biodiversity area. The Superb Parrot inhabits woodlands dominated by River Red Gums along the Murrumbidgee River which is listed as a Key Biodiversity Area for this species (Commonwealth of Australia, 2021) and hence the habitat modified is important to the long-term survival of the species. The habitat to be removed is also important to the Little Lorikeet and Turquoise Parrot as the habitat is suitable for the species to breed and forage however on a population level it is not crucial for the survival of the species.
d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
No Areas of Outstanding Biodiversity (AOBV) will be impacted either directly or indirectly by the proposed works.
e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The BC Act lists numerous key threatening processes (KTP's). KTP's relevant to the proposal include the following: • Clearing of native vegetation. • Loss of Hollow-bearing Trees • Infection by Psittacine circoviral (beak and feather) disease affecting endangered psittacine species **Clearing of native vegetation.** The proposal will increase the impacts from and forms part of this KTP by removing greater than 10% of the remnant native vegetation in the study area. **Loss of Hollow-bearing Trees** The proposal works will impact 17 hollow bearing trees this will significantly reduce the breeding habitat present in the region. **Infection by Psittacine circoviral (beak and feather) disease affecting endangered psittacine species**

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
The proposal has potential to increase the likelihood of PBFD occurrence within the locality due to increased competition for hollows. The proposal will increase the impact from and forms part of all three listed KTPs above.

Conclusion

Mitigation Measure and Safeguards for threatened entities include:

- Threatened species find protocol; In the event a threatened species is identified breeding on site, works would cease, and further assessment and consultation would be conducted.
- Conducting works to avoid the breeding season of the species between May and January.
- Vegetation to be retained within the development footprint is to be clearly marked.
- Exclusion zones at the extent of the works corridor to limit works encroaching outside the corridor should be used.

Works should be conducted between mid-January and early April, outside the Superb Parrots Breeding period on the Edward and Murrumbidgee Rivers (DCCEEW, 2023). This will also fall outside of the breeding period for the other two species.

The proposed works will remove 5.71 ha of habitat potentially suitable for foraging and breeding for the Superb Parrot, Turquoise Parrot, and Little Lorikeet and would exacerbate the loss of hollow-bearing trees locally.

The proposed works are likely to have a significant impact on the Superb Parrot due to loss of breeding habitat in a Key Biodiversity Area.

The Little Lorikeet and Turquoise Parrot local populations may be impacted by the proposed works, but this impact is not deemed to be significant.

D.3 Raptors

This Test of significance (ToS) characterises the significance of likely impacts associated with the proposal on the following listed species:

- Barking Owl (*Ninox connivens*) – Vulnerable
- Little Eagle (*Hieraaetus morphnoides*) – Vulnerable
- Black Falcon (*Falco subniger*) – Vulnerable

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
a) In the case of a threatened species, whether the proposed development or activity 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?

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats

The Barking Owl is flexible in its habitat use and can be found across woodland and open forests, including fragmented remnant vegetation and partly cleared farmland. Roosting occurs in tree canopies that provide shaded portions, which include tall midstorey trees with dense foliage such as *Acacia* and *Casuarina* species (OEH 2023). Foraging occurs across its habitat and extends into closed forests and large open areas. The species relies on an abundance of large and old Hollow Bearing Trees (HBTs) to roost with a preference for living eucalypts, although dead trees may also be used. The species displays nest site fidelity, often returning to old nest sites repeatedly over years if they remain undisturbed. Preferred food types include small arboreal mammals such as Squirrel Gliders and Common Ringtail Possums, but when a loss of tree hollows decreases these prey populations the Barking Owl becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits. Consequently, the species requires very large permanent territories within their habitats to compensate for sparse prey densities (OEH 2023). Four BioNet records occur within the study area, the closest record it 2.3 km away from the development footprint (spatial accuracy 10 m) and occurs in an urban, semi-urban matrix habitat similar to Wilks Park; - the record is from 2000.

