LOBBS LANE
HIGH STREET
GRIMWADE ROAD
KIRWANS BRIDGE ROAD
MCGREGOR AVENUE
HAYSHED ROAD
GOULBURN VALLEY-GOULBURN VALLEY OUT RAMP
LOTUS COURT
GOULBURN VALLEY FREEWAY
PEPPERCORN ROAD
KEAN ROAD
RACECOURSE ROAD
HABEL ROAD
MCDONALDS ROAD

DRAFT & CONFIDENTIAL

Rail station
Swift Parrot Point Survey
Project Area

Map 8 of 15

Data Sources:
AJM 2018
DELWP 2018
Vicmap 2018
Basemap: ESRI 2018

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Swift Parrot Survey Locations

Drawing Number:			Revision:
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Drawn By: A. Mattinson	Approved By: S. Waller	Date: 25/09/2019	Map Size: A3

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Metres
Coordinate System: GDA 1994 MGA Zone 55

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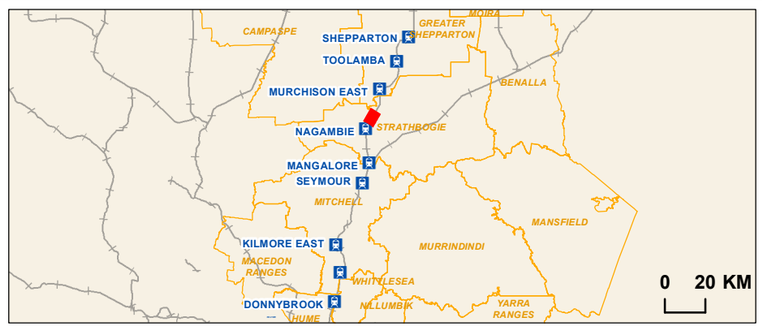
Rail station
Swift Parrot Point Survey
Project Area

Map 9 of 15



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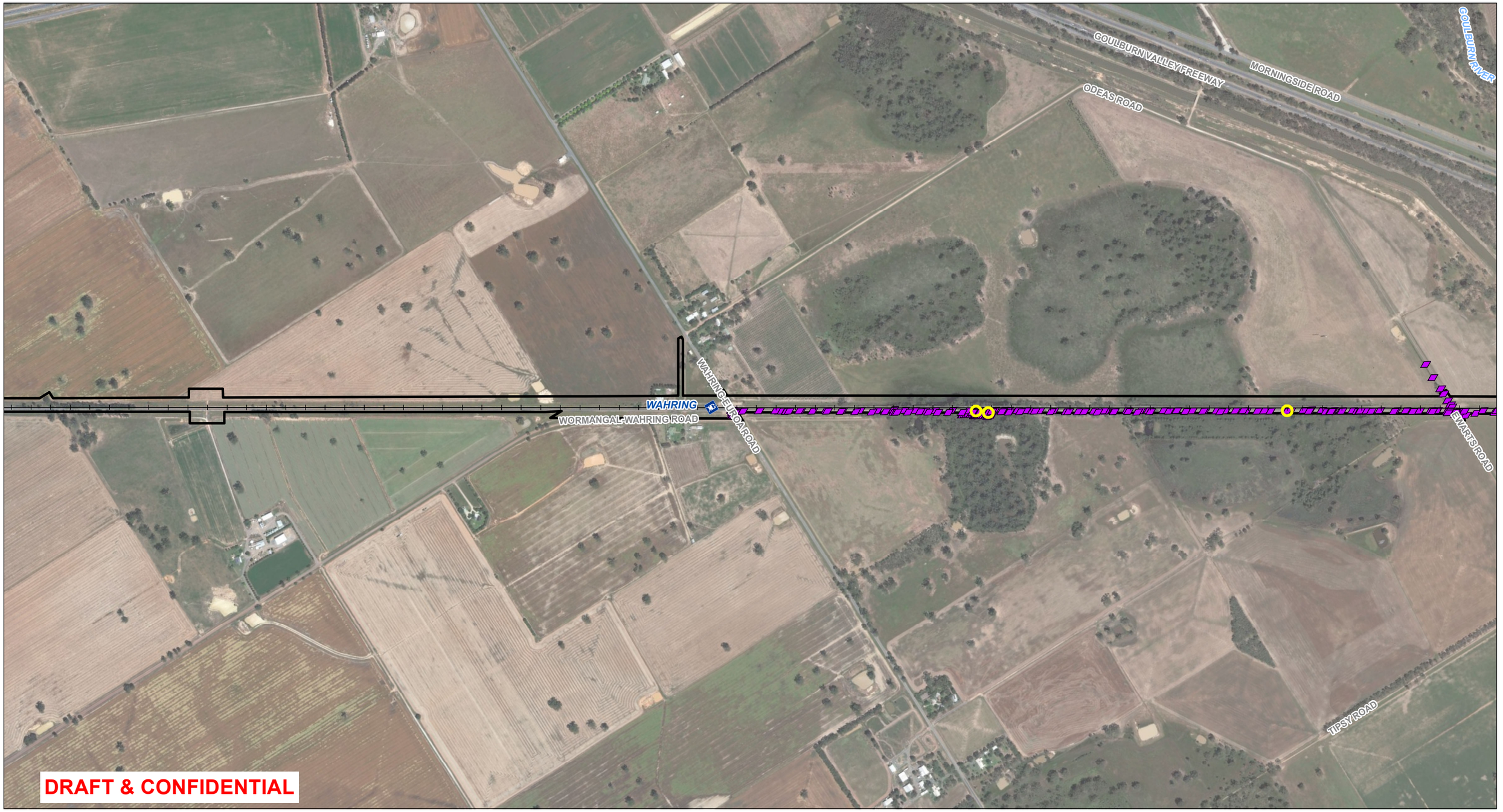

Rail station
Swift Parrot Point Survey
Swift Parrot Driving Survey
Project Area

Map 10 of 15

Data Sources:
AJM 2018
DELWP 2018
Vicmap 2018
Basemap: ESRI 2018

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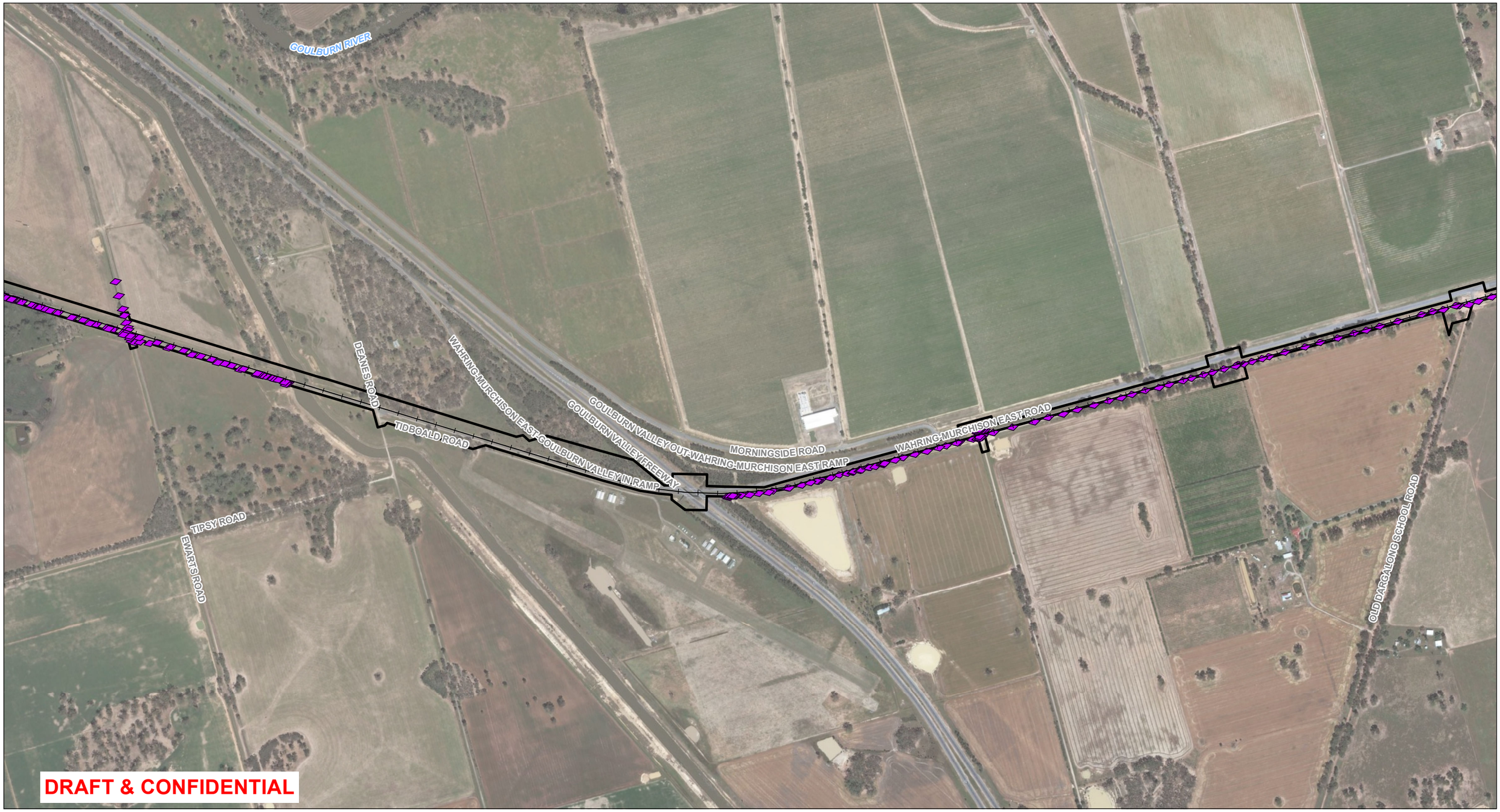
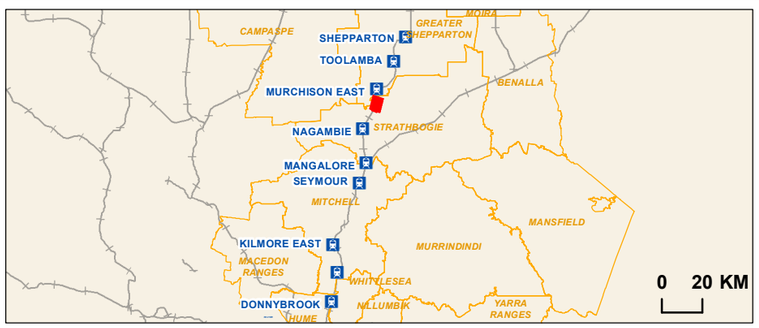


Rail station
Swift Parrot Point Survey
Swift Parrot Driving Survey
Project Area

Map 11 of 15



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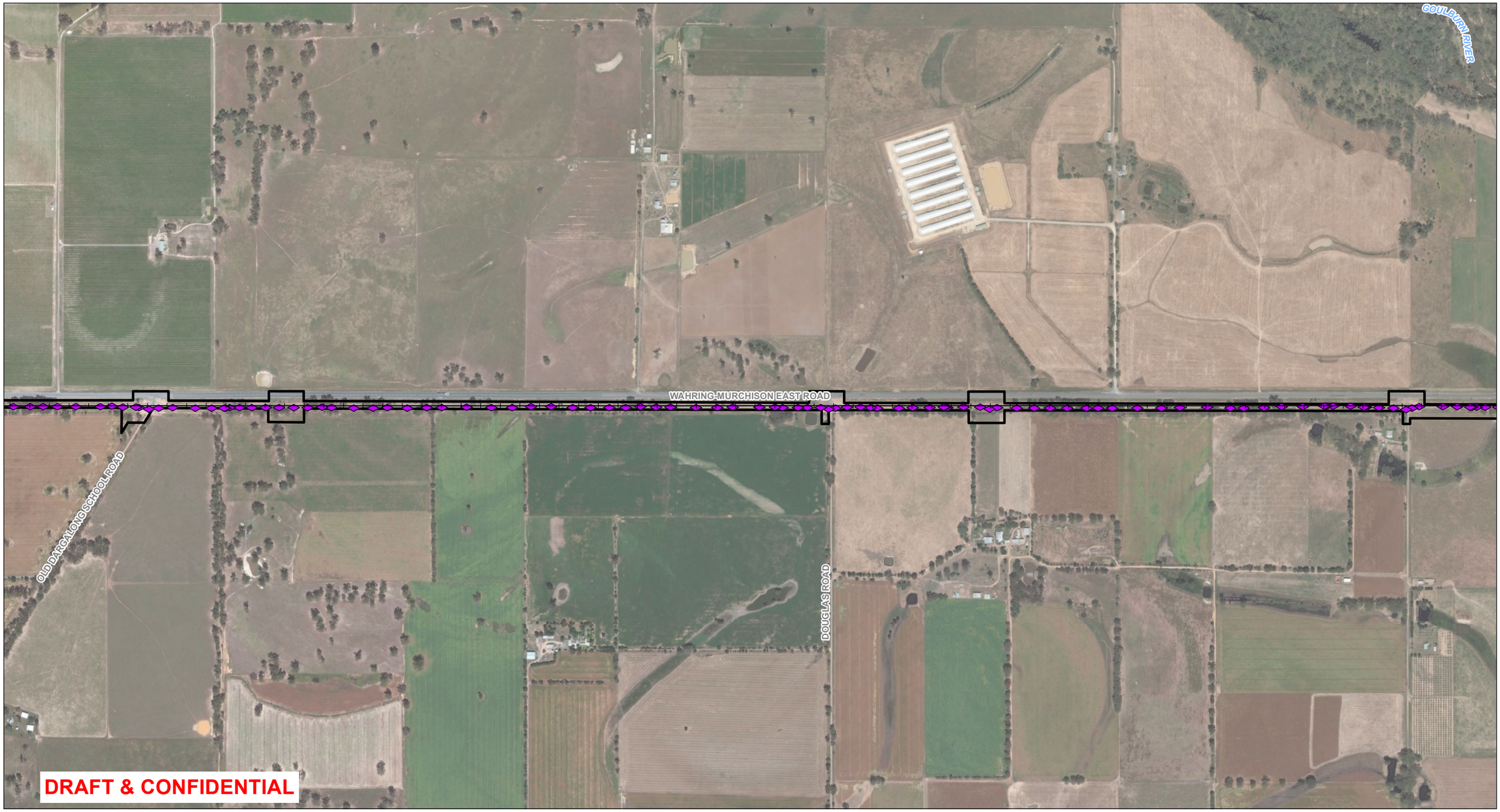
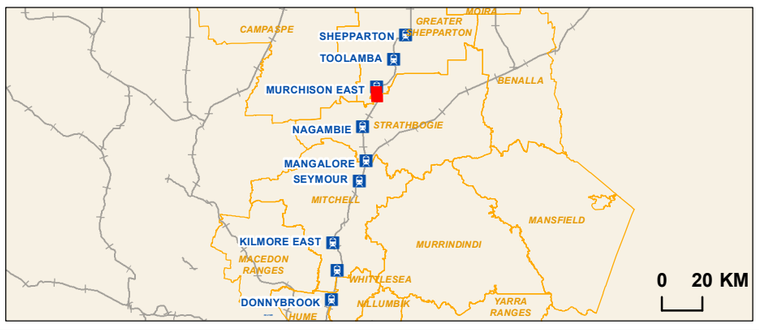


Rail station
Swift Parrot Point Survey
Swift Parrot Driving Survey
Project Area

Map 12 of 15



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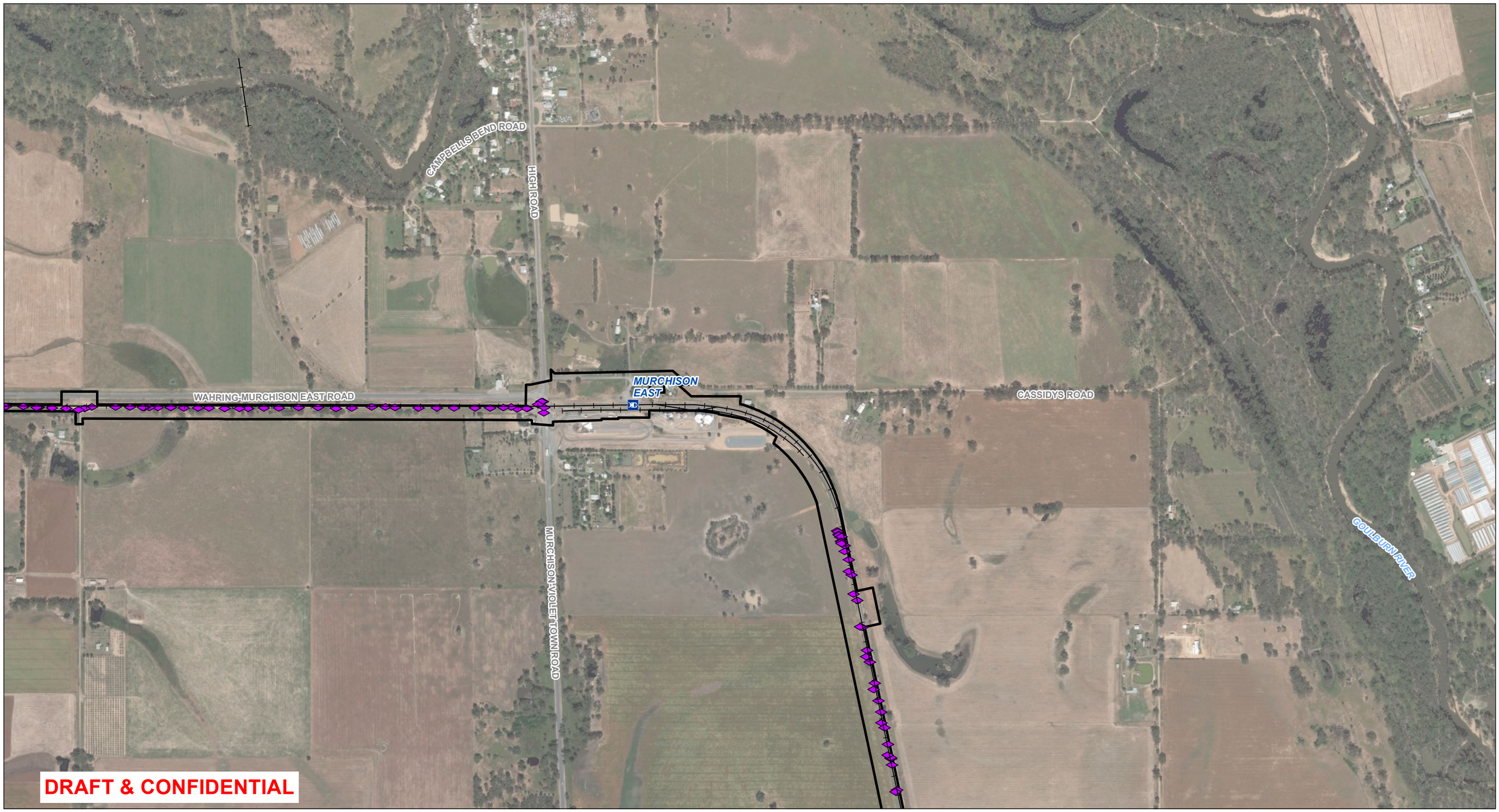
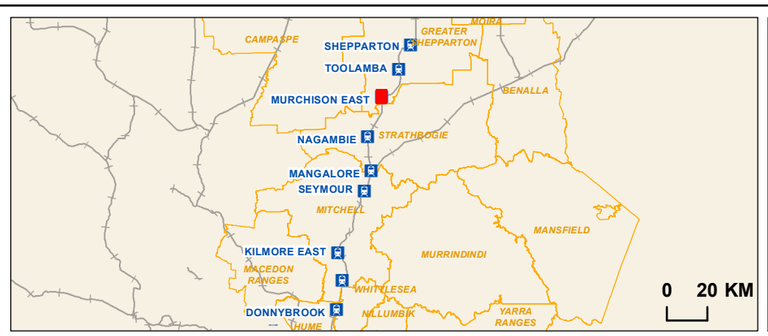


- Rail station
- Swift Parrot Point Survey
- Swift Parrot Driving Survey
- Project Area

Map 13 of 15



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Swift Parrot Survey Locations

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DUGGANS ROAD

CASSIDYS ROAD

BROWNS ROAD

GRIFFIN LANE

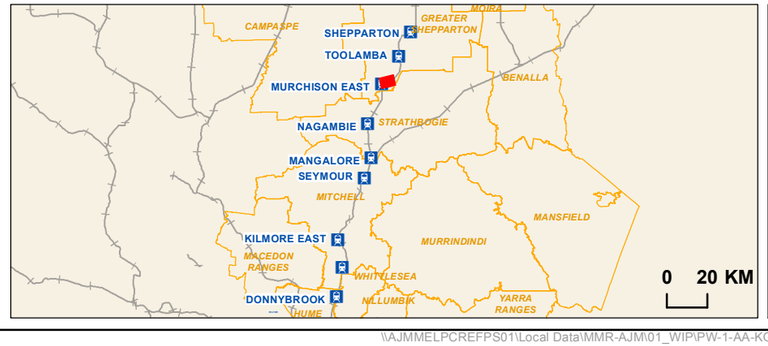
FLYNNS ROAD

MURCHISON-VICTORIA ROAD

DRAFT & CONFIDENTIAL

- Rail station
- Swift Parrot Point Survey
- Swift Parrot Driving Survey
- Project Area

Map 14 of 15



Data Sources:
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RAIL PROJECTS VICTORIA

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Swift Parrot Survey Locations

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- Rail station
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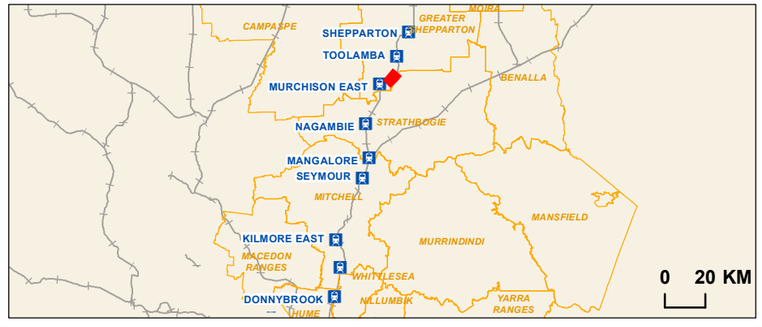
Map 15 of 15



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Appendix H

Targeted Survey Results

Appendix H - Targeted Survey Results

***Delma impar* (Striped Legless Lizard)**

Results of the targeted survey conducted in suitable habitat within the project area at Seymour did not detect the presence of Striped Legless Lizard. No further surveys are required within the current project area.

***Lathamus discolor* (Swift Parrot)**

Results of the targeted survey conducted in suitable habitat within the project area between Seymour and Murchison East did not detect the presence of the Swift Parrot. No further surveys are required within the current project area.

Targeted Aquatic Fauna

Targeted surveys of aquatic fauna were conducted at two locations: the rail intersection with Pranjip Creek; and an irrigation drain proximate to the previously proposed stabling yards at Lemnos on the Dookie Rail Line.

None of the targeted threatened fish species were identified during the Targeted Surveys. A summary of the findings is provided below.

- Pranjip Creek

At the time of the survey, Pranjip Creek was largely dry, though a small pool of water remained and was surveyed. The channel was approximately 6 m wide at the point where the pool was sampled, increasing to 10 m under the railway bridge and narrowing upstream. The riparian vegetation habitat was typical of the region, consisting of a mix of large old eucalypts and younger Blackwoods with an understory of native grasses and sedges. When flowing, Pranjip Creek would have a mix of instream habitat for fish and macroinvertebrates, including large and small woody debris (snag) habitat and varied pool depths.

Four species were detected, though no threatened (EPBC Act /FFG Act) aquatic species were present. The native Western Carp Gudgeon (*Hypseleotris klunzingeri*) and Yabbies (*Cherax destructor*) were recorded, with two exotic species, Goldfish (*Carassius auratus*) and Gambusia (*Gambusia holbrookii*).

FIGURE H-1 UPSTREAM ASPECT OF PRAJIP CREEK, SHOWING THE DRY CREEK CHANNEL

FIGURE H-2 DOWNSTREAM ASPECT OF PRAJIP CREEK, SHOWING THE DRY CREEK CHANNEL

FIGURE H-3 REMNANT POOL IN THE BED OF PRANJIP CREEK

FIGURE H-4 GOLDFISH FOUND IN A SMALL REMNANT POOL OF PRANJIP CREEK

FIGURE H-5 MIX OF EASTERN GAMBUSIA AND WESTERN CARP GUDGEON FOUND IN A SMALL REMNANT POOL OF PRANJIP CREEK

FIGURE H-6 WESTERN CARP GUDGEON FEMALE SPECIMEN FOUND IN PRANJIP CREEK

FIGURE H-7 WESTERN CARP GUDGEON MALE SPECIMEN FOUND IN PRANJIP CREEK

Appendix I

Terrestrial Fauna Habitat

Appendix I - Terrestrial Fauna Habitat

Woodland

Woodland habitats, are characterised by an open canopy of eucalypts, a sparse shrub layer, and a ground cover consisting of tussock grasses and other herbs. Plains Grassy Woodland is the dominant EVC within the project area, other woodland EVCs present include Swampy Riparian Woodland, Floodplain Riparian Woodland, Creekline Grassy Woodland, Grassy Woodland and Riverine Grassy Woodland.

Woodland remnants provide valuable foraging and nesting habitat for a diversity of fauna species. Many nomadic birds are attracted by mass-flowering of the eucalypts. High densities of hollow bearing trees and trees with Mistletoe are present within woodland patches located within the project area, particularly in the vicinity of Mangalore and Mooroopna. Such areas should be avoided where possible. These areas provide potential habitat for both the Critically Endangered Swift Parrot and Regent Honeyeater, and hollow dependent fauna including the threatened species Brush-tailed Phascogale (*Phascogale tapoatafa*), Squirrel Glider (*Petaurus norfolkensis*) and Barking Owl (*Ninnox connivens connivens*).

Forest

Forest habitats, found in Heathy Dry Forest, Herb-rich Foothill Forest, Valley Grassy Forest, Valley Heathy Forest and Box Ironbark Forest, are characterised by a relatively closed eucalypt canopy.

Forested habitats within the project area provide a diversity of niches for native fauna. Insectivorous birds can forage on the tree trunk and limbs, underneath the bark, on leaves, around flowers and in coarse woody debris and leaf litter at ground level. The eucalypts provide an important source of food for nectar-feeding birds (e.g. Swift Parrot *Lathamus discolor*, honeyeaters and lorikeets).

Some areas of the project area support high numbers of Large trees, including hollow bearing trees. Hollow-dependent mammals (e.g. Brush-tailed Phascogale (*Phascogale tapoatafa*), Sugar Glider (*Petaurus breviceps*) and Barking Owl (*Ninnox connivens connivens*)) are expected to occur, although potentially at low densities.

Open Grasslands and Pasturelands

Large sections of the project area have been cleared of remnant vegetation, and are dominated by exotic flora species, predominantly pasture grasses. Due to their highly modified nature, exotic grassland provides few resources for native fauna and therefore this habitat contains relatively few species. Species which commonly utilise introduced habitats of this nature include open ranging species (e.g. Grey Kangaroo *Macropus giganteus*), ground-foraging birds (e.g. Australian Magpie *Gymnorhina tibicen*, Ravens and Corellas), and some birds of prey (e.g. Brown Falcon *Falco berigora*). With the lack of suitable cover, exotic grasslands generally provide poor habitat for smaller birds and smaller native mammals that rely on sheltering vegetative cover, and reptiles and frogs.

Riparian Zones

Riparian zones occur along waterways throughout the project area including (but not limited to) the Goulburn River, Pranjip Creek, Hughes Creek and Eight Mile Creek, and Four Mile Creek. Riparian zones support important habitat types not found elsewhere in the landscape while providing essential biodiversity movement corridors. Riparian vegetation is also critical for supporting aquatic ecosystems by providing woody habitat, shade, stable banks, and by filtering out sediments and processing nutrients.

The riparian zones within the project area had been subject to varying degrees of previous disturbance, though still provide important biodiversity values (e.g. specific native vegetation types and biodiversity movement corridors) within the already fragmented landscape of the surrounding regions. Mooroopna Station has been subject to previous rail-related disturbance and provides substantial opportunity for habitat use by arboreal mammals, suggested by historic presence records of threatened arboreal mammal species.

Some of the vegetation types present in riparian zones of the project area included EVC 18 Riparian Forest, EVC 56 Floodplain Riparian Woodland, and EVC 295 Riverine Grassy Woodland. Some of the native vegetation associated with riparian zones also supported large concentrations of hollow-bearing trees, such as the vegetation surrounding the Goulburn River railway intersections, both south of Toolamba Station, and adjacent to Mooroopna Station (Appendix B, Native Vegetation Mapping, map book pages 28 and 31, respectively).

Habitats provided by the riparian zone of the project area are utilised by fauna species, including ground-dwelling and arboreal mammals, including various kangaroos and wallabies, wombats and echidnas, various gliders (e.g. the threatened Squirrel Glider), various possums and the threatened Brush-tailed Phascogale, and bats. A vast suite of birds and owls use this habitat along with various frogs and reptiles.

Waterbodies and Waterways

A desktop analysis and reconnaissance inspection of natural waterways and irrigation channels and drains was performed in October 2018, as part of the Early Ecology Fieldwork Report (NES-AJM-NES-AWD-REP-XEV-NAP-0000164). It is noted that watercourse intersections with railways can be areas of higher rail impact and subsequent mortality (van der Ree, et. al., 2008). As such, all water courses that intersected or were adjacent to the rail line were assessed on a case-by-case basis (Appendix K).

Aquatic fauna listed by the EPBC and/or FFG Acts and which had suitable habitat present within the project area were assumed to be present in larger waterways (including the Goulburn and Broken Rivers and the East Goulburn Main Channel). The presence of such species was also presumed in smaller tributaries that have had substantial prior aquatic surveys performed (such as Hughes Creek).

Reconnaissance surveys found the majority of tributary waterways and irrigation infrastructure that crossed the project area were dry at the time of inspection and thus further targeted aquatic surveys were not required. In these cases it is recommended that signalling and civil and track works be completed during seasons where these waterways are dry.

Rail structures

Rail structures can provide valuable fauna habitat in a disturbed rail corridor environment and where the rail line imposes a barrier to passage from one area of habitat to another. Rail structure habitat can include bridges, culverts, station buildings and associated infrastructure, and manmade drainage areas. Bridges and culverts can provide barrier-minimising breaks in the continuity of the rail line, which pose opportunities for fauna to cross the railway, which, depending on the mobility, agility, and body size of the fauna (e.g. turtles, small mammals and amphibians), may not be possible across continuous lengths of rail (Santos, et. al., 2017).

Bridges, and culverts are known to provide habitat for bats and colonial nesting birds, such as Welcome Swallows (*Hirundo neoxena*) and Fairy Martins (*Petrochelidon ariel*) found in these habitats in the project area. Larger fauna are also known to use rail bridges and culverts for passage below the rail line, including native mammals (e.g. kangaroos, wallabies, possums, and gliders) and exotic species (e.g. predatory foxes, cats, and dogs). Threatened species have also been shown to successfully utilise bridges and culverts, such as the threatened Brush-tailed Phascogale (van der Ree et al., 2008).

Drainage features intentionally or unintentionally created in the rail environment provide habitat for a variety of species, particularly amphibians and reptiles. Water-retaining features (e.g. drainage detention ponds) can provide habitat for water-associating birds, such as various ducks and Pelicans (*Pelicanus conspicillatus*) identified using the project area, amphibians and reptiles. Other fauna are drawn to drinking water resources, such as bats and larger mammals.

Habitat Connectivity and Fauna Movement

Wildlife corridors are habitats that provide connectivity and dispersal routes for species to move between areas of habitat. Corridors can, and often do, constitute valuable habitat in their own right. Vegetation areas retained within rail corridors often function as important wildlife corridors. Wildlife corridors prevent demographic changes occurring in fauna populations, by aiding gene flow, and preventing prolonged isolation from other populations of the same species. Where this connectivity is impacted by railway development, by way of barriers to dispersal and/or the rail-effect zone (which includes the area over which ecological effects of rail and its traffic extend into the adjacent landscape (van der Ree et al., 2008), biodiversity movement may be impacted.

The Goulburn River that crosses the project area and is present alongside some of the project area is a vital habitat corridor in an otherwise cleared agricultural landscape. The rail corridor supplements this and retains a connection to some otherwise isolated patches of remnant vegetation across the landscape. Of particular importance is the retention of large hollow bearing trees within these corridors. These corridors are important habitat for hollow-dependent species such as the Brush-tailed Phascogale, possums, gliders and owls, due to the past clearing of larger remnant patches of woodland and forest for agriculture throughout the majority of the region.

Appendix J

Geomorphology

Appendix J - Geomorphology

Physiography and Landforms

The project area includes a number of railway sections between Donnybrook and Seymour and continuous stretch of railway between Seymour and Shepparton. The sections of railway between Donnybrook and Seymour traverse the Volcanic Plains closer to Melbourne then transitioning into dissected upland and valleys further north. The waterways crossed in this section are relatively benign, typically comprising drainage depressions that lack a clearly defined channel. The Seymour to Shepparton railway alignment extends in a north south direction, traversing the flatter areas of the Goulburn Valley. These flatter areas are typically referred to as being part of the Riverine Plain Land System, and consist of flat plains sloping towards the north-west (Butler, Blackburn et al. 1973). The landforms that comprise these plains are largely fluvial in origin. Erosion and deposition from earlier streams have given the Plain its general form (Butler, Blackburn et al. 1973).

The major geomorphological feature within the Goulburn Valley, is the Goulburn River itself. The River originates on the northern slopes of the Great Dividing Range and flows in a generally westerly direction, before turning northwards near Seymour and continuing to the Murray River. The floodplain of the Goulburn River occupies a trench cut into resistant clay or sandy clay: a geological formation referred to as the Shepparton Formation. This trench was cut by streams that were larger, and carried a coarser load, than the modern Goulburn River (Erskine, Rutherfurd et al. 1993).

The Goulburn River is an anabranching channel system, and as such over geological time-scales the river abandons one section on floodplain to occupy another. Where the river abandons several meander loops that change in course is known as an avulsion, and this is a common process in Victorian Rivers (Erskine, Rutherfurd et al. 1993). The river may also shift its position as a result of ongoing processes of bank erosion and channel migration. The current condition and stability of the Goulburn River channel and floodplain is linked to its longer geological history, but also more recent changes that have occurred in the historical past (such as land clearing, flow regulation and floodplain mining).

The project area crosses the Goulburn River channel and floodplain environments at three locations: Seymour, Toolamba, and Mooroopna. The project area also crosses the Broken River, near its confluence with the Goulburn River. The section of railway between Seymour and Toolamba traverse relict and modern streams associated with the Shepparton Formation. These areas and the streams themselves have undergone significant historical erosion and channel changes, likely to be attributed to a combination of activities including clearing, agriculture, channelisation, channel dredging, bushfires and droughts (Davis and Finlayson 2000). In some cases, excessive erosion in steeper upper catchment areas, large quantities of sediment have been released into the creeks, with this material then being deposited downstream on the lower gradient plains (Davis and Finlayson 2000). Whilst the major period of historical erosion and channel changes is likely to have passed, some of the streams may still be experiencing instabilities (incision, gullying, aggradation).

Waterway Condition

This section provides a general description of the condition of waterways along the rail alignment where works are proposed. This is broken into three sections that reflect the range of waterways traversed by the rail alignment:

1. Major named waterways: Goulburn and Broken River channel and floodplain;

2. Minor named waterways: Merri Creek and larger tributaries of the Goulburn River

3. Minor unnamed waterways: smaller tributaries and drainage channels.

Major Named Waterways – Goulburn and Broken River Channel and Floodplain

The geomorphological characteristics and form of the Goulburn River and its floodplain are highly valued. The Goulburn River between Lake Eildon and the Murray River is listed as a Heritage River in Victoria for its significant nature conservation, recreation, scenic and cultural heritage attributes (*Heritage Rivers Act 1992*). Attributes of the Goulburn River as identified by the *Heritage River Act 1992* are to be protected.

The project area traverses the Goulburn River channel and floodplain at three locations, Seymour, Toolamba and Mooroopna. The river at these locations has an anabranching channel form, that has the potential to dynamically change its course in response to floods - the duration and extent of flooding and its impacts on the river and floodplain vary considerably with each flood. A summary of the condition of the river channel and floodplain at these locations is documented in table J.1.

The floodplain at Seymour within the vicinity of the Goulburn River railway bridge has been identified as an area of high risk of channel avulsion, as a result of the presence of a large extraction pit at this location (Jacobs and Moroka 2014, Jacobs and Moroka 2015, Judd 2016). Extreme consequences would occur if, during flooding, the Goulburn River leaves its channel and creates a new channel into or through the pit. The impacts of pit capture may extend upstream and result in the severing of the railway lines that cross the river. Any services that are attached to the railway bridges or traverse the floodplain in the area impacted would also be damaged or destroyed (i.e. electricity, telecommunications, water, gas, sewer) (Jacobs and Moroka 2014, Jacobs and Moroka 2015, Judd 2016).

The project area also crosses the Broken River and floodplain near its confluence with the Goulburn River. The Broken River at this location has a meandering channel form. Similarly, to the Goulburn River, the condition of the channel and floodplain may change in response to floods. Also, while not classified as natural waterway, it is also noted that the project area crosses the East Goulburn Main Channel.

TABLE J.1: CONDITION OF GOULBURN RIVER CHANNEL AND FLOODPLAIN

WATERCOURSE, LOCALITY	GENERAL CHARACTERISTICS OF CHANNEL AND FLOODPLAIN
Goulburn River floodplain and channel south of Seymour Railway Station	Anabranching channel form with flow confined to a single meandering channel during low to moderate flood events. Large floods breakout and follow flow paths distributed across the floodplain. Avulsion of the river into and through the extraction pit, subsequent erosion and damages to the railway has been identified as a critical risk at this location.
Goulburn River floodplain and channel south of Toolamba	Anabranching channel form with flow confined to a single meandering channel during low to moderate flood events. Large floods breakout and follow flow paths distributed across the floodplain.
Goulburn River floodplain and channel adjacent to Mooroopna Railway Station	Anabranching channel form with flow confined to a single meandering channel during low to moderate flood events. Large floods breakout and follow flow paths distributed across the floodplain.
Broken River west of Shepperton	Meandering channel form, relatively steep banks confine low to moderate flood events. Large floods breakout and distribute flow across the floodplain.

Minor Named Waterways: Merri Creek and Larger Tributaries of the Goulburn River

There are several minor named waterways traversed by the railway. A summary of the condition of these waterways is documented in Table J.2.

TABLE J.2: CONDITION OF MINOR NAMED WATERWAYS

WATERCOURSE, LOCALITY	GENERAL CHARACTERISTICS
Merri Creek, Wallan and Heathcote Junction	Ephemeral meandering creek with refuge pools along its course, extensive in-channel vegetation. Stable bed and banks.
Whiteheads Creek, Seymour	Ephemeral meandering creek, likely to have small refuge pools along its course, extensive in-channel vegetation (reeds). Stable bed and banks.
Four Mile Creek, Mangalore	Ephemeral meandering creek, dry at time of inspection (25/10/2018). Relatively flat and uniform bed, considered unlikely that water will pond along this waterway.
Eight Mile Creek, Mangalore	Ephemeral meandering creek, dry at time of inspection (25/10/2018). Flat and uniform sand/gravel bed with stable grassed/treed banks.
Hughes Creek, Avenel	Meandering creek. May contain semi-permanent pools along its course.
Pranjip Creek, Moorim	Meandering creek, wet at the time of inspection (25/10/2018). May contain semi-permanent pools along its course.

FIGURE J-1: WHITEHEADS CREEK, SEYMOUR

FIGURE J-2: PRANJIP CREEK, MOORIM

Minor Unnamed Waterways: Smaller Tributaries and Drainage Channels

The project area also traverses a series of minor unnamed waterways. These comprise small tributaries and drainage channels. The form of these waterways varies, from a drainage depression to small meandering creeks, like some of the minor named waterways documented above. Figure G-3 and Figure G-4 highlight differences in form for two unnamed waterways.

FIGURE J-3: MINOR UNNAMED WATERWAY, SEYMOUR. SMALL MEANDERING CREEK WITH OCCASIONAL SHALLOW POOLS (<0.2M DEEP).