The development footprint contains 14 large HBTs, supporting 35 suitably large entrance diameter tree hollows, that will be directly impacted by the proposed works. A total of 141 HBTS are recorded in Wilks Park with 119 providing suitable large hollows. The removal and disturbance of approximately 12% of potentially suitable nesting tree hollows is likely to reduce the species' regional habitat availability across breeding seasons, especially for a species that demonstrates strong nest site fidelity. The species' flexibility in its habitat use and large permanent territories and dispersal ability ensures the clearing of suitable habitat vegetation is unlikely to impact foraging behaviours. The fragmentation of habitat may increase any present individuals' foraging territory in an attempt to locate areas of higher prey densities. Although, this is unlikely to impact upon the species' foraging success. The substantial loss of suitable breeding habitat for the Barking Owl makes the proposed works likely to have an adverse effect on the life cycle of the species such that a viable local population of the species may be placed at risk of extinction.

The Little Eagle occupies open eucalypt forest, woodland or open woodland with a preference for *Acacia* woodlands and riparian woodlands across the Riverina (OEH 2023). The species nests in tall, large diameter-at-breast height (DBH) living tress within remnant patches of vegetation across their range. Breeding pairs build large stick nests during winter before females lay eggs in spring, where pairs provide parental care for young until they fledge in early summer. During nesting and breeding season, the species displays site fidelity and territoriality to occupied habitat trees. The species utilises its high dispersal ability to forage widely, and often many kilometres away from their nest. Prey items include juvenile rabbits, smaller birds, insects, reptiles and carrion (ACT Government 2023). The species has a total of 28 BioNet records occur within 10 km of the proposed works. No records occur within the development footprint, the closest record is 2.3 km away in open rural habitat. Breeding activity and habitat is unlikely to be impacted by the proposed works as the species is highly mobile and known to disperse widely to meet their nesting requirements (Larkin et al. 2020). The removal of 18.18 ha of native vegetation that provides suitable habitat for prey species may result in the decline of food availability for the Little Eagle, however it has been reported that habitat edges and open areas associated with human activities can benefit raptor species. Roadside microhabitats usually contain a high biomass of small mammals, insects and roadkill, and so the species choose habitat areas close to urban areas and have been reported to habituate to disturbances (Debus et al. 2007; Larkin et al. 2020). Therefore, it is unlikely that the proposed works will have an adverse effect on the life cycle of this species such that a viable local population of the Little Eagle is likely to be placed at risk of extinction.

The Black Falcon prefers sparse woodlands, scrub-dominated grasslands and farmland across arid areas. The species is highly mobile and are widely, but sparsely, distributed across most of New South Wales (OEH 2023). The Black Falcon nests along tree-lined creeks and rivers of inland drainage systems in tall

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
living trees with both parents providing care to young. Preferred prey includes smaller birds, small mammals, insects, reptiles and carrion with foraging able to occur far away from nests and roosts (BirdLife Australia 2023). Eight BioNet records occur within 10 km of the proposed works. The proposed works will impact 18.18 ha of native vegetation which could be considered suitable nesting and foraging habitat. The Black Falcon has been reported to have a preference for faster aerial hunting methods and avian prey, therefore, combined with the high dispersal ability of the species, the potential loss of terrestrial prey habitat is unlikely to impact the persistence of a local population (Czechura & Debus 1985). The species is considered to have flexible nesting requirements often laying eggs in abandoned stick nests and suitable structures created by other birds and fauna. The loss of tall living trees within the native vegetation to be removed by the proposed works will not adversely interrupt the breeding behaviours of the Black Falcon. Consequently, the proposed works is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of Black Falcons will be placed at risk of extinction.
b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: 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.
N/A
c) In relation to the habitat of a threatened species or ecological community: i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.
i. The excavation works surrounding Hampden Avenue will impact 5.71 ha of River Red Gum Woodland habitat - PCTs 5, 9 and 74. This represents a loss of 17.3% of the existing patch in Wilks Park. The proposal will remove 14 hollow bearing trees which provide 35 suitably large tree hollows that support the breeding behaviours of raptor bird species breeding, specifically the Barking Owl. This represents around 12% of available large hollows in the existing patch within Wilks Park. ii. The proposed works would increase fragmentation through Wilks Park. At its greatest extent a 393 m wide clearing of vegetation could occur through the centre of suitable woodland habitat. iii. Wilks Park is an isolated remnant of woodland, being surrounded by urban landscape (North Wagga and Wagga Wagga in the East and West) and rural cleared landscapes to the North and South. The impacted HBTS represent suitable breeding habitat for local populations of the Barking Owl and could impacts on the persistence of the species. The 5.71 ha of Riverine Woodland habitat that will be impacted by the proposed works represents only potential habitat within a broader landscape of suitable habitat for highly mobile raptor bird species. It is unlikely the removal of this