FIGURE J-4: MINOR UNNAMED WATERWAY, MOORILM. SHALLOW DRAINAGE DEPRESSSION

Appendix K

List of Watercourses

Appendix K - List of Watercourses

TABLE K.1: LIST OF WATERCOURSES ALONG THE RAIL CORRIDOR

WATERCOURSE NAME	LOCATION (SUBURB)	SCOPE OF WORKS	WATERWAY CLASS	WATERWAY FORM	PUBLICLY ACCESSABLE	RAIL CORRIDOR / PRIVATE ACCESS	RECONNAISSANCE RECOMMENDED	ADDITIONAL COMMENTS
Unnamed watercourses	Donnybrook	Level crossing upgrades (CSR works)	Minor unnamed waterways	Drainage depressions	No	Not required	No	Not significant waterways, do not require inspection
Unnamed watercourse	Wallan	Level crossing upgrades (CSR works)	Minor unnamed waterway	Drainage depression/drain	Yes	Not required	No	Not a significant waterway, does not require inspection. Public access is possible from Station Street (off Wallan-Whittlesea Road)
Unnamed watercourse	Wallan	Level crossing upgrades (CSR works)	Minor unnamed waterway	Drainage depression/drain	No	Not required	No	Not a significant waterway, does not require inspection
Merri Creek	Wallan	Level crossing upgrades (CSR works)	Minor named waterway	Drainage depression	Yes	Not required	No	Not a significant waterway, does not require inspection. Public access is possible from Epping-Kilmore Road (western

WATERCOURSE NAME	LOCATION (SUBURB)	SCOPE OF WORKS	WATERWAY CLASS	WATERWAY FORM	PUBLICLY ACCESSABLE	RAIL CORRIDOR / PRIVATE ACCESS	RECONNAISSANCE RECOMMENDED	ADDITIONAL COMMENTS
								side of rail corridor)
Four unnamed watercourses	Heathcote Junction	Level crossing upgrades (CSR works)	Minor unnamed waterways	Drainage depressions	No	Not required	No	Not significant waterways, do not require inspection
	Heathcote Junction	Level crossing upgrades (CSR works)	Minor named waterway	Drainage depression	No	Not required	No	Not a significant waterway, does not require inspection.
Two unnamed watercourses	Heathcote Junction	Level crossing upgrades (CSR works)	Minor unnamed waterways	Drainage depressions	Yes	Not required	No	Not significant waterways, do not require inspection. Public access is possible from Rail Street.
Eight unnamed watercourses	Sunday Creek	Level crossing upgrades (CSR works)	Minor unnamed waterways	Drainage depressions	Yes	Not required	No	Not significant waterways, deso not require inspection. Public access is possible from Dry Creek Road.
Five unnamed watercourses	Tullarook	Level crossing upgrades (CSR works)	Minor unnamed waterways	Drainage depressions	Yes	Not required	No	Not significant waterways, does not require inspection. Public access is possible off Dockereys Road and track that

WATERCOURSE NAME	LOCATION (SUBURB)	SCOPE OF WORKS	WATERWAY CLASS	WATERWAY FORM	PUBLICLY ACCESSABLE	RAIL CORRIDOR / PRIVATE ACCESS	RECONNAISSANCE RECOMMENDED	ADDITIONAL COMMENTS
								runs along but outside of rail corridor on western side.
Four unnamed watercourses	Hilldene	Level crossing upgrades (CSR works)	Minor unnamed waterways	Drainage depressions	No	Not required	No	Not significant waterways, do not require inspection.
Goulburn River (Palaeochannel/floodrunner)	Hilldene	Level crossing upgrades (CSR works)	Major named waterway	Palaeochannel/flood runner	No	Not required	No	Inspection not required. Can bring prior understanding from other projects and literature to assessment of the river and floodplain at this location.
Goulburn River	Seymour	Level crossing upgrades (CSR works)	Major named waterway	Anabranching channel	No	Not required	No	Inspection not required. Can bring prior understanding from other projects and literature to assessment of the river and floodplain at this location.
Goulburn River (Palaeochannel/floodrunner)	Seymour	Level crossing	Major named waterway	Palaeochannel/flood runner	No	Not required	No	Inspection not required. Can

WATERCOURSE NAME	LOCATION (SUBURB)	SCOPE OF WORKS	WATERWAY CLASS	WATERWAY FORM	PUBLICLY ACCESSABLE	RAIL CORRIDOR / PRIVATE ACCESS	RECONNAISSANCE RECOMMENDED	ADDITIONAL COMMENTS
		upgrades (CSR works)						bring prior understanding from other projects and literature to assessment of the river and floodplain at this location. Not possible to assess in the field on the 25/10/2018 (not visable from Eliza Street)
Whiteheads Creek	Seymour	Level crossing upgrades (CSR works)	Minor named waterway	Meandering channel	Yes	Not required	Yes (Completed)	Assessable from Oak Street/Tarcombe Road (southern side of Rail Corridor). Assessed 25/10/2018. Ephemeral meandering reedy creek, potentially small localised refuge pools, stable banks, considered unlikely that

WATERCOURSE NAME	LOCATION (SUBURB)	SCOPE OF WORKS	WATERWAY CLASS	WATERWAY FORM	PUBLICLY ACCESSABLE	RAIL CORRIDOR / PRIVATE ACCESS	RECONNAISSANCE RECOMMENDED	ADDITIONAL COMMENTS
								aquatic survey is required.
Unnamed Watercourse	Seymour	Level crossing upgrades (CSR works)	Minor unnamed waterway	Drainage depression	No	Not required	No	Not a significant waterway, does not require inspection.
Unnamed Watercourse	Seymour	Level crossing upgrades (CSR works)	Minor unnamed waterway	Drainage depression	No	Not required	No	Not a significant waterway, does not require inspection.
Unnamed Watercourse	Seymour	Level crossing upgrades (CSR works)	Minor unnamed waterway	Meandering channel	Yes	Not required	Yes (Completed)	Assessable from Old Hume Highway (eastern side of Rail Corridor). Assessed 25/10/2018. Ephemeral meandering channel (2-3m wide), occasional small shallow pools (<0.2m deep, up to 5 m in length). Well wooded.
Four Mile Creek and two unnamed watercourses (tributaries)	Mangalore	Level crossing upgrades (CSR works)	Minor named and unnamed waterways	Meandering channel	Yes	Not required	Yes (Completed)	Assessable from Old Hume Highway (eastern side of Rail Corridor).

WATERCOURSE NAME	LOCATION (SUBURB)	SCOPE OF WORKS	WATERWAY CLASS	WATERWAY FORM	PUBLICLY ACCESSABLE	RAIL CORRIDOR / PRIVATE ACCESS	RECONNAISSANCE RECOMMENDED	ADDITIONAL COMMENTS
								Assessed Four Mile Creek on 25/10/2018 - ephemeral waterway, no evidence of pools but expected that these could form after rain (shallow).
Unnamed Watercourses	Mangalore	Level crossing upgrades (CSR works)	Minor unnamed waterway	Drainage depression	Yes	Not required	No	Not significant waterways, do not require inspection.
Unnamed Watercourse	Mangalore	Level crossing upgrades (CSR works)	Minor unnamed waterway	Drainage depression	Yes	Not required	No	Not a significant waterway, does not require inspection.
Eight Mile Creek	Mangalore	Level crossing upgrades (CSR works)	Minor named waterway	Meandering channel	Yes	Not required	Yes (Completed)	Accessible from Station Road (off Old Hume Hwy). Assessed 25/10/2018. Ephemeral creek, flat and uniform sand/gravel bed, appears to have been impacted by sediment slugs.

WATERCOURSE NAME	LOCATION (SUBURB)	SCOPE OF WORKS	WATERWAY CLASS	WATERWAY FORM	PUBLICLY ACCESSABLE	RAIL CORRIDOR / PRIVATE ACCESS	RECONNAISSANCE RECOMMENDED	ADDITIONAL COMMENTS
Two unnamed Watercourses	Mangalore	Level crossing upgrades (CSR works)	Minor unnamed waterway	Drainage depressions	No	Not required	No	Not significant waterways, do not require inspection.
Hughes Creek	Tabilk	Level crossing upgrades (CSR works)	Minor named waterway	Meandering channel	No	Not required	No	Presence assumed
East Goulburn Main Channel	Wahring	Level crossing upgrades (CSR works)	Named Watercourse (Not a natural waterway)	Irrigation Channel	Yes	Not required	No	Accessible from Deanes Road
Unnamed Watercourse	Moorilm	Level crossing upgrades (CSR works)	Minor unnamed waterway	Meandering channel	Yes	Not required	Yes (Completed)	Accessible from Donegans Road (north of Railway Corridor). Assesed 25/10/2018. Appearance of floodrunner (billabong/chain of ponds), some ponding of water noted.
Pranjip Creek	Moorilm	Level crossing upgrades (CSR works)	Minor named waterway	Meandering channel	No	Yes	Yes (Completed)	Aquatic survey completed 29/01/2019
Gouburn River	Toolamba	Level crossing	Major named waterway	Anabranching channel	No	Not required	No	Presence assumed

WATERCOURSE NAME	LOCATION (SUBURB)	SCOPE OF WORKS	WATERWAY CLASS	WATERWAY FORM	PUBLICLY ACCESSABLE	RAIL CORRIDOR / PRIVATE ACCESS	RECONNAISSANCE RECOMMENDED	ADDITIONAL COMMENTS
		upgrades (CSR works)						
Goulburn River	Moroopna	Level crossing upgrades (CSR works)	Major named waterway	Anabranching channel	Maybe	Not required	No	Presence assumed
Broken River	Shepparton	Level crossing upgrades (CSR works)	Major named waterway	Meandering channel	Yes	Not required	Yes (Completed)	Access from Pedestrian Path off Lincoln Drive

Appendix L

EVC Descriptions

Appendix L - Descriptions of EVCs Identified Within the Project Area:

EVC 18: Riparian Forest

Riparian Forest only occurred within the CVU bioregion to the north of Wandong in association with Dry Creek. The vegetation quality of this Riparian Forest achieved an average assessment score of 53 (i.e. 53/75), indicating the Riparian Forest vegetation assessed was of moderate to high quality with a minimal weed incursion.

The canopy strata was dominated by *Eucalyptus ovata* (Swamp Gum) and *E. viminalis* (Manna Gum). The sub-canopy and mid-stratum was dominated by *Acacia dealbata* (Silver Wattle), *A. mearnsii* (Black Wattle), and *Cassinia arculeata* (Common Cassinia), while the ground stratum included *Bossiaea prostrata* (Creeping Bossiaea), *Lomandra filiformis* (Wattle Mat-rush), *Poa labilliaderi* (River Tussock), various *Rytidosperma* spp. (Wallaby Grasses) and *Microlaena stipoides* (Weeping Grass).

A low to moderate weed cover was present, including *Anthoxanthum odoratum* (Sweet Vernal Grass), *Hypericum perforatum* (St Johns Wart), *Sonchus oleraceus* (Milk Thistle) and *Dactylis glomerata* (Cocksfoot), and noxious weeds *Ulex ulicifolia* (Gorse), and *Cirsium vulgare* (Spear Thistle).

This EVC is not considered to be synonymous with any listed EPBC and FFG threatened community and hence no additional protections are applied to this native vegetation, as relevant to the project.

FIGURE L-1: (A) AND (B) RIPARIAN FOREST (EVC 18) NORTH OF WANDONG

EVC 23: Herb-rich Foothill Forest

Herb-rich Foothill Forest only occurred within the CVU bioregion in the area between Heathcote Junction and Wandong, mostly on the eastern side of the rail corridor. The vegetation quality of this Herb-rich Foothills Forest attained similar Habitat Scores, with an average Habitat Score of 40 (i.e. 40/75), indicating the quality was relatively low compared to an undisturbed pristine remnant.

The vegetation assemblage generally featured a canopy strata dominated by Swamp Gum with *E. cephalocarpa* (Mealy Stringybark) occurring in some areas. The mid-strata was dominated by *Acacia melanoxylon* (Blackwood) and *A. dealbata* (Silver Wattle) with a ground layer dominated by *Pteridum esculentum* (Austral Braken) and *Rhytidosperma* spp. (Wallaby Grasses) with *Juncus* spp (Spike Rushes) occurring in damp areas.

Exotic species were present, including scattered mature *Pinus radiata* (Radiata Pine) and a dense infestation of the noxious weed *Rubus fruticosis* L agg.(Blackberry).

This EVC is not considered to be synonymous with any listed EPBC and FFG threatened community and hence no additional protections are applied to this native vegetation, as relevant to the project.

FIGURE L-2: HERB-RICH FOOTHILL FOREST (EVC 23) WITH A CANOPY OF SWAMP GUM AND DENSE INFESTATION OF BLACKBERRY

EVC 47: Valley Grassy Forest

Valley Grassy Forest was distributed across three modelled bioregions, including the VVP, the CVU, and Highlands Northern-Fall as these bioregions mixed between Wallan and Seymour. However, the gently undulating landscape where Valley Grassy Forest occurred was most representative of the CVU bioregion. As such, the patches have been assessed against the benchmark characteristics of the CVU bioregion. The range of Habitat Scores for the Valley Grassy Forest identified within the project area varied between 21/75 and 61/75, with the majority of patches scoring below 40/75, indicating relatively low to moderate quality due to previous disturbance and weed incursion.

The vegetation assemblage of the Valley Grassy Forest generally featured a canopy strata of *Eucalyptus melliodora* (Yellow Box), and *E. radiata* (Narrow-leaf Peppermint), with occurrences of *E. microcarpa* (Grey Box), and *E. camaldulensis* (River Red Gum). The midstorey included shrubs of Silver Wattle, *Cassinia aculeata* (Common Cassinia), *Acacia pycnantha* (Golden Wattle), and *A. acinacea s.l.* (Gold-dust Wattle). Occasional clusters of *Xanthorrhoea australis* (Austral Grasstree) were detected within this EVC in Habitat Zone LG27a (Appendix B, Map book page 20). The ground stratum included herbs and graminoids of *Gonocarpus tetragynus* (Common Raspwort), *Dianella revoluta* (Black-anthered Flax-lily), and *D. longifolia* (Pale Flax-lily) with *Austrostipa scabra* (Rough Spear-grass), *Themeda triandra* (Kangaroo Grass), and various Wallaby Grasses.

Common weed incursions included species such as *Phalaris aquatica* (Toowoomba Canary Grass), *Dactylis glomerata* (Cocksfoot), *Briza minor* (Lesser Quaking Grass) and *B. maxima* (Large Quaking Grass), *Paspalum dilatum* (Paspalum), *Hypochaeris radicata* (Cat's-ear). Declared noxious weeds included *Genista monspessulana* (Montpellier Broom), *Rosa rubiginosa* (Sweet Briar), and *Hypericum perforatum* (St John's Wort).

This EVC is not considered to be synonymous with any listed EPBC and FFG threatened community and hence no additional protections are applied to this native vegetation, as relevant to the project.

FIGURE L-3: VALLEY GRASSY FOREST (EVC 47) SOUTH OF BROADFORD

EVC 53: Swamp Scrub

Swamp Scrub was mapped only in the VVP bioregion, occurring as five small patches within the Wallan Station area. The vegetation was fairly disturbed with only a few life forms present, but a low weed incursion led to an average Habitat Score of 54 (54/75).

These patches consisted of a mature *M. ericifolia* (Swamp Paperbark) shrub layer over an understorey consisting of *L. longifolia* (Pale Flax-lily) and *Juncus spp*. (Spike Rushes). This EVC is not considered to be synonymous with any listed EPBC and FFG threatened community and hence no additional protections are applied to this native vegetation, as relevant to the project.

FIGURE L-4: SWAMP SCRUB (EVC 53) AT WALLAN STATION

EVC 55: Plains Grassy Woodland

This EVC occurred across all bioregions of the project area. The EVC is an open eucalypt woodland to 15 m tall that occurs on various geologies and soil types with a generally sparse shrub layer and a species-rich grassy and herbaceous ground stratum. In the VR and VVPs bioregions, the Plains Grassy Woodland EVC includes two sub-classes: EVC 55_61 Plains Grassy Woodland, and EVC 55_62 *Riverina* Plains Grassy Woodland (syn. EVC 803 Plains Woodland). The difference being largely hydrology based; the EVC 55_62 *Riverina* Plains Grassy Woodland receives <600mm annual rainfall and typically occupies damp or poorly draining substrates. The EVC 55_61 Plains Grassy Woodland typically receives >600mm rainfall.

Of the 336 patches of Plains Grassy Woodland mapped across the project area, most were found to be degraded with an average overall Habitat Score of 37(37/75). Patches within the CVU were found to be of highest quality, though still of moderate condition (average Habitat Score of 48/75), followed by the VR (average Habitat Score of 37/75) and the relatively low quality disturbed patches in the VVP (average Habitat Score of 22/75). Where the condition of this EVC is high, the vegetation assemblage has the potential to be synonymous with the EPBC Act Grey Box Grassy Woodland Endangered Ecological Community.

The most extensive patch of this EVC occurs south of Mangalore. The canopy of this patch was dominated by Grey Box with Yellow Box and River Red Gum. The understorey was dominated by Golden Wattle, *Acacia paradoxa* (Hedge Wattle), *A. implexa* (Lightwood), Common Cassinia, and

Eutaxia microphylla (Common Eutaxia). The ground stratum featured a diverse understorey of graminoids and herbs including *Lomandra filiformus* subsp. *coriacea* (Wattle Mat-rush), various Wallaby Grasses, *Austrostipa mollis* (Supple Spear-grass), *A. scabra* (Rough Spear-grass), *Bothriochloa macra* (Red-leg Grass), and *Anthrosachne scaber* (Common Wheat-grass), *Vittadinia cuneata* subsp. *cuneata* (New Holland Daisy), *Xerochrysum viscosum* (Sticky Everlasting), and *Calocephalus citreus* (Lemon Beautyheads). This particular patch was found to be of a high enough quality to satisfy condition thresholds prescribed of the EPBC Act Endangered Ecological Community, Grey Box Grassy Woodland. The FFG Act Listed species, *Dianella tarda* (Late-flowering Flax-lily), was found in this patch (common within the investigation area). An unidentified *Diuris* species was identified in this location to the east of Mangalore Station. The two individuals present were not adequately flowering to enable identification to a species level, though it is expected the species was not one of the protected species due to the geographic distribution and habitat requirements of the protected species. Of note, this particularly patch of Plains Grassy Woodland included many large hollow-bearing trees, which are important habitat resources for threatened fauna.

Weeds present in this EVC generally included Cocksfoot, Toowoomba Canary Grass, Wild Oat, *Schinus molle* (Peppercorn) and Radiata Pine trees, and Paspalum. Noxious weeds included Blackberry and Spear Thistle.

Many patches of this EVC satisfied the condition thresholds of the EPBC Act Grey Box Grassy Woodland Endangered Ecological Community (mapped in Appendix B)

FIGURE L-5: PLAINS GRASSY WOODLAND (EVC 55) SOUTH OF MANGALORE

EVC 56: Floodplain Riparian Woodland

Floodplain Riparian Woodland occurred in the VR and Central Victorian Upland bioregions. The largest extent of this EVC (1.9 ha) was mapped closely to the south of Seymour in association with the periodically inundated DELWP Current Wetland no. 60906 which is a paleochannel previously linked with the Goulburn River. In this location, the canopy vegetation was dominated by River Red Gum with Grey Box. The mid-storey was lacking much of the ideal herb diversity and the grassy ground stratum included a high level of organic litter. Species of the mid and ground strata included Common Cassinia, various Wattles, Kangaroo Grass, Wattle Mat-rush, Black-anther Flax-lily, *Attriplex* sp. (Saltbush), and various Wallaby Grasses and Spear-grasses.

Weed species typically present in this EVC included *Avena fatua* (Wild Oat), Large Quaking Grass, *Acacia baileyana* (Cootamundra Wattle), Toowoomba Canary Grass, *Watsonia meriana* (Bulbil Watsonia), and *Olea europaea* (Common Olive). Declared noxious weeds included Sweet Briar, Blackberry, Box Thorn, and Montpellier Broom.

This EVC is not considered to be synonymous with an EPBC Act and FFG Act threatened community and hence no additional protections are applied to this native vegetation, as relevant to the project.

FIGURE L-6: FLOODPLAIN RIPARIAN WOODLAND (EVC 56) PRESENT SOUTH OF SEYMOUR

EVC 61: Box Ironbark Forest

Box Ironbark Forest occurred between Seymour and Mangalore in both the Central Victorian Upland and the VR bioregions, with the largest area (23 ha) occurring within the wide part of the project investigation area just north of Seymour. This patch was identified to be of relatively high quality (Habitat Score of 71/75) and satisfied the condition thresholds of the EPBC Act Grey Box Grassy Woodland Endangered Ecological Community.

The general assemblage of this EVC as it was observed included Grey Box with *Eucalyptus leucoxylon* (Yellow Gum), and Red Box. The mid-storey was variable, depending on landscape positioning, and generally included Common Cassinia, various Wattles, Common Raspwort, *Dillwynia* sp. (Parrot Pea), and *Pimelea curvula*. The ground stratum included graminoids and herbs of various Wallaby Grasses, Kangaroo Grass, Common Wheat-grass, *Bulbine bulbosa* (Bulbine Lily), *Chrysocephalum apiculatum* (Common Everlasting), *Dianella longifolia* (Pale Flax-lily), Black-anther Flax-lily.

Weed species typically found in this EVC included Large Quaking Grass, Wild Oat, *Lolium perenne* (Perennial Rye Grass). Declared noxious weeds identified in this EVC included *Asparagus asparagoides* (Bridal Creeper) and *Optunia stricta* (Prickly Pear).

Multiple patches of the EVC satisfied the thresholds of the EPBC Act Grey Box Grassy Woodland Endangered Ecological Community, these are mapped in Appendix B.

FIGURE L-7: BOX IRONBARK FOREST (EVC 61) NORTH OF SEYMOUR

EVC 68: Creekline Grassy Woodland

EVC 68 Creekline Grassy Woodland occurred broadly across the project area in the VR and the CVU bioregions. This vegetation type typically occurs alongside creeks and adjacent floodplains with a mature canopy. The typical assemblage of this EVC includes a canopy dominated by River Red Gum and a sparse understorey with the occasional Silver Wattle. Mid and ground strata features a high diversity of grasses and herbs including *Carex spp*. (Sedges), *Glyceria spp*. (Sweet Grass), *Poa labillardieri* (Common Tussock-grass), Weeping Grass and Wallaby grasses.

Weed species typically found in this EVC included *Dactylis glomerata* (Cocksfoot), *Hypericum perforatum* (St Johns Wart) and *Herea spp.* (Ivy). Declared noxious weeds identified in this EVC included Sweet Briar and Montpellier Broom,

Where this EVC has been identified at Eight Mile Creek and Pranjip Creek it qualifies as the FFG Act listed Threatened Community Creekline Grassy Woodland (Goldfields).

FIGURE L-8: CREEKLINE GRASSY WOODLAND (EVC 68) AT PRANJIP CREEK

EVC 83: Swampy Riparian Woodland

Swampy Riparian Woodland occurred extensively in the more southern areas of the project investigation in the VVP and the CVU bioregions. The vegetation type occurs across a large floodplain in the Wallan area which likely experiences seasonal inundation from the adjacent Merri Creek. The range of Habitat Scores for the Swampy Riparian Woodland identified within the project area varied between 20/75 and 56/75, with the majority of patches scoring below 25/75, indicating low quality due to previous disturbance and weed incursion. The typical assemblage of this EVC includes a canopy of Swamp Gum (*Eucalyptus ovata*) and understorey of scattered *Acacia melanoxylon* (Blackwood) and *Acacia mearnsii* (Black Wattle). The ground strata is dominated by sedges (*Carex spp*.), spike rushes (*Juncus spp.*), Wallaby and Spear grasses and other herbs including Hypoxis and Bidgee-widgee (*A. novae-zelandiae*). The EPBC Act listed species, Matted Flax-lily (*Dianella amoena*) was recorded in patches of Swampy Riparian Woodland south of Wallan, these areas have been designated as No-Go Zones.

Weed species typically found in this EVC included Toowoomba Canary Grass, Cocksfoot and Wild Oat. Declared noxious weeds identified include Gorse, Spear Thistle and Blackberry.

This EVC is not considered to be synonymous with any listed EPBC and FFG threatened community and hence no additional protections are applied to this native vegetation, as relevant to the project. However, EPBC Act listed flora species identified in this EVC require relevant consideration and protection under the Act.

FIGURE L-9: SWAMPY RIPARIAN WOODLAND AT WALLAN STATION

EVC 125: Plains Grassy Wetland

Plains Grassy Wetland occurred as both remnant wetlands and in cess drains and other water-collecting railside swales and depressions associated with the adjacent rail infrastructure. The EVC was identified in both the VVP and VR bioregions. Remnant wetland areas contained typically higher quality patches with a greater proportion of native species cover, and more diverse species assemblages. Lower quality artificially created patches were typically dominated by Australian Sweet-grass (*Glyceria australis*), with limited diversity of other native species (e.g. rushes *Juncus* spp) and often highly invaded by exotic species such as Toowoomba Canary-grass (*Phalaris aquatica*). Common Reed (*Phragmites* australis) was also found to dominate lower quality patches.

The range of Habitat Scores for the Plains Grassy Wetland identified within the project area varied between 28/75 and 67/75 with an average Habitat Score of 37/75. Where the condition of this EVC is high, the vegetation assemblage has the potential to be synonymous with the EPBC Act Seasonal Herbaceous Wetland Critically Endangered Ecological Community.

The highest quality patches of Plains Grassy Wetland occurred north of Toolamba and south of Wallan. The highest quality examples of these patches were designated as EPBC Act Seasonal Herbaceous Wetland and are No-Go Zones. These patches were characterised by an abundance and diversity of graminoids and herbs including Common Spike Sedge (*Eleocharis acuta*), Common Swamp Wallaby Grass (*Amphibromus nervosus*), Cotton Fireweed (*Senecio quadridentatus*), Blue Devil (*Eryngium ovinum*), Milky Beauty-heads (*Calocephalus lacteus*), River Buttercup (*Ranunculus inundates*) and Swampweed (*Selliera radicans*). Shallower areas on the wetland fringe were characterised by smaller herbs including Upright Water-milfoil (*Myriophyllum crispatum*) and Water Ribbons (*Cycnogeton spp*). A large population of the EPBC Act listed species, Swamp Everlasting (*Xerochrysum palustre*) was recorded south of Wallan (within a No-Go Zone area), which indicates the high quality of this Plains Grassy Wetland patch.

Weed species typically found in this EVC included Toowoomba Canary Grass, Briar Rose and Water Couch (*Paspalidium distichum*). Declared noxious weeds identified include Blackberry and Gorse.

FIGURE L-10: PLAINS GRASSY WETLAND (EVC 125) WITH THREATENED SWAMP EVERLASTING AND PALE SWAMP EVERLASTING PRESENT

EVC 127: Valley Heathy Forest

Valley Heathy Forest was only present in the CVU bioregion, where it existed on undulating areas of the landscape within the rail corridor usually associated with drier soils. The Habitat Scores for the Valley Heathy Forest identified within the project area ranged between 27/75 and 59/75, with an average Habitat Score of 42/75, indicating this vegetation type was typically less disturbed than others within the project area. The higher quality patches were typically

The vegetation assemblage of the Valley Heathy Forest generally featured a canopy strata of *Eucalyptus cephalocarpa* (Silver-leaf Stringybark), with an understorey of *Acacia spp*. including Silver Wattle, Blackwood and Hedge Wattle as well as Common Cassinia (*Cassinia aculeata*). The ground stratum included Parrot Pea (*Dilwynia spp*.), Clustered Everlasting (*C. semipapposum*), Black-anther Flax-lily, Wattle Mat-rush, multiple Wallaby grasses and the Common Tusock-grass and climber Purple Coral-pea (*Hardenbergia violacea*).

Weed species typically found in this EVC included Radiata pine, Wild Oat, English Broom (*Cyrtostylis reniformis*) and Sweet Vernal-grass (*Anthoxanthum odoratum*).

This EVC is not considered to be synonymous with any listed EPBC and FFG threatened community and hence no additional protections are applied to this native vegetation, as relevant to the project..

FIGURE L-11: VALLEY HEATHY FOREST (EVC 127) NEAR HEATHCOTE JUNCTION

EVC 132: Plains Grassland

Plains Grassland was formerly widespread across the VVP and VR bioregions and would have included extensive areas along the rail corridor. Now this EVC is almost entirely been degraded and absent from the project investigation area apart from two zones located in the VR and CVU bioregions, which contain a scattering of native grasses such as Kangaroo Grass (*Themeda triandra*) and Wallaby grasses amongst infestations of exotic grasses such as Toowoomba Canary Grass and Paspalum.

The Habitat Scores for Plains Grassland reach a maximum of 30/75, which indicate that this EVC has been heavily degraded due to previous disturbance and weed incursion.

Weed species typically found in this EVC included Cocksfoot, Wild Oat, Toowoomba Canary Grass and Paspalum, Declared noxious weeds include Sweet Briar and Blackberry.

No patches of this EVC satisfied the thresholds of the EPBC and FFG Acts and hence no additional protections are applied to this native vegetation, as relevant to the project.

EVC 175: Grassy Woodland

Grassy Woodland is an open eucalypt woodland to 15 m tall that occurs on various geologies and soil types with a generally sparse shrub layer and a species-rich grassy and herbaceous ground stratum. In the VR and CVU bioregions, the Grassy Woodland EVC includes two sub-classes: EVC 175_61 Grassy Woodland and EVC 175_62 Low Rises Grassy Woodland. The difference being largely hydrology

based; the EVC175_62 Low Rises Grassy Woodland occurs on more undulating hills with more depressions. The average Habitat Score for this EVC is 37/75 which indicates that most of these patches are relatively degraded and have experienced significant weed incursion. Where the condition of this EVC is high and it occurs in the VR bioregion, the vegetation assemblage has the potential to be synonymous with the EPBC Act Grey Box Grassy Woodland Endangered Ecological Community.

The typical assemblage of this EVC includes a canopy strata of a range of Eucalypt species, including Grey Box, Yellow Box, Broad-leaf Peppermint and River Red Gum. The understorey consists of a range of *Acacia spp*. such as Golden Wattle, Hedge Wattle and Silver Wattle with Common Cassinia often prevalent. Ground stratum consists of Kangaroo grass, Wallaby grasses (*Rytidosperma spp*.), Black-anther Flax-lily, Wattle Mat-rush and Clustered Everlasting.

Weed species typically found in this EVC included Wild Oat, Toowoomba Canary Grass and Plantago lanceolate. Declared noxious weeds include Blackberry and Sweet Briar.

There were six patches of EVC 175_62 Low Rises Grassy Woodland in the CVU bioregion that satisfied the thresholds of the EPBC Act Grey Box Grassy Woodland Endangered Ecological Community.

FIGURE L-12: GRASSY WOODLAND (EVC 175) NEAR TALLAROOK

EVC 292: Red Gum Swamp

Red Gum Swamp is characterised by an open woodland to 15 m tall with a diverse understorey dominated by sedgy or grassy-herbaceous aquatics and species tolerant of intermittent to seasonal inundation. It typically occurs on alluvial plains in the seasonally wet depressions of shallow drainage lines and can experience inundation for up to 6 months. In the project area Red Gum Swamp exists primarily in the VR with a single patch identified in the CVU bioregion.

The typical assemblage of this EVC within the project area included a canopy of River Red Gum (*Eucalyptus camaldulensis*) with often no significant mid-storey or typically either regenerating Red Gums. The understorey species included scattered Common Cassinia, Gold Dust Wattle, Wattle Mat-rush and Cotton Fireweed, with a ground cover of species requiring regular inundation, including *Juncus amabolis*, and *Carex tetracaulis* (Poong'ort). This EVC was well represented by high quality patches identified achieving a Habitat Score of 49/75.

Weed species typically found in this EVC included Toowoomba Canary Grass and *Ehrhart* sp. (Annual Veldt Grass).

FIGURE L-13: RED GUM SWAMP (EVC 292) NORTH OF NAGAMBIE

EVC 295: Riverine Grassy Woodland

Riverine Grassy Woodland is a River Red Gum dominated woodland with a groundlayer typically dominated by graminoids with occasional tall shrubs. In the project area, Riverine Grassy Woodland occurred within the VR bioregion. The assemblage of this EVC included a canopy dominated by River Red Gum with Yellow Box. Understorey species included Gold Dust Wattle, Common Cassinia, and Silver Wattle, with a ground stratum of various Wallaby and Spear Grasses, Wild Oat, and *Juncus* sp.

Weed species typically found in this EVC included *Romulea rosea* (Onion Grass), *Vicia sativa* (Narrow-leaf Vetch), Paspalum, and *Bromus hordeaceus* (Soft Brome). Declared noxious weeds identified included Spear Thistle.

FIGURE L-14: RIVERINE GRASSY WOODLAND (EVC 295) NEAR MOOROPNA

EVC 803: Plains Woodland

Plains woodland was one of the most abundant and wide-spread EVCs across the project area, most prevalent between Arcadia and Shepparton. The EVC typically includes an open, eucalypt woodland occurring on various geologies and soil types. It occupies fertile clays and clay loam soils on flat or gently undulating plains at low elevations in areas with <600 mm annual rainfall. The understorey typically consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer and chenopods are often present.

Where the condition of this EVC is high and occurs in the VR, CVU and the VVP bioregions, the vegetation assemblage has the potential to be synonymous with the EPBC Act Grey Box Grassy Woodland Endangered threatened ecological community. Occurrences of this community are mapped in Appendix B.

FIGURE L-15: PLAINS WOODLAND (EVC 803) NEAR ARCADIA

EVC 814: Riverine Swamp Forest

Riverine Swamp Forest is an open eucalypt forest to 25 m tall with an understorey dominated by wetland species (or opportunistic annuals during sustained dry periods) and can range from closed sedgeland or herbland to grassy-herbaceous or extremely sparse and with cover primarily leaf-litter, black water or exposed alluvium. Occupies low-lying areas subject to reasonably regular flooding, typically flood-prone lower river terraces and low-lying areas adjacent to floodways through or within riverine forest. Just one patch of this EVC occurred within the project area, just south of Avenel.

EVC 821: Tall Marsh

This EVC occurred as both remnant patches and artificial creations in culverts and cess drains. This EVC included Common Reed (*Phragmites australis*), Cumbungi (*Typha* spp.) and Flat Sedge dominated wide areas of the floodplain, with scattering of other species such as Common Water-ribbons, Swamp Dock and Common Spike-sedge. In other locations where it was artificially induced it may only include a patch of Cumbungi or Common Reed in otherwise mostly weedy areas.

FIGURE L-16: TALL MARSH (EVC 821) SOUTH OF WALLAN

Appendix M

List of DELWP Mapped Wetlands

Appendix M - List of DELWP Mapped Wetlands

TABLE M.1 MAPPED WETLANDS INTERSECTED BY THE PROJECT AREA (DELWP 2018 SPATIAL DATA)

WETLAND NUMBER	WETLAND TYPE	AQUATIC SYSTEM CONNECTIVITY	WATERING REGIME	SALINITY REGIME	AREA (HA)
60906	Unknown	N/A	Periodically inundated – seasonal or episodic	Fresh	33.675
60909	Unknown	Moderate	Periodically inundated – episodic	Fresh	6.9065
61995	Temporary freshwater marshes and meadows	Low	Periodically inundated – episodic	Fresh	15.675
62005	Temporary freshwater marshes and meadows	Low	Periodically inundated – episodic	Fresh	18.945
62006	Temporary freshwater marshes and meadows	Low	Periodically inundated – episodic	Fresh	23.170
62017	Unknown	Moderate	Periodically inundated – seasonal or episodic	Fresh	45.708
62044	Unknown	Moderate	Periodically inundated – seasonal or episodic	Fresh	52.841
62072	Temporary freshwater swamps	Low	Periodically inundated – seasonal or episodic	Fresh	24.601

Appendix N

Threatened Species Likelihood of Occurrence

Appendix N - Threatened Species Likelihood of Occurrence

TABLE N.1: LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA SPECIES PREVIOUSLY RECORDED WITHIN 5 KM OF THE PROJECT AREA (DELWP, 2018)

SPECIES	MOST RECENT RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Buloke *Allocasuarina luehmannii*	2009	**FFG** Listed **VicAdv** Endangered	Usually growing in woodland with *Eucalyptus microcarpa*, on non-calcareous soils (RBGV 2018).	**Moderate**: species may be present in areas of Plains Grassy Woodland and Plains Woodland.
River Swamp Wallaby-grass *Amphibromus fluitans*	1997	**EPBC** Vulnerable	Inhabits Plains Grassy Wetland, Riverine Swampy Woodland and Sedgy Riverine Forest. Largely confined to permanent swamps, principally along the Murray River between Wodonga and Echuca, uncommon to rare in the south (e.g. Casterton, Moe, Yarram), probably due to historic drainage of wetlands (RBGV 2018) (Department of the Environment Water Heritage and the Arts 2008).	**Low:** No historic records intersect the project area or the Central Victorian Uplands Bioregion.
Plump swamp Wallaby Grass *Amphibromus pithoogastrus*	1992	**FFG** Listed **VicAdv** Endangered	A rare species of shallow, seasonally inundated depressions (e.g. gilgais) on water-retentive clay soils supporting grasslands and grassy woodlands. Known from near Mansfield and scattered occurrences to the south and west (e.g. Yea, Heathcote, Craigieburn, Beaufort, Dunkeld, Casterton).	**Low**: Not recorded in the vicinity of the project area since the Millenium drought
Buloke Mistletoe *Amyema linophylla subsp. orientalis*	2009	**VicAdv** Vulnerable	Widespread in western Victoria but scarce due to the depletion of its main host plant, Buloke (RBGV 2018).	**Moderate:** species may be present in areas of Plains Grassy Woodland and Plains Woodland, however is dependent on its host species. No records intersect the Central Victorian Uplands Bioregion.
Jericho Wire-grass *Aristida jerichoensis var. subspinulifera*	2015	**FFG** Listed **VicAdv** Endangered	Rare species with a scattered distribution in northern Victoria. Can be found on light soils in plains woodland communities (RBGV 2018).	**Low: s**pecies may be present in plains woodland communities.
Yellow-Tongue Daisy *Brachyscome chrysoglossa*	2002	**FFG** Listed **VicAdv** Vulnerable	In Victoria occurring as far west as Jeparit and Horsham, extending eastward to Strathmerton and Ulupna Island. Commonly on clay soils subject to inundation (RBGV 2018). Species may be associated with Creekline Grassy Woodland, Floodplain Riparian Woodland, Riverine Swamp Forest and Riverine Swampy Woodland.	**Low:** one previous 2002 record ~550m north of the Dookie stabling yards in a currently cropped paddock.

SPECIES	MOST RECENT RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Mueller Daisy *Brachyscome muelleroides*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Endangered	Extremely rare, in Victoria confined to floodplains of the Murray River and its tributaries, from Tocumwal east to the Ovens River (RBGV 2018) (Lucas 2010). No records within 10km	**Low:** species may be present in areas of Floodplain Riparian Woodland and Creekline Grassy Woodland.
Water Shield *Brasenia schreberi*	2009	**FFG** Listed **VicAdv** Vulnerable	Known in recent times only from shallow lagoons of the Goulburn River and tributaries near Nagambie where they are locally common (RBGV 2018).	**Moderate:** species may be present in areas of Red Gum Swamp, Riverine Swampy Forest, Riverine Swampy Woodland and Plains Grassy Wetland.
Cut-leaf Burr-daisy *Calotis anthemoides*	1989	**FFG** Listed	Scattered north and west of Melbourne (e.g. Sunshine, Camperdown, Moyston, Dunkeld, Numurkah regions) on heavy soils prone to waterlogging, but now rather rare due to habitat depletion (RBGV 2018).	**Moderate**: species may be present in areas of Plains Woodland.
Curly Sedge *Carex tasmanica*	2009	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Uncommon, and confined to heavy and wet clayey soils, from North of Craigieburn to Heywood (RBGV 2018).	**Moderate:** species may be present around areas with heavy and wet clayey soils.
Cottony Haeckeria *Cassinia ozothamnoides*	1990	**VicAdv** Vulnerable	An uncommon pioneer species of disturbed sites in dry open-forests on poor shaly or stony soils of the north-east. Distribution previously extended to south-central Victoria around Daylesford. Occurs from 170–400 m altitude (RBGV 2018).	**Moderate:** species may be present in areas of Box Ironbark Forest.
Small Milkwort *Comesperma polygaloides*	2009	**FFG** Listed **VicAdv** Vulnerable	Occasional on heavier soils (clays, alluvium) supporting grassland and grassy woodland communities in central and south western areas (RBGV 2018). One record from 2009 approx. 1.5km east of Nagambie	**High:** species found to be present in Plains Grassy Woodland. Unlikely to occur south of the Great Dividing Range where this species has not been recorded in the vicinity of the project area since prior to the millennium drought in 1995 in the vicinity of Craigieburn.
Pale Swamp Everlasting *Coronidium gunnianum*	2014	**FFG** Listed **VicAdv** Vulnerable	Widespread in VIC, usually in grasslands and riverine woodland soils prone to inundation (RBGV 2019).	**Moderate**: species may be present in grasslands and riverine woodlands

SPECIES	MOST RECENT RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Small Scurf-Pea *Cullen parvum*	2011	**FFG** Listed **VicAdv** Endangered	Very rare in Victoria. Occurs in grasslands and grassy woodlands on basalt-derived soils in north central and south-central Victoria (RBGV 2018). Previous records in the southern (Beverage) and northern (Toolamba, Maroopna, Shepparton) ends of the project area.	**Moderate**: species may be present in areas of Creekline Grassy Woodland.
Tough Scurf-pea *Cullen tenax*	2015	**FFG** Listed **VicAdv** Endangered	Drier parts of Victoria in grassland and grassy woodlands on heavy soils.	**Moderate**: species may be present in grasslands and grassy woodlands.
Matted Flax-lily *Dianella amoena*	2015	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	Largely confined to drier grassy woodland and grassland communities south of the Dividing Range and now much depleted through its range (RBGV 2018)..	**Confirmed present:** Species confirmed to occur within the Wallan works area.
Arching Flax-lily *Dianella* sp. aff. *longifolia* (Benambra)	2015	**VicAdv** Vulnerable	Occurs in lowland plains grassland and grassy woodlands (e.g. Volcanic Plain and Riverina) as well as around rocky outcrops at higher altitudes than the var. longifolia (e.g. between Swifts Creek and Omeo, Benambra-Corryong district, Don River near Launching Place). Overall, rather rare in the State.	**Moderate**: May occur in remnant grasslands and woodlands within the project area.
Late-flower Flax-lily *Dianella tarda*	2011	**VicAdv** Vulnerable	Grassy forests of foothills and plains of north-eastern and north-central Victoria. Often on lower slopes or near gullies and watercourses, usually on clay or clay-loam soils (RBGV 2018)	**Confirmed:** species may be present in areas of Grassy Woodland, Plains Woodland, Plains Grassy Woodland and Box Ironbark Forest.
Studley Park Gum *Eucalyptus* X *studleyensis*	2006	**VicAdv** Endangered	Occurs in association with the lower Yarra River.	**Low**: Although there is a recent record of this species in the vicinity of the project area at the Donnybrook Merri Creek crossing, the project area in the vicinity of that record (near the Merri Creek crossing) did not support any individuals of this species.
Swamp Diuris *Diuris palustris*	1977	**FFG** Listed **VicAdv** Vulnerable	Scattered around western Victoria, found in swampy depressions within grassland or open woodland communities	**Moderate**: species may be present in grasslands and grassy woodlands.
Trailing Hop-bush *Dodonaea procumbens*	PMST	**EPBC** Vulnerable **VicAdv** Vulnerable	Grows in low-lying, often winter-wet areas in woodland, low open-forest and grasslands on sands and clays. May occur in areas of Creekline Grassy Woodland and Plains Woodland.	**Low:** no species records within 5 km of the project area.