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
vegetation will result in an adverse impact on the long-term survival of these species in the locality.
d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).
No areas of outstanding biodiversity will be impacted either directly or indirectly by the proposed works.
e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
The BC Act lists numerous key threatening processes (KTPs). KTPs relevant to the proposal include the following (DPE, 2021): • Clearing of native vegetation • Loss of hollow-bearing trees *Clearing of native vegetation* The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the determination, the NSW Scientific Committee found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity'. Clearing can lead to direct habitat loss, habitat fragmentation and associated genetic impacts, habitat degradation and off–site impacts such as downstream sedimentation. Impacts to 18.18 ha of native vegetation from the proposed works would be minimal, therefore the proposed works would lead to a minor increase in this KTP. *Loss of hollow-bearing trees* The density of hollow-bearing trees required to sustain viable populations of vertebrates is controlled by the diversity of competing fauna species at a site, population densities, number of hollows required by each individual over the long-term, and the number of hollows with suitable characteristics occurring in each tree. The presence, abundance and species richness of hollow-using fauna are correlated with the density of hollow-bearing trees; suggesting that the availability of hollows is often a limiting environmental factor. In some instances, it is the prey species of a threatened predator that is limited by hollow availability. The distribution and abundance of hollow-bearing trees in NSW has been reduced and fragmented by extensive clearing of native vegetation during the past two centuries, primarily for agriculture. The proposal would increase this KTP through the removal of 17 HBTs.

Conclusion

Mitigation Measure and Safeguards for threatened entities include:

- Conducting works outside of the breeding period for these species between March and June
- Works to cease, and further assessment and consultation would be conducted.
- Salvage and appropriate relocation of any large hollows to trees without hollows.
- Revegetation in strategic areas of groundcover habitat to enhance foraging habitat.
- Vegetation to be retained within the development footprint is to be clearly marked.

Exclusion zones at the extent of the works corridor to limit works encroaching outside the corridor should be used. The proposed works will remove 5.71 ha of suitable foraging and breeding habitat for Barking Owl and less so for Little Eagle and Black Falcon.

The loss of approximately 12% of large hollows withing the patch remnant represents a significant impact to the Barking Owls breeding capabilities.

Provided mitigation measures and safeguards are abided by the proposed works are unlikely to have significant impact on the long-term survival of the Little Eagle and Black Falcon locally.

D.4 Passerine Birds

This Test of Significance (ToS) characterises the significance of likely impacts associated with the proposal on the following listed species

- Varied Sittella (*Daphoenositta chrysoptera*) -
- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*) – BC-V,
- Hooded Robin *(south-eastern form*) – BC-V, EPBC-E
- Scarlet Robin (*Petroica boodang*) – BC-V
- Diamond Firetail *(Stagonopleura guttata)* – BC-V