SPECIES	MOST RECENT RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Veiled Fringe-sedge *Fimbristylis velata*	2000	**VicAdv** Rare	Occasional on drying mud beside lakes and rivers and in seasonally wet depressions, mostly in northern Victoria (RBGV 2018). May be present in areas of Floodplain Riparian Woodland, Creekline Grassy Woodland, Plains Grassy Wetland, Riverine Grassy Woodland, Riverine Swamp Forest, Sedgy Riverine Forest or Red Gum Swamp.	**Moderate**: species previously recorded in association with the Goulburn River riparian environment north of Nagambie and south of Toolamba.
Austral Crane's-bill *Geranium solanderi var. solanderi s.s.*	2012	**VicAdv** Vulnerable	Uncommon species found in damp to dryish, usually sheltered sites in grassy woodlands, often along drainage lines or in seepage areas RBGV, 2018).	**Moderate**: species may be present in grassy woodlands, along drainage and seepage lines.
Large-flower Crane's-bill *Geranium sp. 1*	2012	**FFG** Listed **VicAdv** Vulnerable	Basaltic grassland (now weedy) in Glenroy-Braodmeadows regions, Riddells Creek and Malmsbury.	**Moderate**: species may be present in basaltic grasslands.
Pale-flowered Carane's-bill Geranium sp. 3	2012	**VicAdv** Rare	In Victoria, currently known only from Stawell, Yan Yean, Eltham, and Bonegilla areas	**Moderate**: species may be present in grasslands and grassy woodlands in the south of the project area
Delicate Crane's-bill *Geranium sp. 6*	2011	**VicAdv** Vulnerable	May be endemic to Victoria. Recorded from sheltered sites from central to north-east Victoria (Strathbogie Ranges, Benalla, Wangaratta and Beechworth) (RBGV 2018)	**Moderate:** species may be present in areas of Grassy Woodland, Plains Woodland and Plains Grassy Woodland.
Clover Glycine *Glycine latrobeana*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Widespread but of sporadic occurrence and rarely encountered. Grows mainly in grasslands and grassy woodlands (RBGV 2018). species may be present in areas of Plains Grassy Woodland, Grassy Woodland, Creekline Grassy Woodland and Plains Woodland.	**Low:** no species records within 5 km of the project area.
Sand Rush *Juncus psammophilus*	2000	**VicAdv** Rare	Extant populations are confined to *Eucalyptus camaldulensis* or sometimes *Eucalyptus microcarpa* woodlands along the sandy or silty banks of streams or in seasonal swamps and depressions. Although rare, it may be locally abundant	**Moderate**: species may be present in areas of Plains Woodland, Floodplain Riparian Woodland, Box Ironbark Forest, Creekline Grassy Woodland, Plains Grassy Wetland, Red Gum Swamp, Plains Woodland and Sedgy Riverine Forest.

SPECIES	MOST RECENT RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Adamson's Blown-grass *Lachnagrostis adamsonii*	1990 PMST	**EPBC** Endangered **FFG** Listed **VicAdv** Vulnerable	Found within and around saline depressions that are present on the Volcanic Plains in south-west Victoria, in a vicinity extending from approximately Portalington west to near the South Australian border (RBGV 2018).	**Low:** Two records of the species in the vicinity of the project area associated with drainage lines near Wollert and Beveridge in 1990. However, the species has seen declines since these records, with those areas no longer considered to be part of the known range of the species (Murphy 2010).
Lachnagrostis punicea subsp. *punicea*	2015	**VicAdv** Rare	Scattered from near Melbourne to the South Australian border, mainly in grassland, occasionally woodland communities in somewhat saline depressions of the volcanic plain, but also known from seasonal, slightly brackish swampy sites east of Melbourne (e.g. Cranbourne, Safety Beach, Giffard, Sale areas).	**Moderate:** Species may occur within grassland and grassy woodland areas within the project area on the Victorian Volcanic Plain.
Basalt Peppercress *Lepidium hyssopifolium s.s.*	2010	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	Scattered on volcanic plain, mostly found in weedy sites, however was sighted near Port Fairy in a saline estuary amongst saltmarch and fringing sedgeland. (RBGV 2018)	**Moderate:** species may be present within the works area at Donnybrook..
Chinese Lespedeza *Lespedeza juncea subsp. sericea*	2002	**VicAdv** Rare	Scattered in north-eastern and eastern Victoria and often locally abundant on seasonally-inundated sandy soils along watercourses. Flowers Summer-Autumn (RBGV 2018).	**Moderate:** species may be present in areas of Grassy Woodland, Plains Woodland, Plains Grassy Woodland and Box Ironbark Forest.
Hoary Sunray *Leucochrusum albicans subsp. tricolor*	PMST	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	Rare in Victoria with a restricted occurrence area of volcanic grasslands remnants in areas around Wickliffe, Willaura, Streatham, Inverleigh and Creswick districts (RBGV 2018).	**Low:** no species records within 5 km of the project area.
Plains Yam-daisy *Microseris scapigera s.s.*	2010	**VicAdv** Vulnerable	Moist depressions on the basalt plains of western Victoria, but now very rare due to loss of habitat (RBGV 2019)	**Low:** may be present on basalt plains,.
Ridged Water-milfoil *Myriophyllum porcatum*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Rare and restricted to northern and north-western Victoria where it has been recorded growing in temporary waterholes, lagoons, farm dams and rock holes, and on clay pans (RBGV 2018)	**Low:** no species records within 5 km of the project area.

SPECIES	MOST RECENT RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Velvet Daisy-bush *Olearia pannosa subsp. cardiophylla*	1987	**FFG** Listed **VicAdv** Vulnerable	Rare in Victoria, however, known to exists in dry open-forest, on shallow rocky soils near Wedderburn, Rushworth and in the Brisbane Ranges, and in coastal woodland near Anglesea (RBGV 2018).	**Low:** may be present in dry open forests.
Spiny Rice-flower *Pimelea spinescens subsp. spinescens*	PMST	**EPBC** Critically Endangered **FFG** Listed	The spiny rice flower is a small shrub, endemic to the grasslands of Victoria. It is typically associated with the critically endangered Natural Temperate Grassland of the Victorian Volcanic Plain threatened ecological community (RBGV 2018)	**Low:** no species records within 5 km of the project area.
Round-leaf Pomaderris *Pomaderris vacciniifolia*	PMST	**EPBC** Critically Endangered **FFG** Listed **VicAdv** Endangered	The herb rich foothill forests and damp forests north east of Melbourne are the typical habitat of the Round-leaf pomaderris (Department of the Environment and Energy 2019)	**Low:** no species records within 5 km of the project area.
Petite Leek-Orchid *Prasophyllum aff. petilum (Murchison)*	2010	**VicAdv** Endangered	Relatively fertile soils in grassy woodland or natural grassland. Apparently endemic to Victoria where known from two sites in native grassland near Wangaratta and Murchison (RBGV 2019).	**Moderate**: species may be present in areas of Creekline Grassy Woodland, particularly where the work area approaches Murchison.
Maroon Leek-orchid *Prasophyllum frenchii*	PMST	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	While rare in Victoria, *Prasophyllum frenchii* can be found across southern Victoria in open forests, grassland and heathlands, typically on well drained landscapes (RBGV 2019).	**Low:** no species records within 5 km of the project area.
Silurian Leek Orchid *Prasophyllum pyriforme* s.s.	1989	**VicAdv** Endangered	Occurs in hill country woodlands and open forests on well-drained clay loams. The distribution of this species is poorly known due to confusion with several closely related species.	**Low:** No recent records of the species ion the vicinity of the project area, further, the area in the vicinity of the 1989 records is highly degraded, principally supporting exotic grasses

SPECIES	MOST RECENT RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Sturdy Leek-orchid *Prasophyllum validum* Note that the species, *Prasophyllum validum*, is recognised as endemic to South Australia. It is assumed PMST results include an older taxonomic name, referring to the same *Prasophyllum sp. aff. Validum B* endemic to Victoria.	PMST	**EPBC** Vulnerable **VicAdv** Endangered	Drier woodland habitats with low sparse understorey Occurs in Box and Box-Ironbark woodlands with *Eucalyptus* and *Calltris* overstorey species and grassy understorey species. Soils vary from heavy clays to sandy loams (Duncan 2010a). Species may occur in Box and Box-Ironbark woodlands. Known to occur in Axedale Flora Reserve (Duncan 2010b), 15 km from Seymour.	**Low:** no species records within 5 km of the project area.
Green-striped Greenhood *Pterostylis chlorogramma*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Unclear as to exact occurrences due to confusion with closely related species, however typically is found in moist areas of shrubby and heath forest (RBGV 2018).	**Low:** no recent species records within 5 km of the project area
Brackish Plains Buttercup *Ranunculus diminutus*	1998	**VicAdv** Rare	Uncommon to rare in Victoria and recorded only from seasonally wet clay soils fringing Lake Omeo in the east and Lakes Corangamite, Goldsmith and Kennedy in the west (between Colac and Hamilton).	**Moderate**: May occur in seasonally wet depressions.
Fragrant saltbush *Rhagodia parabolica*	2012	**VicAdv** Rare	In Victoria occurs on a few steep rocky slopes and broad ridges between Sunbury and Geelong (e.g. Jacksons Creek, Long Forest, Werribee Gorge, Steiglitz, Buckleys Falls on the Barwon River), but locally rather common, and in mallee at a few scattered locations in the northwest. The common name refers to the fragrant flowers, not the foliage which is usually malodorous.	**Low**: limited suitable habitat for this species within the project area.
Button Wrinklewort *Rutidosis leptorrhynchoides*	PMST	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	Clayey loamy soils of forests and woodland in central Victoria. Mostly areas of seasonal inundation (RBGV 2018).	**Low:** no recent species records within 5 km of the project area.
Turnip Copperburr *Sclerolaena napiformis*	PMST	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	Known only from a few populations in remnant grassland on clay-loam soils in north-central Victoria in the Echuca-Nathalia area, and between Donald and Stawell in the west.	**Low:** no recent species records within 5 km of the project area.
Bulging Fireweed *Senecio campylocarpus*	2011	**VicAdv** Rare	Throughout central Victoria and in the north-east in loam to clay soils in forest and woodland, usually in seasonally inundated areas (RBGV 2018)	**Moderate:** species may be present in areas of Box Ironbark Forest and Creekline Grassy Woodland.

SPECIES	MOST RECENT RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Large-fruit Fireweed *Senecio macrocarpus*	2003	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Restricted to remnant *Themeda* grasslands occurring on loamy clay soils extending from near Melbourne west to Skipton area (RBGV 2019).	**Low:** Themeda grasslands within the known range of this species were determined to be highly disturbed and unlikely to support this species.
Swamp Fireweed *Senecio psilocarpus*	2002	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Rare and restricted, found in few herb rich, winter wet swamps on clay or peat soils around the south of Victoria, west from sale (RBGV 2018).	**Moderate:** May be present in herb rich, winter wet swamps on clay or peat soils.
Western Rat-tail Grass *Sporobolus creber*	1972	**VicAdv** Vulnerable	Rare in Victoria, known from few locations in central to north-eastern Victoria (e.g. Broadford, Mitiamo, Rochester, Walwa) (RBGV 2018).	**Low:** no recent records.
Small Purple Pea *Swainsona recta*	PMST	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	Endemic to the grasslands and woodlands of South-Eastern Australia (RBGV 2018).	**Low:** no recent species records within 5 km of the project area.
Spiral Sun-orchid *Thelymitra matthewsii*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Widely distributed but rare, in coastal sandy flats or slightly elevated sites (to 400 m) in well-drained soils (sandy loams to gravelly limestone soils) in open forest. [0]	**Low:** no recent species records within 5 km of the project area.
Rye Beatle Grass *Tripogon Loliiformis*	2015	**VicAdv** Rare	An uncommon grass of scattered occurrence through drier areas of the state (e.g. Mt Arapiles, basalt plains just west of Melbourne, Strathbogie Ranges, Killawarra Forest near Wangaratta, Beechworth, Suggan Buggan). Usually occurring on shallow soils overlying rock.	**Moderate:** May occur in grasslands and woodlands within the Victorian Volcanic Plain Bioregion
Swamp Everlasting *Xerochrysum palustre*	2014	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Scattered from near the South Australian border to north-west of Bairnsdale in Lowland swamps on black cracking clay soils – rare however due to lack of habitat.	**Confirmed present:** May be present in lowland swamps, on black cracking clay soils.

TABLE N.2: LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES PREVIOUSLY RECORDED WITHIN 5 KM OF THE PROJECT AREA (DELWP, 2018)

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
BIRDS				
Regent Honeyeater *Anthochaera phrygia*	2018	**EPBC** Critically Endangered **FFG** Listed **VicAdv** Critically Endangered	Dry open forest, woodlands, or red ironbark, yellow box, white and yellow gum, mistletoe on river she-oaks, trees in farmlands, streets, gardens. (Pizzey and Knight 2012).	**High**: Recent record within 10 km of the project area
Common Sandpiper *Actitis hypoleucos*	1980 PMST	**EPBC** Migratory & Marine **VicAdv** Vulnerable	Shallow, pebbly, muddy or sandy edges of rivers and streams, coastal to far inland; dams, lakes, sewage ponds; margins of tidal rivers; waterways in mangroves or saltmarsh; mudflats; rocky or sandy beaches; causeways, riverside lawns, drains, street gutter (Pizzey and Knight 2012)	**Low:** Migratory species, only one record of the species in the vicinity of the project area from 1980. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Azure Kingfisher *Alcedo azurea*	2013	**VicAdv** Near Threatened	Root-festooned banks of fresh or tidal creeks, rivers and streams in rainforest, lakes, swamps, estuaries, mangroves. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas, rivers or depressions, interaction with the Rail Corridor is likely limited to flying overhead.
Australasian Shoveler *Anas rhynchotis*	2008	**VicAdv** Vulnerable	Larger waters, fresh and saline lakes, well-vegetated freshwater wetlands, coastal inlets sewage ponds, floodwaters. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Magpie Goose *Anseranas semipalmata*	1991	**EPBC** Migratory **FFG** Listed **VicAdv** Near Threatened	Large seasonal wetlands and well-vegetated dams with rushes and sedges, wet grasslands, floodplains. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Fork-tailed Swift *Apus pacificus*	PMST	**EPBC** Migratory	Migrant from North-East Asia to Australia, usually in high foraging flocks above inland plains. (Department of the Environment Water Heritage and the Arts)	**Low:** Migratory species, interaction with the Rail Corridor is likely limited to flying overhead.

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Intermediate Egret *Ardea intermedia*	2001	**EPBC** Marine **FFG** Listed **VicAdv** Endangered	Freshwater wetlands, pastures and croplands, tidal mudflats, floodplains. (Pizzey and Knight 2012)	**Moderate:** May be present within nearby wetland areas or depressions or open grassy plains. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Eastern Great Egret *Ardea modesta*	2012	**EPBC** Marine **FFG** Listed **VicAdv** Vulnerable	Shallows of rivers, estuaries, tidal mudflats, freshwater wetlands; sewage ponds, irrigation areas, larger dams etc. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Hardhead *Aythya australis*	2009	**VicAdv** Vulnerable	Deep, permanent wetlands, large open waters, brackish coastal swamps, farm dams, ornamental lakes sewage ponds. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Musk Duck *Biziura lobata*	2009	**VicAdv** Vulnerable	Well-vegetated swamps, wetlands, both brackish and fresh, lakes, reservoirs, shallow bays, inlets; occasionally at sea. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Australasian Bittern *Botaurus poiciloptilus*	2011	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	Narrow habitat preferences, preferring shallow, vegetated freshwater or brackish swamps. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Bush Stone-curlew *Burhinus grallarius*	1999	**FFG** Listed **VicAdv** Endangered	Open woodland, dry watercourses with fallen branches, leaf-litter, sparse grass; sandplains with spinifex and mallee; coastal scrub, mangrove fringes, golf-courses, rail reserves; timber remnants on roadsides; orchards, plantations; suburbs, towns. (Pizzey and Knight 2012)	**High**: May be present within timbered areas, known activity within Rail Corridors. Known to occur on properties adjacent to the rail corridor at Mangalore

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Chestnut-rumped Heathwren *Calamanthus pyrrhopygius*	2014	**FFG** Listed **VicAdv** Vulnerable	Heathy woodlands/ shrublands and Box/ Ironbark forests (Pizzey and Knight 2012)	**Low**: May be present within timbered areas, particularly in Eucalypt rich areas. Closest record from 2014 over 10km west of the project area
Sharp-tailed Sandpiper *Calidris acuminata*	PMST	**EPBC** Migratory & Marine	Tidal mudflats, saltmarshes, mangroves; shallow fresh, brackish or saline inland wetlands; floodwaters, irrigated pasture and crops; sewage ponds and saltfields. (Pizzey and Knight 2012)	**Low:** Migratory species, interaction with the Rail Corridor is likely limited to flying overhead.
Curlew Sandpiper *Calidris gerruginea*	PMST	**EPBC** Critically Endangered **FFG** Listed **VicAdv** Critically Endangered	Migrate to Australia and congregate on intertidal mudflats and muddy margins of terrestrial wetlands (Bird Life Australia 2019)	**Low:** no recent species records within 5 km of the project area.
Curlew Sandpiper *Calidris ferruginea*	PMST	**EPBC** Critically Endangered **VicAdv** Endangered	Tidal mudlfats; saltmarsh, saltfields; fresh, brackish or saline wetlands; sewage ponds. (Pizzey and Knight 2012). May be present within nearby wetland areas or depressions, interaction with the Rail Corridor is likely limited to flying overhead.	**Low:** No recent records within 5 km of the project area
Pectoral Sandpiper *Calidris melanotos*	PMST	**EPBC** Migratory & Marine	Prefers shallow fresh waters, often with low grass or other herbage; swamp margins, flooded pastures, sewerage ponds; occasionally tidal areas, saltmarshes. (Pizzey and Knight 2012)	**Low:** Migratory species, interaction with the Rail Corridor is likely limited to flying overhead.
Speckled Warbler *Chthonicola sagittatus*	2007	**FFG** Listed **VicAdv** Vulnerable	Dry sclerophyll forests and woodlands (woodlands have fewer trees than forests) dominated by eucalypts. (BirdLife Australia 2018a)	**Moderate**: May be present within grassy timbered areas.
Spotted Harrier *Circus assimilis*	2007	**VicAdv** Near Threatened	Grassy plains, crops and stubblefields; bluebush, saltbush, spinifex associations; scrublands, mallee, heathlands; open, grassy woodlands. (Pizzey and Knight 2012)	**Moderate**: May be present within grasslands and open timbered areas.
Brown Treecreeper (south-eastern ssp.) *Climacteris picumnus victoriae*	2013	**VicAdv** Near Threatened	Drier forests, woodlands, scrubs, river red gums on water courses and around lakeshores, paddocks with standing dead timber, stumps, margins of denser wooded areas. (Pizzey and Knight 2012)	**Moderate**: May be present within hollow-bearing timbered areas.
Emu *Dromaius novaehollandiae*	1999	**VicAdv** Near Threatened	The main habitats of the Emu are sclerophyll forest and savanna woodland. May be present within timbered areas, known distribution associated with project area.	**High**: Known to occur in land on each side of the rail corridor and would traverse the project area where accessible.

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Little Egret *Egretta garzetta nigripes*	2007	**EPBC** Marine **FFG** Listed **VicAdv** Endangered	Tidal mudflats, saltmarshes, mangroves, freshwater wetlands, sewage ponds. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Latham's Snipe *Gallinago hardwickii*	2007	**VicAdv** Near Threatened	Freshwater or brackish wetlands, preferring to be close to protective vegetation cover. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Diamond Dove *Geopelia cuneata*	2008	**FFG** Listed **VicAdv** Near Threatened	Drier grassy woodlands, scrub near water, wooded watercourses. (Pizzey and Knight 2012)	**Moderate:** May be present within timbered areas, particularly adjacent depressions.
Painted Honeyeater *Grantiella picta*	2013	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Mistletoes in eucalypt forests/woodlands; black box on watercourses; box-ironbark-yellow gum woodlands; paperbarks, Casuarinas; mulga, other acacias; trees on farmland; gardens. (Pizzey and Knight 2012). May be present within timbered areas, particularly in relationship to presence of mistletoe or adjacent depressions	**High:** Recent records area clustered around the timbered areas near Maroopna station and the adjacent Goulburn River crossing
Brolga *Grus rubicunda*	2012	**FFG** Listed **VicAdv** Vulnerable	Freshwater swamps flooded grasslands, margins of billabongs, lagoons, dry floodplains, irrigated pastures; occasionally estuaries. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
White-bellied Sea-Eagle *Haliaeetus leucogaster*	2008	**EPBC** Marine **FFG** Listed **VicAdv** Vulnerable	Coasts, inlands, estuaries, inlets, large rivers, inland lakes, reservoirs. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions, interaction with the Rail Corridor is likely limited to flying overhead.

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
White-throated Needletail *Hirundapus caudacutus*	2006	**EPBC** Migratory **VicAdv** Vulnerable	Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns, feeding companies frequency patrol back and forward along favoured hilltops and timbered ranges. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions, interaction with the Rail Corridor is likely limited to flying overhead.
Caspian Tern *Hydroprogne caspia*	1999	**EPBC** Migratory & Marine **FFG** Listed **VicAdv** Near Threatened	Coastal, offshore waters, beaches, mudflats, estuaries, larger rivers, reservoirs and lakes. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Little Bittern *Ixobrychus minutus dubius*	1988	**FFG** Listed **VicAdv** Endangered	Dense reedbeds in freshwater swamps, lakes and rivers; tussocks in wetland areas. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Swift Parrot *Lathamus discolor*	2006	**EPBC** Critically Endangered **FFG** Listed **VicAdv** Endangered	Open grassy woodland, with dead trees, near permanent water and forested hills, coastal heaths, pastures with exotic grasses, weeds, roadsides, orchards. (Pizzey and Knight 2012). May be present within timbered areas, particularly in areas of Box Ironbark Forest, recent records of flocks at Bailieston near project area.	**High:** The area is in the migration flight path and species may stop over to forage
Square-tailed Kite *Lophoictinia isura*	2016	**FFG** Listed **VicAdv** Vulnerable	Heathlands, woodlands, forests, rainforest, timbered water courses, hills and gorges. (Pizzey and Knight 2012)	**Moderate**: May be present within timbered areas.
Hooded Robin *Melanodryas cucullata*	2007	**FFG** Listed **VicAdv** Near Threatened	Drier eucalypt forests, woodlands, scrubs with fallen logs, debris, *Casuarina*, cypress pine, cleared paddocks (Pizzey and Knight 2012)	**Moderate**: May be present within timbered and/or scrubby areas within the project area.
Yellow Wagtail *Motacilla flava*	PMST	**EPBC** Migratory	Occupies a range of damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs to damp steppe and grassy tundra. (International Union for Conservation of Nature and Natural Resources)	**Low:** Migratory species, interaction with the Rail Corridor is likely limited to flying overhead or brief interaction with nearby wetlands and damp woodlands.

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Black-faced Monarch *Monarcha melanopsis*	PMST	**EPBC** Migratory	Found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. (BirdLife Australia)	**Low:** Migratory species, interaction with the Rail Corridor is likely limited to flying overhead or brief interaction with nearby woodland.
Satin Flycatcher *Myiagra cyanoleuca*	PMST	**EPBC** Migratory	Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests (Blakers et al. 1984; Emison et al. 1987; Officer 1969).	**Low:** Migratory species, interaction with the Rail Corridor is likely limited to flying overhead and intermittent foraging.
Barking Owl *Ninox connivens*	1999	**FFG** Listed **VicAdv** Endangered	Open forests, woodlands, dense scrubs, foothills; river red gums, other large trees near watercourses, penetrating otherwise open country; paperbark woodlands. (Pizzey and Knight 2012)	**Moderate**: May be present within hollow-bearing timbered areas, particularly woodland fringe supporting hunting behaviours.
Powerful Owl *Ninox strenua*	2010	**FFG** Listed **VicAdv** Vulnerable	Pairs occupy a large, probably permanent, home range in mountain forests, gullies and forest margins, sparser hilly woodlands, coastal forests, woodlands, scrubs, exotic pine plantations, large trees in private/public gardens, some in cities. (Pizzey and Knight 2012)	**Moderate**: May be present within hollow-bearing timbered areas, particularly woodland fringe supporting hunting behaviours.
Eastern Curlew *Numenius madagascariensis*	PMST	**EPBC** Critically Endangered **VicAdv** Vulnerable	Estuaries, tidal mudflats, sandspits, saltmarshes, mangroves; occasionally fresh or brackish lakes; bare grasslands near water. (Pizzey and Knight 2012). May be present within nearby wetland areas or depressions, interaction with the Rail Corridor is likely limited to flying overhead.	**Low:** No recent records within 5 km of the project area
Nankeen Night Heron *Nycticorax caledonicus hillii*	2006	**VicAdv** Near Threatened	Shallow margins of rivers, wetlands, mangrove-lined estuaries, offshore islands, floodwaters, garden trees. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Blue-billed Duck *Oxyura australis*	2008	**FFG** Listed **VicAdv** Endangered	Found on temperate, fresh to saline, terrestrial wetlands including sewerage ponds, rivers, salt lakes and saltpans. Preferring deep, permanent open water within or near dense vegetation. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Osprey *Pandion haliaetus*	PMST	**EPBC** Migratory & marine **VicAdv** Vulnerable	It inhabits the areas around shallow waters, being sufficiently tolerant of human settlement to persist in suburban and sometimes urban environments (del Hoyo 1994).	**Low:** Migratory species, interaction with the Rail Corridor is likely limited to flying overhead.
Plains-wanderer *Pedionomus torquatus*	PMST	**EPBC** Critically Endangered **FFG** Listed **VicAdv** Critically Endangered	Sparse, treeless, lightly grazed native grasslands/herbfields with bare ground, old cereal crops, short Lucerne, sparse saltbush, low shrubland. (Pizzey and Knight 2012)	**Low:** May be present within grassy or timbered areas, however is unlikely to inhabit disturbed areas.
Pied Cormorant *Phalacrocorax varius*	2009	**VicAdv** Near Threatened	Coastal waters with sloping shorelines; estuaries, bays, tidal inlets, large inland lakes and rivers, irrigation ponds, coastal mangroves and offshore islands. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions, Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Glossy Ibis *Plegadis falcinellus*	2008	**VicAdv** Near Threatened	Well vegetated wetlands, wet pastures, rice fields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats; occasionally dry grasslands. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Royal Spoonbill *Platalea regia*	2009	**VicAdv** Near Threatened	Larger shallow waters, inland and coastal, well-vegetated shallow freshwater wetlands, saltfields, mangroves, islands, farm dams occasionally. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Regent Parrot *Polytelis anthopeplus monarchoides*	2009	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Inhabits floodplain woodlands, mainly areas with large River Red-gums for nesting. (Pizzey and Knight 2012). May be present within timbered areas, however distribution is typically limited to the Mildura area.	**Low**: No recent records within 5 km of the project area

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Superb Parrot *Polytelis swainsonii*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Endangered	River red gums, black box, yellow box, river oak, mostly near rivers; mallee, stubbles, pastures, gardens. (Pizzey and Knight 2012)	**Low**: No recent records within 5 km of the project area
Grey-crowned Babbler *Pomatostomus temporalis*	2013	**FFG** Listed **VicAdv** Endangered	Live in open forest and woodland, acacia shrubland and adjoining farmland. (Pizzey and Knight 2012)	**Moderate**: May be present within timbered areas.
Rufous Fantail *Rhipidura rufifrons*	PMST	**EPBC** Migratory	Mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts, usually with a dense shrubby understorey often including ferns.	**Low:** Migratory species, interaction with the Rail Corridor is likely limited to flying overhead.
Australian Painted Snipe *Rostratula australis*	PMST	**EPBC** Endangered **Treaty** **FFG** Listed **VicAdv** Critically Endangered	Well-vegetated shallows and margins of wetlands, dams, sewage ponds; wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, open timber. (Pizzey and Knight 2012)	**Low:** No recent records within 5 km of the project area
Diamond Firetail *Stagonopleura guttata*	2006	**FFG** Listed **VicAdv** Near Threatened	Open Eucalypt forests/woodlands; River Red Gum, Mallee, Buloke, Cypress Pine. (Pizzey and Knight 2012)	**Moderate**: May be present within timbered areas.
Freckled Duck *Stictonetta naevosa*	1999	**FFG** Listed **VicAdv** Endangered	Large, well vegetated swamps; in dry periods moves to open lakes. (Pizzey and Knight 2012)	**Low:** May be present within nearby wetland areas or depressions. Interaction with the Rail Corridor is likely to be primarily limited to flying overhead. Sporadic foraging may occur within seasonal wetlands within the rail corridor, however these areas are unlikely to constitute habitat important for the persistence of these species in the landscape.
Little Button-quail *Turnix velox*	1997	**VicAdv** Near Threatened	Grassy plains, creek flats, woodlands, burned areas, saltbush, spinifex, mulga, mallee, margins of wetlands, crops, pastures and stubble. (Pizzey and Knight 2012)	**Low:** May be present within remnant grasslands and timbered areas, however is unlikely to inhabit disturbed areas.
Common Greenshank *Tringa nebularia*	PMST	**EPBC** Migratory & Marine **VicAdv** Vulnerable	Mudflats, estuaries, saltmarshes, margins of lakes; wetlands, claypans, fresh and saline; commercial saltfields and sewage ponds. (Pizzey and Knight 2012)	**Low:** Migratory species, interaction with the Rail Corridor is likely limited to flying overhead.
MAMMALS				

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Spotted-tail Quoll *Dasyurus maculatus (SE mainland population)*	PMST	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	Wet and dry sclerophyll forests, coastal heath and scrub, sometimes Red Gum forests and along inland rivers (Van Dyck and Strahan 2008)	**Low:** No recent records within 5 km of the project area
Southern Brown Bandicoot *Isoodon obesulus obesulus*	1968	**EPBC** Endangered **FFG** Listed **VicAdv** Near threatened	Heathland, shrubland, sedgeland, healthy open forest and woodlands, in coastal regions, the Dandenongs, Grampians, and central western Victoria (DEE 2018).	**Low:** may be present near upper plenty or in heathland, shrubland, sedgeland, healthy open forest and woodlands
Broad-toothed Rat (mainland) *Mastacomys fuscus mordicus*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Endangered	Found in complex runways within dense vegetation of wet grass, sedge or heath environment (Office of Environment & Heritage 2019)	**Low:** No recent records within 5 km of the project area
Common Bent-wing Bat *Miniopterus shcreibersii oceansis (eastern subspecies)*	2013	**EPBC:** Critically endangered **FGG:** Listed **VicAdv** Vulnerable	Caves, derelict mines, stormwater tunnels, etc (Office of Environment & Heritage 2019).	**Low:** Species may be present in caves
Squirrel Glider *Petaurus norfolcensis*	2010	**FFG** Listed **VicAdv** Endangered	Dry eucalypt forests containing large old trees with hollows with Acacia understorey. (Van Dyck and Strahan 2008)	**High**: Likely to be present within timbered areas, particularly in areas of Box Ironbark Forest.
Greater Glider *Petaurus volans*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Endangered	Restricted distribution along eastern Australia to central Victoria. Found in eucalyptus Eucalyputus forests and woodlands (DEE 2019) .	**Low:** No recent records within 5 km of the project area
Brush-tailed Phascogale *Phascogale tapoatafa*	2015	**FFG** Listed **VicAdv** Vulnerable	Well-developed dry forest and woodland areas, with stringybarks and trees with hollows. (Van Dyck and Strahan 2008)	**High**: Likely to be present within timbered areas.
Long-nosed Potoroo *Potorous tridactylus tridactylus*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Endangered	Occurs in the South-western region, Grampians, Otways, Western Port, Wilsons Promontory and east Gippsland. Found in forests and woodlands (DEE 2019).	**Low:** No recent records within 5 km of the project area

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Smoky Mouse *Pseudomys fumeus*	PMST	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	Found in dry sclerophyll forest, heath understorey, as well as fern gullies. Has been found in the Greater Grampian region of Victoria (DEE 2019).	**Low:** No recent records within 5 km of the project area
Grey-headed Flying-fox *Pteropus poliocephalus*	2010	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Camps of this species are found in forests or open woodlands, typically along gullies, typically not far from water and usually in vegetation with a dense canopy (Van Dyck and Strahan 2008)	**High**: May be present within timbered areas.
Eastern Horseshoe Bat *Rhinolophus megaphyllus megaphyllus*	1988	**FFG** Listed **VicAdv** Vulnerable	Roost in warm, humid caves, holes and cracks in rocks, old mines and tunnels and occasionally under buildings (Australian Museum 2019).	**Low:** may be present in caves or other humid cracks etc.
Common Dunnart *Smithopsis murina murina*	1988	**VicAdv** Vulnerable	Dry sclerophyll forests and mallee heath land (Austalian Museum 2019).	**Low:** may be present sclerophyll forests and mallee heath land
FISH				
Silver Perch *Bidyanus bidyanus*	2013	**EPBC** Critically Endangered **FFG** Listed **VicAdv** Vulnerable	Rivers, lakes and reservoirs, preferring areas of rapid flow. Swims near surface. (Allen, Midgley et al. 2002). Records throughout the Goulburn River	**High:** May be present within nearby rivers or creeks. Interaction with the Rail Corridor is likely limited to bridges and major and minor river crossings.
Eastern Dwarf Galalxis *Galaxiella pusilla*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Amongst marginal vegetation in still or gently flowing water of roadside ditches, swamps and backwaters of creeks. Occupies both ephemeral and permanent habitats. (Allen, Midgley et al. 2002)	**Low:** the known distribution of G. pusilla is restricted to south of the Great Dividing Range, thus it is unlikely to occur in the Goulburn Catchment.
Flat-headed Galaxias *Galaxias rostratus*	1990	**EPBC** Critically Endangered **VicAdv** Vulnerable	Shoals in mid-water. Usually below 150 m altitude in Murray system in still or gently flowing waters, lakes, billabongs and backwaters. Depth 1 m, substrate of coarse sand and mud, and debris. (Allen, Midgley et al. 2002). May be present within nearby	**Low:** no records within 5km of the project area

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
			rivers or creeks, interaction with the Rail Corridor is likely limited to bridges and river crossings.	
Trout Cod *Maccullochella macquariensis*	2010	**EPBC** Endangered **FFG** Listed **VicAdv** Critically Endangered	Rapidly flowing streams, around the cover of logs and debris, over rocky or gravel bottoms. Larger fish occur in deeper sections. (Allen, Midgley et al. 2002). Records associated with the Goulburn River.	**High:** May be present within nearby rivers or creeks, interaction with the Rail Corridor is likely limited to bridges and river crossings.
Murray Cod *Maccullochella peelii*	2012	**EPBC** Vulnerable **FFG** Listed **VicAdv** Vulnerable	Riparian vegetation, for example River Red Gum (*Eucalyptus camaldulensis*) woodland in the lowland river systems of the Murray-Darling Basin, not only provides an ongoing supply of structural habitat for the Murray Cod in the form of coarse woody debris or snags, but aids stream bank stability and protects riparian soils from water and wind erosion (National Murray Cod Recovery Team 2010). Records associated with the Goulburn River.	**High:** May be present within nearby rivers or creeks, interaction with the Rail Corridor is likely limited to bridges and river crossings.
Golden Perch *Macquaria ambigua*	2016	**VicAdv** Near Threatened	Occurs in a variety of riverine habitats but prefers warm, slow moving turbid sections of streams. (Allen, Midgley et al. 2002)	**Moderate:** May be present within nearby rivers or creeks, interaction with the Rail Corridor is likely limited to bridges and river crossings.
Macquarie Perch *Macquaria australasica*	1992	**EPBC** Endangered **FFG** Listed **VicAdv** Endangered	Cool, clear water of rivers, lakes and reservoirs. Prefers slow-flowing, deep rocky pools. (Allen, Midgley et al. 2002). Records present in the vicinity of Hughes Creek and the Goulburn River.	**Low:** May be present within nearby rivers or creeks, interaction with the Rail Corridor is likely limited to bridges and river crossings.
Murray River Rainbowfish *Melanotaenia fluviatilis*	2011	**FFG** Listed **VicAdv** Vulnerable	Streams, backwaters of large rivers, drainage ditches, overflow ponds and reservoirs. Often congregates along grassy banks or around submerged logs and branches. (Allen, Midgley et al. 2002)	**Moderate:** May be present within nearby rivers or creeks, interaction with the Rail Corridor is likely limited to bridges and river crossings.
Southern Pygmy Perch (Murray-Darling lineage) *Nannoperca australis*	2002	**VicAdv** Vulnerable	Prefers slow flowing or still waters, usually with dense aquatic vegetation and plenty of cover. It has been recorded from small streams, well-vegetated lakes (or wetlands within), billabongs and irrigation channels (Murray Darling Basin Commission 2007).	**Moderate:** May be present within nearby rivers or creeks, interaction with the Rail Corridor is likely limited to bridges and river crossings.
Australian Grayling *Prototroctes mareana*		**EPBC** Vulnerable **FFG** Listed **VicAdv** Endangered	Pelagic, highly mobile, zooplanktivorous. Australian grayling are amphidromonous and require passing flows for upstream migration in Autumn through to Winter.	**Low:** usually associated with coastal streams, thus there is little likelihood that these fish occur in the area.

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Freshwater Catfish *Tandanus tandanus*	2012	**FFG** Listed **VicAdv** Endangered	Swims close to sand or gravel bottoms in slow moving streams, lakes and ponds with fringing vegetation. More abundant in lakes than in flowing water. (Allen, Midgley et al. 2002)	**Moderate:** Likely present within nearby rivers or creeks, interaction with the Rail Corridor is likely limited to bridges and river crossings.
AMPHIBIANS				
Brown Toadlet *Pseudophryne bibronii*	2004	**FFG** Listed **VicAdv** Endangered	Found below rocks in logs in wet and dry sclerophyll forest, in proximity to seasonally inundated areas. (Cogger 2014)	**Low:** May be present within nearby wetland areas or depressions, interaction with the Rail Corridor is likely limited to corridors adjoining depressions.
Growling Grass Frog *Litoria raniformis*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Endangered	A largely aquatic species found among vegetation within or at the edges of permanent water – streams, swamps, lagoons, farm dams and ornamental ponds. Often found under debris on low, often flooded river flats. Frequently active by day. (Cogger 2014). May be present within nearby wetland areas or depressions, interaction with the Rail Corridor is likely limited to corridors adjoining depressions.	**High:** Recent records in the Vicinity of the project area on the VVP bioregion. No recent records between Seymour and Shepparton
CRUSTACEANS				
Murray Spiny Crayfish *Euastacus armatus*	2009	**FFG** Listed **VicAdv** Near Threatened	Inhabit a variety of permanent and ephemeral lotic and lentic waters including creeks, streams, rivers, small tributaries, drainage channels, roadside gutters and seepages, swamps, pools, lagoons, ponds and billabongs. Engaeus species have also been found (Hawking, Smith et al. 2009)	**Moderate:** May be present within nearby rivers or creeks, interaction with the Rail Corridor is likely limited to bridges and river crossings.
INVERTEBRATES				
Golden Sun Moth *Synemon plana*	PMST And 2014	**EPBC** Critically Endangered **FFG** Listed **VicAdv** Critically Endangered	The golden sun moth has been recorded in native grasslands and grassy woodlands (DEWHA)	**Low:** Potential habitat for this species is degraded and not in the vicinity of recent records of this species.
REPTILES				
Pink-tailed Worm-lizard *Aprasia parapulchella*	PMST	**EPBC** Vulnerable **FFG** Listed **VicAdv** Endangered	Favours areas with native grasses and partially buried rocks. (Wilson and Swan)	**Moderate:** No recent records within 5 km of the project area, although species is cryptic..

SPECIES	LAST RECORD	CONSERVATION STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Broad-shelled Turtle *Chelodina expansa*	2003	**FFG** Listed **VicAdv** Endangered	Typically found in turbid water at the bottom of rivers and permanent streams and waterholes, lying concealed among debris or among root-mats. (Cogger 2014)	**Low:** May be present within nearby rivers or creeks, interaction with the Rail Corridor is likely limited to bridges and river crossings or terrestrially where individuals travel between waterbodies.
Striped Legless Lizard *Delma impar*	2003	**EPBC** Vulnerable **FFG** Listed **VicAdv** Endangered	Intact native grassland areas, usually in or around stony rise country or deeply cracked earth. (Cogger 2014)	**Moderate**: May be present within native grassland areas.
Bearded Dragon *Pogona barbata*	1994	**VicAdv** Vulnerable	Semi-arboreal, being seen during the day perched on fallen timber, stumps, fence posts or roadside verges where they forage for insects.	**Moderate**: May be present within grassy and timbered areas with sheltered understorey.
Grassland Earless Dragon *Tympanocryptis pinguicolla*	1988	**EPBC** Endangered **FFG** Listed **VicAdv** Critically endangered	Found in native grasslands, sometimes in burrows of the wolf spider and wood cricket, embedded surface rocks and tussocks (DEE 2019).	**Low:** May in present in areas of native grassland, but no nearby records suggest this is unlikely.
Lace Monitor *Varanus varius*	2000	**VicAdv** Endangered	Coast, ranges, slopes and adjacent plains of eastern and south-eastern Australia. It feeds on insects, reptiles and small mammals, but is a major predator of nestling birds. Often forages on the ground, and in trees. Often lays eggs within the protection (Cogger 2014)	**Moderate**: May be present within timbered areas.