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
a) In the case of a threatened species, whether the proposed development or activity 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?
The Passerine birds listed above have been recorded within the locality (10km from development footprint) and are considered likely to frequent the development footprint. These birds generally inhabit eucalypt forests and woodlands. The BioNet records for each species are listed below: • Varied Sittella – 3 records between 1985 and 2021 • Brown Treecreeper - 37 records between 1978 and 2019 • Hooded Robin – 13 records between 1979 and 2007 • Scarlet Robin – 9 records between 1977 and 2017 • Diamond Firetail – 19 records between 1979 and 2007 The Brown Treecreeper was recorded as recently as 2021 within Wilks Park adjacent to the development footprint (spatial accuracy of 5 m). These species breed throughout different times of the year. The breeding period of each species is listed below. • Varied Sittella – September - December (NSW Scientific Commitee, 2010; ESPD, 2019a; DPE, 2017b) • Brown Treecreeper – July - February (DPE, 2022; NSW Scientific Commitee, 2003; DCCEW, 2023) • Hooded Robin – July – November (NSW Scientific Commitee, 2003; DCCEW, 2023b) • Scarlet Robin – July – January (NSW Scientific Commitee, 2010; EPSD, 2019; DPE, 2017) • Diamond Firetail – August - January (DCCEW, 2023a; DPE, 2017a)

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
The Diamond Firetail, Hooded Robin, Scarlet Robin and the Varied Sitella build nests in the lower and midstory of suitable habitats. It is likely that 5.71 ha of good condition foraging habitat for these species will be impacted by the proposed works. The breeding habitat for these species within the proposal area is marginal for these species due to a degraded midstory and exotic dominated understory. The habitat is unlikely to be utilised by these species for breeding. According to the field step-point method results the woodland habitats contain 23% litter cover a microhabitat feature requirement suggesting these areas are suitable foraging habitat for these species. The Brown Treecreeper nests within tree hollows and has been recorded within Wilks Park (DPE, 2022; NSW Scientific Commitee, 2003; DCCEW, 2023) . The proposed works will impact 17 hollow bearing trees containing a total of 81 tree hollows of varying sizes. These hollows are to remain within the proposal area but will be on the ground. Hollows in standing dead or live trees and tree stumps are essential for nesting. (DPE, 2022; NSW Scientific Commitee, 2003; DCCEW, 2023). It is recommended that any hollows removed from trees be salvaged and relocated to live trees that do not otherwise have hollows. Despite this, the removal of this habitat will limit the availability of breeding and foraging habitat for these species in the area. Wilks Park is a 33 ha isolated remnant of woodland, being surrounded by urban landscape (North Wagga and Wagga Wagga in the East and West) and rural cleared landscapes to the North and South. These species all prefer contiguous patches of intact woodland and the proposed activity will decrease the patch size of Wilks Park by approximately 17.3%. The proposed works will remove 5.71 ha of woodland habitat in Wilks Park, this is approximately 17% of the current woodland habitat. Due to the already small size of the reserve further effects are likely to impact the passerine species in the area. The proposal is expected to adversely impact on Passerine birds by the removal of quality woodland habitat. Barret and Love (2012) state that most bird species do not cross gaps of more than 100 m when dispersing between patches. Given that the species generally do not disperse large distances it is expected that the proposal will adversely impact on the life cycle of the species in relation to dispersal. However, it is not considered that this will put a local population at risk of extinction.
b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: 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
N/A
c) In relation to the habitat of a threatened species or ecological community: i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and ii. whether an area of habitat is likely to become fragmented or isolated from other areas of

	The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
	habitat as a result of the proposed development or activity, and iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
I. II. III.	The excavation works surrounding Hampden Avenue will impact 5.71 ha of moderate- good condition Riparian Woodland habitat. PCTs 5, 9 and 74 are those affected. The proposal will remove 17 hollow bearing trees. The proposed works would increase fragmentation through Wilks Park. At its greatest extent a 393 m wide clearing of vegetation could occur through the centre of suitable woodland habitat. The Brown Tree Creeper is a sedentary species and is known to frequent Wilks Park. Although the landscape is historically fragmented (from the existing road reserve) the increase of clearing widths to over 300m in some areas would create a barrier to movement, with many species displaying a gap-crossing threshold of around 100m (Barret and Love, 2021). No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the register of Critical Habitat. However, habitat critical to the survival of the species is present for the Brown Treecreeper, Diamond Firetail and Varied Sittella. Habitat critical to the survival of the Brown Treecreeper is listed in the federal conservation advice (DCCEW, 2023) as • *Relatively undisturbed grassy woodland with native understorey. (Habitat structure should be quite open at ground level so that birds are able to feed on or near the ground and maintain vigilance against predators. − The required degree of openness is mostly likely to be created by moderate levels of disturbance by fire and/or grazing)* • *Large living and dead trees which are essential for roosting and nesting sites and for foraging;* • *Fallen timber which provides essential foraging habitat and;* • *Hollows in standing dead or live trees and tree stumps are also essential for nesting.* No conservation advice has been released for the Scarlet Robin with in NSW. Wilks Park is known to be frequented by Brown Tree Creeper and given the condition of the woodland present and its scarcity in the broader landscape it is considered locally important to the assessed species.
	d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
	No Areas of Outstanding Biodiversity will be impacted either directly or indirectly by the proposed works.
	e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.
	The BC Act lists numerous key threatening processes (KTP's). KTP's relevant to the proposal include the following (DPE, 2021): • Clearing of native vegetation. • Loss of Hollow-bearing Trees **Key Threatening processes**