Appendix O

PMST Results

Australian Government
Department of the Environment and Energy

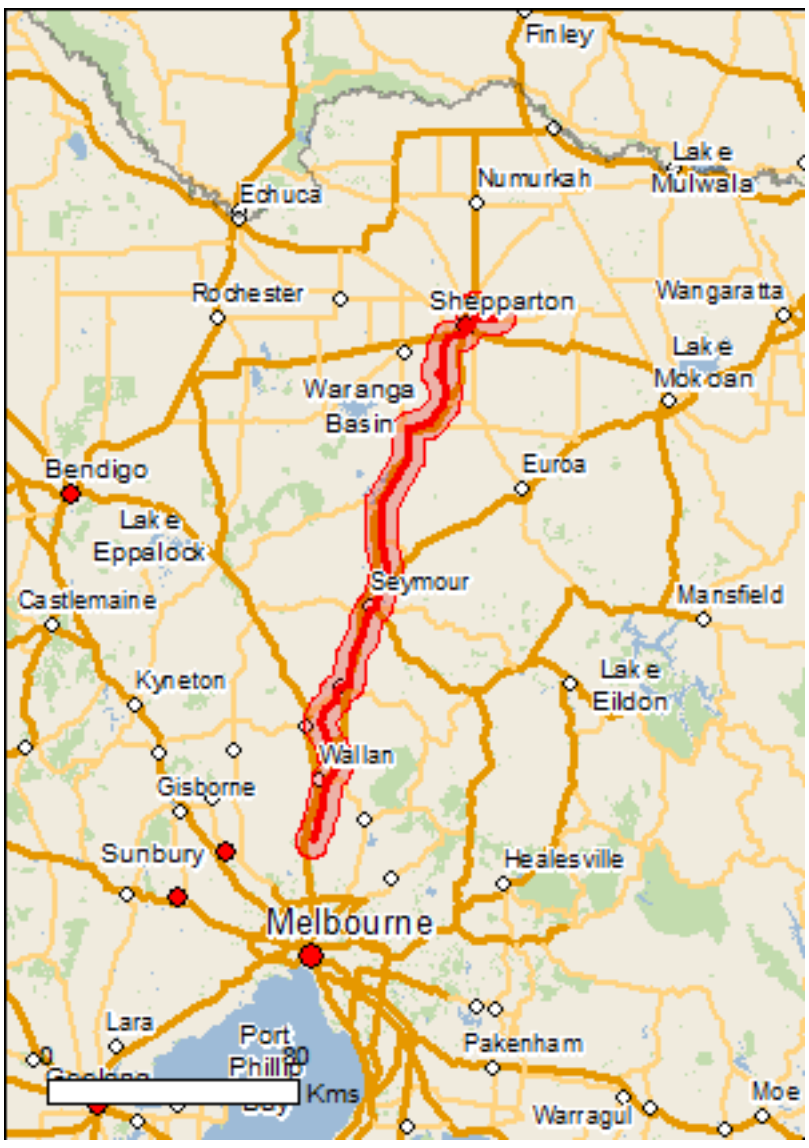
EPBC Act Protected Matters Report

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

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

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 14/01/19 13:42:36



Coordinates

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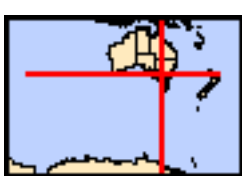


Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	7
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	45
Listed Migratory Species:	14

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	5
Commonwealth Heritage Places:	None
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	28
Regional Forest Agreements:	3
Invasive Species:	48
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Banrock station wetland complex	500 - 600km upstream
Barmah forest	40 - 50km upstream
Gunbower forest	50 - 100km upstream
Hattah-kulkyne lakes	300 - 400km upstream
Nsw central murray state forests	40 - 50km upstream
Riverland	400 - 500km upstream
The coorong, and lakes alexandrina and albert wetland	400 - 500km upstream

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

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pedionomus torquatus		
Plains-wanderer [906]	Critically Endangered	Species or species habitat known to occur within area
Polytelis swainsonii		
Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area
Rostratula australis		
Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Galaxias rostratus		
Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat known to occur within area
Galaxiella pusilla		
Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat likely to occur within area
Maccullochella macquariensis		
Trout Cod [26171]	Endangered	Species or species habitat likely to occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat known to occur within area
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Litoria raniformis		
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Insects		
Synemon plana		
Golden Sun Moth [25234]	Critically Endangered	Species or species habitat known to occur within area
Mammals		
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Mastacomys fuscus mordicus		
Broad-toothed Rat (mainland), Tooarrana [87617]	Vulnerable	Species or species habitat may occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pseudomys fumeus		
Smoky Mouse, Konoom [88]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Pteropus poliocephalus](#) Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
[Amphibromus fluitans](#) River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat known to occur within area
[Brachyscome muelleroides](#) Mueller Daisy [15572]	Vulnerable	Species or species habitat may occur within area
[Dianella amoena](#) Matted Flax-lily [64886]	Endangered	Species or species habitat known to occur within area
[Dodonaea procumbens](#) Trailing Hop-bush [12149]	Vulnerable	Species or species habitat likely to occur within area
[Glycine latrobeana](#) Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat likely to occur within area
[Lachnagrostis adamsonii](#) Adamson's Blown-grass, Adamson's Blowngrass [76211]	Endangered	Species or species habitat known to occur within area
[Leucochrysum albicans var. tricolor](#) Hoary Sunray, Grassland Paper-daisy [56204]	Endangered	Species or species habitat likely to occur within area
[Myriophyllum porcatum](#) Ridged Water-milfoil [19919]	Vulnerable	Species or species habitat likely to occur within area
[Pimelea spinescens subsp. spinescens](#) Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat likely to occur within area
[Pomaderris vacciniifolia](#) Round-leaf Pomaderris [4256]	Critically Endangered	Species or species habitat likely to occur within area
[Prasophyllum frenchii](#) Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat likely to occur within area
[Prasophyllum validum](#) Sturdy Leek-orchid [10268]	Vulnerable	Species or species habitat may occur within area
[Pterostylis chlorogramma](#) Green-striped Greenhood [56510]	Vulnerable	Species or species habitat may occur within area
[Rutidosis leptorrhynchoides](#) Button Wrinklewort [7384]	Endangered	Species or species habitat likely to occur within area
[Sclerolaena napiformis](#) Turnip Copperburr [11742]	Endangered	Species or species habitat likely to occur within area
[Senecio macrocarpus](#) Large-fruit Fireweed, Large-fruit Groundsel [16333]	Vulnerable	Species or species habitat likely to occur within area
[Senecio psilocarpus](#) Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Swainsona recta](#) Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area
[Thelymitra matthewsii](#) Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
[Xerochrysum palustre](#) Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
[Aprasia parapulchella](#) Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area
[Delma impar](#) Striped Legless Lizard [1649]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
[Hirundapus caudacutus](#) White-throated Needletail [682]		Species or species habitat known to occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat likely to occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Breeding known to occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat may occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -
Defence - DYSART SUPPLY DEPOT
Defence - MANGALORE AMMUNITION DEPOT
Defence - Ordnance Depot
Defence - SOMME BARRACKS - SHEPPARTON

Listed Marine Species [Resource Information]

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

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

Name	Threatened	Type of Presence
		habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Arcadia H59 B.R.	VIC
Arcadia SS.R.	VIC
Beveridge B.R	VIC
Broadford G110 B.R.	VIC
Broadford SS.R.	VIC
Bunganail B.R.	VIC
Craigieburn Grassland N.C.R.	VIC
Dabyminga Creek B.R.	VIC
Dargalong SS.R.	VIC
Gemmill Swamp W.R	VIC
Goulburn River	VIC
Goulburn River K49 SS.R.	VIC
Hughes Creek Hill B.R.	VIC
Kilmore East B.R.	VIC
Lowry B.R	VIC
Mangalore N.C.R.	VIC
Moranding I102 B.R	VIC
Moranding I22 B.R	VIC
Mount Piper N.C.R	VIC
Mount Ridley N.C.R.	VIC
Murchison - Rushworth rail line N.C.R.	VIC
Murchison Lagoon W.R.	VIC
Nanny Creek B.R.	VIC
Pulpit Rock S.R.	VIC
Tabilk B.R.	VIC
Tallarook B.R	VIC
Tallarook Wildflower Sanctuary F.R	VIC
Wahring SS.R.	VIC

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Central Highlands RFA	Victoria
North East Victoria RFA	Victoria
West Victoria RFA	Victoria

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Turdus philomelos Song Thrush [597]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Lower Broken River	VIC
Lower Goulburn River Floodplain	VIC

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-37.557186 144.962659,-37.542828 144.969997,-37.52588 144.979439,-37.515124 144.980984,-37.480804 144.994716,-37.418933 145.005188,-37.415524 145.006218,-37.401753 145.021667,-37.389751 145.03128,-37.38525 145.032654,-37.367517 145.026302,-37.343228 145.022526,-37.336131 145.019436,-37.286161 144.9827,-37.253922 144.999523,-37.23397 145.029392,-37.21538 145.030765,-37.205947 145.0457,-37.19829 145.066643,-37.191453 145.068874,-37.132628 145.076084,-37.080879 145.111446,-37.050196 145.115223,-37.026902 145.131874,-37.022654 145.143204,-37.016486 145.14904,-36.992222 145.156765,-36.936535 145.176506,-36.929811 145.179252,-36.929263 145.175304,-36.871745 145.16037,-36.802914 145.160713,-36.781056 145.160713,-36.678834 145.240364,-36.611621 145.240536,-36.6079 145.243625,-36.598667 145.29684,-36.557587 145.339069,-36.531108 145.344219,-36.487646 145.338211,-36.479227 145.318298,-36.485852 145.337524,-36.437117 145.336838,-36.427035 145.338211,-36.399406 145.353832,-36.397333 145.384731,-36.392635 145.396404,-36.360847 145.430565,-36.357252 145.431595,-36.332641 145.431938,-36.356837 145.432796,-36.35587 145.498199,-36.355904 145.499615

Acknowledgements

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

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

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

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix P

Assessment of Impacts to MNES

Appendix P - Assessment of Impacts to Matters of National Environmental Significance

Tables contained in this appendix assess the likelihood of impacts to MNES that were determined to be present within the project area, including threatened communities, threatened flora and threatened fauna. Unless otherwise stated, the significant impact criteria used to determine the likelihood of significant impact have been derived from the Significant Impact Guidelines 1.1 (Department of the Environment 2013). Mitigation measures listed in the tables below refer to specific mitigation measures detailed in Section 6.2.

TABLE P.1 SIGNIFICANT IMPACT ASSESSMENT FOR GREY BOX (EUCALYPTUS MICROCARPA) GRASSY WOODLANDS AND DERIVED NATIVE GRASSLANDS OF SOUTH-EASTERN AUSTRALIA (ENDANGERED), AND WHITE BOX-YELLOW BOX-BLAKELY'S RED GUM GRASSY WOODLANDS AND DERIVED NATIVE GRASSLANDS (CRITICALLY ENDANGERED)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Reduce the extent of an ecological community	If construction works were to proceed without mitigation, removal or partial removal of these communities would be highly likely.	High	**Avoidance measures** • Areas supporting this community have been designated as No-Go Zones	Low: Activities with the potential to cause impact will be excluded from areas supporting these communities.	**Low**
Fragment or increase fragmentation of an ecological community	If construction works were to proceed without mitigation, fragmentation of these communities would be highly likely.	High	**Avoidance measures** • Areas supporting this community have been designated as No-Go Zones	Low: Activities with the potential to cause impact will be excluded from areas supporting these communities.	**Low**
Adversely affect habitat critical to the survival of an ecological community	Construction will not reduce the capacity of the works area to support this threatened community on the future, and thus not adversely impact habitat for these threatened communities.	Low	**No mitigation measures required**	N/A	**Low**
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or	Construction of the CSR will not reduce the capacity of the works area to support this threatened community on the future through the alteration of abiotic factors.	Low	**No mitigation measures required**	N/A	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
substantial alteration of surface water drainage patterns					
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	Where the removal of vegetation to facilitate CSR construction occurs, suitability of remaining areas of these communities may be reduced for species present, thus altering species composition, potentially substantially	Moderate	**Avoidance measures** • Areas supporting this community have been designated as No-Go Zones	Low: As disturbance to these communities has been eliminated by avoidance, there is no risk of altering the species composition of the communities.	**Low**
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • assisting invasive species, that are harmful to the listed ecological community, to become established • causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	Where the disturbance of communities occurs to facilitate CSR construction, there is a high likelihood of introducing harmful invasive species which may reduce the integrity of these communities.	High	**Avoidance measures** • Areas supporting this community have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent the spread of weeds	Low: mitigation measures ensure that the integrity of the communities is maintained.	**Low**
Interfere with the recovery of an ecological community	If construction works were to proceed without mitigation, removal or partial removal of these communities would be highly likely. Substantial removal	Moderate	**Avoidance measures** • Areas supporting this community have been designated as No-Go Zones	Low: mitigation measures ensure that the integrity of the recovery of the communities is not interfered with.	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
	of these communities is considered to constitute interfering with its recovery.		**General construction measures** • Best practice environmental management to prevent the spread of weeds		

TABLE P.2: SIGNIFICANT IMPACT ASSESSMENT FOR SEASONAL HERBACEOUS WETLANDS (FRESHWATER) OF THE TEMPERATE LOWLAND PLAINS (CRITICALLY ENDANGERED)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Reduce the extent of an ecological community	If construction works were to proceed without mitigation, removal or partial removal of this community would be highly likely.	High	**Avoidance measures** • Areas supporting this community have been designated as No-Go Zones	Low: Activities with the potential to cause impact will be excluded from areas supporting this community.	**Low**
Fragment or increase fragmentation of an ecological community	If construction works were to proceed without mitigation, fragmentation of this community would be highly likely.	High	**Avoidance measures** • Areas supporting this community have been designated as No-Go Zones	Low: Activities with the potential to cause impact will be excluded from areas supporting this community.	**Low**
Adversely affect habitat critical to the survival of an ecological community	As the works area consists primarily of is terrestrial and highly disturbed, it is highly unlikely that the works area contains critical habitat for this community outside of where it currently occurs.	Low	**No mitigation measures required**	N/A	**Low**
Modify or destroy abiotic (non-living) factors (such as	Surface runoff is important to this community's persistence. As	High	**General construction measures**	Low: Sediment control measures will reduce the	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	such, it is particularly sensitive to receiving sediment loads.		• Best practice environmental management to prevent surface runoff from delivering sediment loads from construction	risk of this community receiving sediment loads.	
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	Where the removal of vegetation to facilitate CSR construction occurs, suitability of remaining areas of the community may be reduced for species present, thus altering species composition, potentially substantially	Moderate	**Avoidance measures** • Areas supporting this community have been designated as No-Go Zones	Low: As disturbance to these communities has been eliminated by avoidance, there is no risk of altering the species composition of the communities.	**Low**
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • assisting invasive species, that are harmful to the listed ecological community, to become established • causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	Where the disturbance of communities occurs to facilitate CSR construction, there is a high likelihood of introducing harmful invasive species which may reduce the integrity of the community.	High	**Avoidance measures** • Areas supporting this community have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent surface runoff from delivering sediment loads from construction, and the spread of weeds	Low: mitigation measures ensure that the integrity of the community is maintained.	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Interfere with the recovery of an ecological community	If construction works were to proceed without mitigation, removal or partial removal of this community would be highly likely. Substantial removal of this community is considered to constitute interfering with its recovery.	Moderate	**Avoidance measures** • Areas supporting this community have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent surface runoff from delivering sediment loads from construction, and the spread of weeds	Low: mitigation measures ensure that the integrity of the recovery of the community is not interfered with.	**Low**

TABLE P.3: SIGNIFICANT IMPACT ASSESSMENT FOR WETLAND FLORA SPECIES INCLUDING CURLY SEDGE (VULNERABLE), SWAMP FIREWEED (VULNERABLE), AND SWAMP EVERLASTING (VULNERABLE)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of an important population of a species	Removal of areas classified as Seasonal Herbaceous Wetlands of the Temperate Lowland Plains, or a reduction in the quality of these areas through sedimentation or other processes have the potential to lead to the decrease of important populations of these species	Moderate	**Avoidance measures** • Areas supporting that are likely to support these species have been designated No-Go Zones **General construction measures**	Low: By ensuring that areas where important populations of these species may occur are not impacted by the works, the risk of reducing the population sizes in these areas is low.	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Reduce the area of occupancy of an important population	Removal of areas classified as Seasonal Herbaceous Wetlands of the Temperate Lowland Plains, or a reduction in the quality of these areas through sedimentation or other processes have the potential to reduce the area of occupancy of important populations of these species	Moderate	• Best practice environmental management to prevent surface runoff from delivering sediment loads from construction, and the spread of weeds that might impact habitat and potential habitat for these species	Low: By ensuring that areas where important populations of these species may occur are not impacted by the works, the risk of reducing the area of occupancy in these areas is low.	**Low**
Fragment an existing important population into two or more populations	Removal of areas classified as Seasonal Herbaceous Wetlands of the Temperate Lowland Plains, or a reduction in the quality of these areas through sedimentation or other processes have the potential to fragment important populations of these species	Moderate		Low: By ensuring that areas where important populations of these species may occur are not impacted by the works, the risk of fragmenting important populations is low	**Low**
Adversely affect habitat critical to the survival of a species	Removal of areas classified as Seasonal Herbaceous Wetlands of the Temperate Lowland Plains, or a reduction in the quality of these areas through sedimentation or other processes have the potential to adversely affect habitat critical to the survival of a species	Moderate		Low: By ensuring that areas where important populations of these species may occur are not impacted by the works, the risk of adversely affecting critical habitat is low	**Low**
Disrupt the breeding cycle of an important population	Removal of areas classified as Seasonal Herbaceous Wetlands of the Temperate Lowland Plains, or a reduction in the quality of these areas through sedimentation or other processes have the potential to disrupt the breeding of an important population.	Moderate		Low: By ensuring that areas where important populations of these species may occur are not impacted by the works, the risk of disrupting the breeding cycle of an important population is low.	**Low**
Modify, destroy, remove or isolate or decrease the	Removal of areas classified as Seasonal Herbaceous Wetlands	Moderate		Low: By ensuring that areas where important	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
availability or quality of habitat to the extent that the species is likely to decline	of the Temperate Lowland Plains, or a reduction in the quality of these areas through sedimentation or other processes have the potential to decrease the quality and availability of habitat and lead to population declines			populations of these species may occur are not impacted by the works, the risk of causing population declines through reducing habitat availability or quality is low.	
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	If construction works were to proceed without mitigation, the introduction of harmful invasive species becoming established in the vulnerable species' habitat is high	High		Low: mitigation measures reduce the likelihood of the establishment of invasive species	**Low**
Introduce disease that may cause the species to decline	If construction works were to proceed without mitigation, the introduction of disease that may cause decline in the vulnerable species' population is high	High		Low: mitigation measures reduce the likelihood of the establishment of disease.	**Low**
Interfere substantially with the recovery of the species	Removal of areas classified as Seasonal Herbaceous Wetlands of the Temperate Lowland Plains, or a reduction in the quality of these areas through sedimentation or other processes have the potential to interfere substantially with the recovery of the species	Moderate		Low: By ensuring that areas where important populations of these species may occur are not impacted by the works, the risk of interfering substantially with the recovery of the species is low.	**Low**

TABLE P.4: SIGNIFICANT IMPACT ASSESSMENT FOR MATTED-FLAX-LILY (ENDANGERED)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of a population	If construction works were to proceed without mitigation, removal of Matted Flax-lily plants and therefore a decrease in population size would be highly likely.	High	**Avoidance measures** • Areas supporting this species, and those with a high likelihood of supporting this species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to this species.	Low: The specific mitigation measures sufficiently reduce the risk of removing Matted Flax-lily plants and thus leading to a long term decrease in the size of the population	**Low**
Reduce the area of occupancy of a population	If construction works were to proceed without mitigation, removal of Matted Flax-lily plants and therefore a reduction in area of occupancy would be highly likely.	High	**Avoidance measures** • Areas supporting this species, and those with a high likelihood of supporting this species have been designated as No-Go Zones • Pre-clearance surveys to be undertaken within the Wallan works area between November and February. If found, construction to avoid. **General construction measures** • Best practice environmental management to prevent indirect impacts to this species.	Low: The specific mitigation measures sufficiently reduce the risk of removing Matted Flax-lily plants and thus a reduction I the area of occupancy of the species.	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Fragment an existing population into two or more populations	If construction works were to proceed without mitigation, the risk of fragmenting a population through the removal of Matted Flax-lily plants is high	High	**Avoidance measures** • Areas supporting this species, and those with a high likelihood of supporting this species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to this species.	Low: The specific mitigation measures sufficiently reduce the risk of removing Matted Flax-lily plants and thus fragmentation of a population	**Low**
Adversely affect habitat critical to the survival of a species	The general character of the vegetation within the rail corridor is highly disturbed. It is unlikely that habitat critical to this species occurs within the project area	Low	**No mitigation measures required**	N/A	**Low**
Disrupt the breeding cycle of a population	If construction works were to proceed without mitigation, the risk of disrupting the breeding cycle of a population is high.	High	**Avoidance measures** • Areas supporting this species, and those with a high likelihood of supporting this species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to this species.	Low: The specific mitigation measures sufficiently reduce the risk of removing Matted Flax-lily plants and thus the risk of disrupting the breeding cycle of the population.	**Low**
Modify, destroy, remove or isolate or decrease the availability or quality of	The general character of the vegetation within the rail corridor is highly disturbed. It is unlikely that habitat critical to this	Low	**No mitigation measures required**	N/A	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
habitat to the extent that the species is likely to decline	species occurs within the project area				
Result in invasive species that are harmful to a species becoming established in the species' habitat	If construction works were to proceed without mitigation, the introduction of harmful invasive species becoming established is high	High	**Avoidance measures** • Areas supporting this species, and those with a high likelihood of supporting this species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to this species.	Low: mitigation measures reduce the likelihood of the establishment of invasive species	**Low**
Introduce disease that may cause the species to decline	If construction works were to proceed without mitigation, the introduction of disease that may cause decline in the species' population is high	High	**Avoidance measures** • Areas supporting this species, and those with a high likelihood of supporting this species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to this species.	Low: mitigation measures reduce the likelihood of the establishment of disease.	**Low**
Interfere with the recovery of the species	If construction works were to proceed without mitigation, removal of Matted Flax-lily plants and therefore a reduction in area of occupancy would be highly likely.	High	**Avoidance measures** • Areas supporting this species, and those with a high likelihood of supporting this species have been designated as No-Go Zones	Low: By ensuring that areas where important populations of these species may occur are not impacted by the works, the risk of interfering substantially with the	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
			General construction measures • Best practice environmental management to prevent indirect impacts to this species.	recovery of the species is low.	