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats
Clearing of native vegetation. The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the determination, the NSW Scientific Committee found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity'. Clearing can lead to direct habitat loss, habitat fragmentation and associated genetic impacts, habitat degradation and off–site impacts such as downstream sedimentation. Impacts to native vegetation from the proposed works would be very minor, the proposal would lead to a minor increase in this KTP. *Loss of Hollow-bearing Trees* The density of hollow-bearing trees required to sustain viable populations of vertebrates is controlled by the diversity of competing fauna species at a site, population densities, number of hollows required by each individual over the long-term, and the number of hollows with suitable characteristics occurring in each tree. The presence, abundance and species richness of hollow-using fauna are correlated with the density of hollow-bearing trees; suggesting that the availability of hollows is often a limiting environmental factor. In some instances, it is the prey species of a threatened predator that is limited by hollow availability. The distribution and abundance of hollow-bearing trees in NSW has been reduced and fragmented by extensive clearing of native vegetation during the past two centuries, primarily for agriculture. The proposal would increase this KTP through the removal of 17 HBT.

Conclusion

Mitigation Measure and Safeguards for threatened entities include:

- Threatened species find protocol; In the event a threatened species is identified breeding on site, works would cease, and further assessment and consultation would be conducted.
- Conducting works outside of the breeding period for these species between March and June.
- Revegetation in strategic areas of groundcover habitat to enhance foraging habitat
- A fauna spotter catcher is present to check for any other fauna potentially occupying hollows prior to felling.
- Vegetation to be retained within the proposal area is to be clearly marked.
- Exclusion zones at the extent of the works corridor to limit works encroaching outside the corridor should be used.

The proposed works will remove 5.71 ha of suitable foraging and breeding habitat for the Brown Treecreeper, Diamond Firetail, Hooded Robin, Scarlet Robin and the Varied Sitella. Provided mitigation measures and safeguards are abided by the proposed works are unlikely to have significant impact on the long-term survival of the species locally.

D.5 Bats

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

- Grey-headed Flying-fox (*Pteropus poliocephalus*): BC-V, EPBC-V
- Inland Forest Bat (*Vespadelus baverstocki)*: BC-V
- Southern Myotis (*Myotis macropus*): BC-V

f) In the case of a threatened species, whether the proposed development is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Grey-headed Flying-fox

This species is a canopy-feeding frugivore, blossom-eater and nectarivore of rainforests, open forests, woodlands, Melaleuca swamps and Banksia woodlands. As such, it plays an important ecosystem function by providing a means of seed dispersal and pollination for many indigenous tree species (DPE, 2021). Grey-headed Flying-foxes also feed on introduced trees including commercial fruit crops (DPE, 2021). A total of 17 BioNet records of this species exist withing 1 km of the development footprint with records from as recently as 2019. A registered Grey-headed Flying Fox camp occurs 2.3 km southeast of the proposal area, the Wagga Wagga camp is located on the Murrumbidgee River and was last surveyed in 2015 to have up to 500 individuals (DCCEEW, 2014). The proposal area provides foraging resources (eucalypt blossoms) for this species within a short flying distance from a camp.

Grey-headed Flying-foxes congregate in large numbers at roosting sites (camps) that may be found in rainforest patches, Melaleuca stands, mangroves, riparian woodland or modified vegetation in urban areas (DPE, 2021). Individuals generally exhibit a high fidelity to traditional camps and return annually to give birth and rear offspring (DPE, 2021). They forage opportunistically, often at distances up to 30 km from camps, and occasionally up to 60-70 km per night, in response to patchy food resources (DPE, 2021). Given the proximity of the development footprint to the camp and the availability of nectar producing trees it is expected that the species will utilise the study area for foraging. Annual mating commences in January and conception occurs in April or May; single young is born in October or November (OEH, 2020). Relatively long-lived mammals, with the average age of reproductive animals being between six and 10 years. They have a low rate of recruitment as sexual maturity is reached after at least two to three years and generally only one offspring is produced each year (OEH, 2020).

It is unknown how frequently or abundantly the habitat within the development footprint is utilised by the species. The roost site will not be directly or indirectly impacted by the proposal as it is considered too far from the development footprint. Although the species is a nectarivore and the proposal intends to remove nectar producing trees that could provide as a foraging resource the species are known to forage a wide variety of fruits including introduced species and commercial crops. The proposal is unlikely to impact adversely on the breeding cycle of the species as the closest roost site is 2.3 km away. The proposal is also unlikely to impact adversely on the foraging ability of the species given that they are considered to forage a variety of native and introduced species. The proposal is therefore unlikely to have an adverse impact on the life cycle of the species such that a viable local population will be placed at risk of extinction.

Inland Forest Bat

The habitat requirements of this species are poorly known but it has been recorded from a variety of woodland formations, including Mallee, Mulga and River Red Gum (OEH, 2020). Most records are from drier woodland habitats with riparian areas (OEH, 2020). The species roosts in tree hollows, abandoned buildings and sometimes in very small hollows in stunted trees only a few metres high (OEH, 2020). These bats fly rapidly and cover an extensive foraging area and are presumed to feed

on flying insects (OEH, 2020). Given the site has a semi-arid climate and is located within the riparian zone it is considered to consist of suitable habitat for the species.

This species has been recorded once on NSW BioNet approximately 6 km from the development footprint (100 m spatial accuracy). Given that the species utilises a range of hollow sizes and types including tree hollows for roosting it is possible that the removal of 17 HBTs and their associated hollows will impact adversely on the roosting and thus breeding capability of the species. Within the impacted woodland patch 124 HBTs will remain and the loss equates to 12.1% of habitat lost. The small number of records suggests that the species does not occur in the locality in large numbers. It is inferred from this that although the loss of habitat will occur this will not result in adverse impacts such that a local population will be placed at risk of extinction.

Southern Myotis

The species 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 (OEH, 2020). Forage over streams and pools catching insects and small fish by raking their feet across the water surface (OEH, 2020). In NSW females have one young each year usually in November or December (OEH, 2020).

This species has been recorded twice on NSW BioNet with the closest occurring 310 m from the development footprint (spatial accuracy 100 m). Given that the species utilises tree hollows for roosting it is possible that the removal of 17 HBTs and their associated hollows will impact adversely on the roosting and thus breeding capability of the species. Within the impacted woodland patch 124 HBTs will remain and the loss equates to 12.1% of habitat lost. The small number of records suggests that the species does not occur in the locality in large numbers however it may also be due to a lack of survey effort. It has been inferred from this that although the loss of habitat will occur this will not result in adverse impacts such that a local population will be placed at risk of extinction.

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

a. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

b. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

N/A

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

iv. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

v. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

vi. The importance of the habitat to be removed, modified, fragmented or isolated to the long–term survival of the species or ecological community in the locality.

- The excavation works surrounding Hampden Avenue will impact 5.71 ha of moderate -good condition Woodland habitat. (PCTs 5, 9 and 74 are those affected). The proposal will remove 17 hollow bearing trees which equates to 12.1% of HBTs within the patch.
- The proposed works would increase fragmentation through Wilks Park. At its greatest extent a 393 m wide clearing of vegetation could occur through the centre of suitable woodland habitat. The landscape is historically fragmented from the existing road reserve. However these bat species are highly mobile and fragmentation would not be a barrier to movement.
- The habitat to be removed occurs in an area of intact vegetation within an otherwise

extensively cleared landscape. The habitat being impacted is likely to be of least importance to Grey-headed Flying Fox because of the variety of foraging resources utilised by the species and the recorded roost site 2.3 km away. The habitat to be removed may be important to the long-term survival of Inland Forest Bat and Southern Myotis locally due to the density of hollows (approx. 22/ha) present in areas of the development footprint near Wilks Park. Further surveying is recommended to confirm if hollows are being used by the species.

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

No Areas of Outstanding Biodiversity will be impacted either directly or indirectly by the proposed works.

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

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

- Clearing of native vegetation.
- Removal of hollow-bearing trees.

Key Threatening processes (DPE, 2021)

Clearing of native vegetation.

The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the determination, the NSW Scientific Committee found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity'. Clearing can lead to direct habitat loss, habitat fragmentation and associated genetic impacts, habitat degradation and off–site impacts such as downstream sedimentation. Impacts to native vegetation from the proposed works would be very minor, the proposal would lead to a minor increase in this KTP.

Loss of Hollow-bearing Trees

The density of hollow-bearing trees required to sustain viable populations of vertebrates is controlled by the diversity of competing fauna species at a site, population densities, number of hollows required by each individual over the long-term, and the number of hollows with suitable characteristics occurring in each tree. The presence, abundance and species richness of hollow-using fauna are correlated with the density of hollow-bearing trees; suggesting that the availability of hollows is often a limiting environmental factor. In some instances, it is the prey species of a threatened predator that is limited by hollow availability. The distribution and abundance of hollow-bearing trees in NSW has been reduced and fragmented by extensive clearing of native vegetation during the past two centuries, primarily for agriculture. The proposal would increase this KTP through the removal of 17 HBT.

The proposed activity is part of and is likely to increase the impact of the abovementioned KTPs through the clearing of native vegetation including HBTs.

Conclusion

Mitigation actions:

- Bat boxes to be installed at a ratio of 1:1 for hollows removed
- Fauna spotter catcher to inspect all hollows prior to clearing and appropriately handle/relocate any fauna
- Mid-winter to be avoided for clearing as many microbats enter torpor and relocation may be fatal.

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

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

NGH Pty Ltd

NSW • ACT • QLD • VIC

ABN 31 124 444 622 ACN 124 444 622

E: ngh@nghconsulting.com.au

GOLD COAST

2B 34 Tallebudgera Creek Road
Burleigh Heads QLD 4220
(PO Box 424 West Burleigh QLD 4219)

T. (07) 3129 7633

SYDNEY REGION

Unit 17, 21 Mary Street
Surry Hills NSW 2010

T. (02) 8202 8333

BEGA

Suite 11, 89-91 Auckland Street
(PO Box 470)
Bega NSW 2550

T. (02) 6492 8333

MELBOURNE

Level 14, 10-16 Queen Street
Melbourne VIC 3000

T: (03) 7031 9123

TOWNSVILLE

Level 4, 67-75 Denham Street
Townsville QLD 4810

T. (07) 4410 9000

BRISBANE

T3, Level 7, 348 Edward Street
Brisbane QLD 4000

T. (07) 3129 7633

NEWCASTLE - HUNTER & NORTH COAST

Level 1, 31-33 Beaumont Street
Hamilton NSW 2303

T. (02) 4929 2301

WAGGA WAGGA - RIVERINA & WESTERN NSW

35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650

T. (02) 6971 9696

CANBERRA

Unit 8, 27 Yallourn Street
(PO Box 62)
Fyshwick ACT 2609

T. (02) 6280 5053

SUNSHINE COAST

Suite 101, Level 2/30 Main Drive
Birtinya QLD 4575

(07) 4410 9000

WODONGA

Unit 2, 83 Hume Street
(PO Box 506)
Wodonga VIC 3690

T. (02) 6067 2533