TABLE P.5: SIGNIFICANT IMPACT ASSESSMENT FOR THE REGENT HONEYEATER (CRITICALLY ENDANGERED) AND SWIFT PARROT (CRITICALLY ENDANGERED)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of a population	If construction works were to proceed without mitigation, reductions in habitat for these species may lead to population decreases	High	**Avoidance measures** • Areas supporting high quality habitat for these species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to these species.	Low: The specific mitigation measures sufficiently reduce the risk of removing habitat for these species which may have led to a long term decrease in the size of the population.	**Low**
Reduce the area of occupancy of a population	Due to the dispersed nature of this species, it is unlikely that vegetation removal within the project area would reduce the overall area of occupancy of these species.	Low	**No mitigation measures required**	N/A	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Fragment an existing population into two or more populations	Due to these species being highly mobile, removal of vegetation within the project area is unlikely to fragment a population	Low	**No mitigation measures required**	N/A	**Low**
Adversely affect habitat critical to the survival of a species	Vegetation within the project area is not considered critical for the survival of the species	Low	**No mitigation measures required**	N/A	**Low**
Disrupt the breeding cycle of a population	In the case of the Regent Honeyeater, removal of habitat has the potential to disrupt the breeding of a population. As the Swift Parrot breeds in Tasmania, its breeding cycle is unlikely to be affected	High	**Avoidance measures** • Areas supporting high quality habitat for these species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to these species.	Low: The specific mitigation measures sufficiently reduce the risk of removing habitat for these species which may have led to disrupting the breeding cycle of the Regent Honeyeater.	**Low**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	If construction works were to proceed without mitigation, reductions in habitat for these species may lead to species decline	High	**Avoidance measures** • Areas supporting high quality habitat for these species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to these species.	Low: The specific mitigation measures sufficiently reduce the risk of removing habitat for these species which may have led to a decline in these species.	**Low**
Result in invasive species that are harmful to a species becoming	If construction works were to proceed without mitigation, the introduction of harmful invasive	High	**Avoidance measures** • Areas supporting high quality habitat for these	Low: mitigation measures reduce the likelihood of the	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
established in the species' habitat	species becoming established is high		species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to these species.	establishment of invasive species	
Introduce disease that may cause the species to decline	If construction works were to proceed without mitigation, the introduction of disease that may cause decline in the species' population is high	High	**Avoidance measures** • Areas supporting high quality habitat for these species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to these species.	Low: mitigation measures reduce the likelihood of the establishment of disease.	**Low**
Interfere with the recovery of the species	If construction works were to proceed without mitigation, reductions in habitat for this species have the potential to interfere with the recovery of these species	High	**Avoidance measures** • Areas supporting high quality habitat for these species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to these species.	Low: The specific mitigation measures sufficiently reduce the risk of removing habitat for this species which may have interfered with the recovery of these species.	**Low**

TABLE P.6: SIGNIFICANT IMPACT ASSESSMENT FOR THE PAINTED HONEYEATER (VULNERABLE)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of an important population of a species	If construction works were to proceed without mitigation, reductions in habitat for this species may lead to population decreases	High	**Avoidance measures** • Areas supporting high quality habitat for this species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to this species.	Low: The specific mitigation measures sufficiently reduce the risk of removing habitat for this species which may have led to a long term decrease in an important population of the species.	**Low**
Reduce the area of occupancy of an important population	Due to the dispersed nature of this species, it is unlikely that vegetation removal within the project area would reduce the overall area of occupancy of this species.	Low	**No mitigation measures required**	N/A	**Low**
Fragment an existing important population into two or more populations	Due to this species being highly mobile, removal of vegetation within the project area is unlikely to fragment a population	Low	**No mitigation measures required**	N/A	**Low**
Adversely affect habitat critical to the survival of a species	Vegetation within the project area is not considered critical for the survival of the species	Low	**No mitigation measures required**	N/A	**Low**
Disrupt the breeding cycle of an important population	Vegetation removal within the project area has the potential to disrupt the breeding of this species where it occurs within the project area	High	**Avoidance measures** • Areas supporting high quality habitat for this species have been designated as No-Go Zones **General construction measures**	Low: The specific mitigation measures sufficiently reduce the risk of removing habitat for this species which may have led to a disruption of the breeding cycle of this species.	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
			• Best practice environmental management to prevent indirect impacts to this species.		
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	If construction works were to proceed without mitigation, reductions in habitat for this species may lead to species decline	High	**Avoidance measures** • Areas supporting high quality habitat for this species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to this species.	Low: The specific mitigation measures sufficiently reduce the risk of removing habitat for this species which may have led to a decline in the species.	**Low**
Result in invasive species that are harmful to a species becoming established in the vulnerable species' habitat	If construction works were to proceed without mitigation, the introduction of harmful invasive species becoming established is high	High	**Avoidance measures** • Areas supporting high quality habitat for this species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to this species.	Low: mitigation measures reduce the likelihood of the establishment of invasive species	**Low**
Introduce disease that may cause the species to decline	If construction works were to proceed without mitigation, the introduction of disease that may cause decline in the species' population is high	High	**Avoidance measures** • Areas supporting high quality habitat for this species have been designated as No-Go Zones	Low: mitigation measures reduce the likelihood of the establishment of disease.	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
			General construction measures • Best practice environmental management to prevent indirect impacts to this species.		
Interfere substantially with the recovery of the species	If construction works were to proceed without mitigation, reductions in habitat for this species have the potential to interfere with the recovery of the species	High	**Avoidance measures** • Areas supporting high quality habitat for this species have been designated as No-Go Zones **General construction measures** • Best practice environmental management to prevent indirect impacts to this species.	Low: The specific mitigation measures sufficiently reduce the risk of removing habitat for this species which may have led to a decline in the species.	**Low**

TABLE P.7: SIGNIFICANT IMPACT ASSESSMENT FOR AQUATIC FAUNA INCLUDING THE SILVER PERCH (CRITICALLY ENDANGERED) AND THE TROUT COD (ENDANGERED)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of a population	Disturbance of waterway habitat has the potential to decrease the size of a population	High	**Waterways and wetlands measures** • The only works to take place in the vicinity of waterways are CSR cable routing works • For bridge crossings, the CSR cable is to be attached to the bridge, with no associated construction works to enter the channel itself. • For culvert crossings the CSR is to be under-bored for perennial waterways. Trenching through waterways may only take place when the stream is dry, provided the structural integrity of the channel is not compromised **General construction measures** • Best practice environmental management to prevent indirect impacts to this species through means such as erosion, sedimentation or the introduction of pests, weeds and diseases.	Low: likelihood of disturbance of waterway habitat is low	**Low**
Reduce the area of occupancy of a population	Disturbance of waterway habitat has the potential to reduce the area of occupancy of a population	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Fragment an existing population into two or more populations	Disturbance of waterway habitat has the potential to fragment an existing population	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Adversely affect habitat critical to the survival of a species	Disturbance of waterway habitat has the potential to adversely affect critical habitat	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Disrupt the breeding cycle of a population	Disturbance of waterway habitat has the potential to disrupt the breeding cycle of these species	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Disturbance of waterway habitat has the potential cause declines though habitat modification	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Result in invasive species that are harmful to a species becoming established in the species' habitat	Disturbance of waterway habitat has the potential cause declines though habitat modification	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Introduce disease that may cause the species to decline	Disturbance of waterway habitat has the potential to cause declines though disease introduction	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Interfere with the recovery of the species	Disturbance of waterway habitat has the potential to interfere with the recovery of the species	High		Low: likelihood of disturbance of waterway habitat is low	**Low**

TABLE P.8: SIGNIFICANT IMPACT ASSESSMENT FOR THE MURRAY COD (VULNERABLE)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of an important population	**CSR construction**: Disturbance of waterway habitat has the potential to decrease the size of a population	High	**Waterways and wetlands measures** • The only works to take place in the vicinity of waterways are CSR cable routing works • For bridge crossings, the CSR cable is to be attached to the bridge, with no associated construction works to enter the channel itself. • For culvert crossings the CSR is to be under-bored for perennial waterways. Trenching through waterways may only take place when the stream is dry, provided the structural integrity of the channel is not compromised **General construction measures** • Best practice environmental management to prevent indirect impacts to this species through means such as erosion, sedimentation or the introduction of pests, weeds and diseases.	Low: likelihood of disturbance of waterway habitat is low	**Low**
Reduce the area of occupancy of an important population	**CSR construction**: Disturbance of waterway habitat has the potential to reduce the area of occupancy of a population	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Fragment an existing important population into two or more populations	**CSR construction**: Disturbance of waterway habitat has the potential to fragment an existing population	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Adversely affect habitat critical to the survival of a species	**CSR construction**: Disturbance of waterway habitat has the potential to adversely affect critical habitat	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Disrupt the breeding cycle of an important population	**CSR construction**: Disturbance of waterway habitat has the potential to disrupt the breeding cycle of these species	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**CSR construction**: Disturbance of waterway habitat has the potential cause declines though habitat modification	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat	**CSR construction**: Disturbance of waterway habitat has the potential cause declines though habitat modification	High		Low: likelihood of disturbance of waterway habitat is low	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Introduce disease that may cause the species to decline	**CSR construction**: Disturbance of waterway habitat has the potential to cause declines though disease introduction	High		Low: likelihood of disturbance of waterway habitat is low	**Low**
Interfere substantially with the recovery of the species	**CSR construction**: Disturbance of waterway habitat has the potential to interfere with the recovery of the species	High		Low: likelihood of disturbance of waterway habitat is low	**Low**

TABLE P.9: SIGNIFICANT IMPACT ASSESSMENT FOR THE GROWLING GRASS FROG (VULNERABLE) AS PER THE SIGNIFICANT IMPACT GUIDELINES FOR THE VULNERABLE GROWLING GRASS FROG (DEWHA 2009A)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Habitat degradation in an area supporting an important population	**CSR construction**: Disturbance of area supporting seasonal Herbaceous Wetlands of the Temperate Lowland Plains that exists south of Wallan has the potential to degrade temporary habitat for an important population of this species. Works in this area also have the potential of spreading Chytrid fungus to/from this area.	High	**Avoidance measures** • Areas supporting high quality habitat for this species have been designated as No-Go Zones **Waterways and wetlands measures** • The only works to take place in the vicinity of waterways are CSR cable routing works • For bridge crossings, the CSR cable is to be attached to the bridge, with no associated	Low: likelihood of disturbance of waterway habitat is low	**Low**
Isolation and fragmentation of populations	**CSR construction**: Disturbance of waterway habitat has the potential to isoate and fragment populations	High		Low: likelihood of disturbance of waterway habitat is low	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
			construction works to enter the channel itself. • For culvert crossings the CSR is to be under-bored for perennial waterways. Trenching through waterways may only take place when the stream is dry, provided the structural integrity of the channel is not compromised **General construction measures** • Best practice environmental management to prevent indirect impacts to this species through means such as erosion, sedimentation or the introduction of pests, weeds and diseases (including Chytrid fungus).		

TABLE P.10: SIGNIFICANT IMPACT ASSESSMENT FOR THE GREY-HEADED FLYING-FOX (VULNERABLE)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of an important population of a species	**Negligible:** Although this species may forage within the project area, it is a highly mobile species und unlikely to be	Low	**No mitigation measures required**	N/A	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
	affected in this way by the proposed works				
Reduce the area of occupancy of an important population	**Negligible:** Although this species may forage within the project area, it is a highly mobile species und unlikely to be affected in this way by the proposed works	Low		N/A	**Low**
Fragment an existing important population into two or more populations	**Negligible:** Although this species may forage within the project area, it is a highly mobile species und unlikely to be affected in this way by the proposed works	Low		N/A	**Low**
Adversely affect habitat critical to the survival of a species	**Negligible:** Although this species may forage within the project area, it is a highly mobile species und unlikely to be affected in this way by the proposed works	Low		N/A	**Low**
Disrupt the breeding cycle of an important population	**Negligible:** Although this species may forage within the project area, it is a highly mobile species und unlikely to be affected in this way by the proposed works	Low		N/A	**Low**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Negligible:** Although this species may forage within the project area, it is a highly mobile species und unlikely to be affected in this way by the proposed works	Low		N/A	**Low**
Result in invasive species that are harmful to a species becoming established in the vulnerable species' habitat	**Negligible:** Although this species may forage within the project area, it is a highly mobile species und unlikely to be	Low		N/A	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
	affected in this way by the proposed works				
Introduce disease that may cause the species to decline	**Negligible:** Although this species may forage within the project area, it is a highly mobile species und unlikely to be affected in this way by the proposed works	Low		N/A	**Low**
Interfere substantially with the recovery of the species	**Negligible:** Although this species may forage within the project area, it is a highly mobile species und unlikely to be affected in this way by the proposed works	Low		N/A	**Low**

TABLE P.11: SIGNIFICANT IMPACT ASSESSMENT FOR THE STRIPED LEGLESS LIZARD AND THE PINK-TAILED WORM LIZARD (VULNERABLE)

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of an important population of a species	**High:** Removing a population of this species has the potential to lead to a population decrease in the short term.	High	**Avoidance measures** • Areas supporting high quality habitat for this species, where the species has not previously been determined to be absent through targeted surveys have been designated as No-Go Zones **Avoidance measures** • Outside the MSA area, where vegetation is to be cleared that has a moderate likelihood of supporting Striped Legless Lizard and Pink Tailed Worm Lizard (mapped in Appendix B), fauna spotters must supervise works to ensure the absence of these species. Should these species be determined to be present, works must stop, with the habitat occupied by these species to be avoided by construction.	**Low**: mitigation measures mitigate the risk of this type of impact	**Low**
Reduce the area of occupancy of an important population	**High:** Removing a population of this species has the potential to reduce the area of occupancy of an important population.	High		**Low**: mitigation measures mitigate the risk of this type of impact	**Low**
Fragment an existing important population into two or more populations	**High:** Removing a population or part thereof of this species has the potential to fragment an important population into two or more important populations	High		**Low**: mitigation measures mitigate the risk of this type of impact	**Low**
Adversely affect habitat critical to the survival of a species	**Moderate:** Removal of an area occupied by this species has the potential to adversely affect critical habitat, if that population existed within critical habitat.	Moderate		**Low**: mitigation measures mitigate the risk of this type of impact	**Low**
Disrupt the breeding cycle of an important population	**High:** Removing a population of this species would disrupt the breeding cycle of a population of this species.	High		**Low**: mitigation measures mitigate the risk of this type of impact	**Low**
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**High:** Removing a population of this species may potentially cause the species to decline.	High		**Low**: mitigation measures mitigate the risk of this type of impact	**Low**
Result in invasive species that are harmful to a species becoming established in the vulnerable species' habitat	**High:** Egress of works into areas occupied by this species may introduce invasive species.	High		**Low**: mitigation measures mitigate the risk of this type of impact	**Low**
Introduce disease that may cause the species to decline	**High:** Egress of works into areas occupied by this species may introduce disease.	High		**Low**: mitigation measures mitigate the risk of this type of impact	**Low**

SIGNIFICANT IMPACT CRITERION	RISK TO MNES WITHOUT MITIGATION MEASURE	LIKELIHOOD OF A SIGNIFICANT IMPACT (IN ACCORDANCE WITH BASELINE MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURES (SEE SECTION 6.2)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Interfere substantially with the recovery of the species	**High:** Removing a population of this species has the potential to substantially interfere with the recovery of the species..	High		**Low**: mitigation measures mitigate the risk of this type of impact	**Low**

Appendix Q

Fauna Dispersal Structures

Appendix Q – Fauna Dispersal Structures

Requirement for habitat linkage structures

Areas where large tracts of wooded vegetation occur close to the track are preferred fauna crossing points, as well as hotspots for vegetation clearing to facilitate the proposed works. Habitat Linkage Structures have been recommended for areas where habitat loss and fragmentation will negatively impact threatened arboreal and semi-arboreal fauna populations. Fragmentation particularly impacts these functional groups as they are highly agile within the mid-storey and canopy layer and will avoid coming-to-ground where they are less so. Two arboreal, threatened fauna species listed under the FFG-Act, are assumed to be present throughout the corridor; the Brush-tailed Phascogale and Squirrel Glider from Tallarook to Shepparton. These two species will be the focus of the Habitat Linkage Structure recommendations.

The Squirrel Glider has been shown to be less likely to disperse across linear canopy gaps in habitat once the gap between the canopy between two areas of vegetation increases past 30 m (van der Ree, Cesarini et al. 2010). Phascogales are more vulnerable to gaps in habitat as they lack the ability to glide. Increasing the gap between areas of habitat, at all strata levels (ground, mid-storey, and canopy layers), for this species increases the predation risk by feral species, such as European Red Fox *Vulpes vulpes* and Feral Cat *Felis catus*, as Phascogale are forced to come-to-ground, and decreases the likelihood that this species will successfully be able to disperse to obtain resources, such a food, or for population viability purposes, such as breeding. Train-wildlife collisions are likely to also increase following vegetation removal whilst animals re-stablish home-ranges and dispersal pathways.

The objective of linking habitat is to increase overall landscape connectivity for fauna, rather than to connect ad-hoc, singular points or small patches across the railway. Individual trees to be removed will, in many cases, increase a gap used by wildlife, and therefore risk, to cross the railway. However, each individual tree will not necessarily be located in a place where wildlife can be directed to or are predicted to cross the railway. This is especially problematic in areas of high tree cover, where wildlife are likely to cross at many places and because diversion fencing of the railway corridor is not feasible across the entire project area. As such, any area identified as a potentially strategic location for railway crossing by fauna are group into Crossing Zones. This inbuilt resilience ensures a more robust and reliable crossing option that will remain functional in the long-term. However, as the removal of high-quality habitat is limited throughout the project area, natural crossing points still exist throughout the rail corridor and across broader local landscapes. Consequently, proposed Crossing Zones are formed across larger extents throughout the project area where vegetation removal exacerbates fragmentation extensively and incorporates existing habitat linkages across the railway.

Crossing Zones are priority areas for maintaining and connecting important fauna habitat. Therefore, within each Crossing Zone multiple habitat linkage structure types are utilised, in conjunction with re-vegetation. For the current project, Crossing Zones, and therefore, habitat linkages, can consist of canopy rope bridges, gliding poles and at-ground vegetation re-instatement. Where removal of habitat and a tree(s) negatively impact the ability of wildlife to cross the railway, recommendations for placement of habitat linkage structures within Crossing Zones are recommended. Impacts predicted to negatively impact wildlife movement within the project area are defined as;

For the current project, Crossing Zones, and therefore, habitat linkages, can consist of canopy rope bridges, gliding poles and at-ground vegetation re-instatement. Where removal of habitat and a tree(s) negatively impact the ability of wildlife to cross the railway, recommendations for placement of habitat linkage structures within Crossing Zones are recommended. Impacts predicted to negatively impact wildlife movement within the project area are defined as;

- Removal of vegetation where fragmentation increases to a gap of ≥ 30 m, including in the tree canopy.

- Locations of high-quality vegetation removal in terms of fauna use.
- Removal of a large, old tree(s) and/ or hollow-bearing tree(s).
- Areas where blockages to movement (past and present) have the potential to increase rates of train-wildlife collisions.

Three Crossing Zones have been identified for the project and are presented within Table Q.9.1.

Areas outside of these Crossing Zones have not been included as present vegetation extent and type is not likely to support the focal species or connect populations across the landscape. Vegetation removal extent as a result of the current project is also reduced outside of these Crossing Zones.

All proposed locations can be viewed in the attached fauna dispersal structures mapping below. The specific, final placement of rope bridges and gliding poles will be determined in the field following finalisation of project works, as the feasibility of such locations is dependent upon a multitude of design and on-ground ecological factors. An arboreal ecologist should review the design and placement before they are finalised and installed.

It should be noted that the proposed civil works component of this project (as opposed to the CSR works component), have not been identified to exacerbate fauna dispersal issues. As such, opportunities to install larger structures as part of the civil works component of this project (such as fauna underpasses) have not been discussed.

TABLE Q.9.1: CROSSING ZONES WHERE FAUNA DISPERSAL CAPABILITY WILL BE REDUCED BY PROPOSED VEGETATION REMOVAL

CROSSING ZONE	IMPORTANCE	CONFIGURATION OF HABITAT LINKAGES	REASONING FOR PROPOSED LOCATION
1: Tallarook – Kennys Lane to Schoolhouse Lane	• Both focal species likely to be present. • Good quality, remnant habitat fragments run linear to the rail on both sides within the corridor and connect to larger tracks of important fauna habitat sources, such as Creeklines and State Parks. • Canopy connectivity and vegetation cover present close to the rail generally with a maximum gap of 20 m at present.	• Three Canopy Bridges south of Tallarook • One Canopy Bridge north of the Tallarook township.	• Bridge 1: Vegetation removal on eastern side of rail increases crossing gap from 24 m to 40 m. Placement will connect habitat along creek line joining Hume Highway in the east though to Sunday Creek to the west. • Bridge 2: Vegetation removal increases gap to over 40 m. Placement connects vegetated drainage line through to Lowry Bushland Reserve west of the rail. • Bridge 3: Vegetation removal increases gap from 22 m to 39 m. Extensive vegetation removal along western side of rail within 500 m either side of Bridge. Placement connects Dabyming Creek through to Sharps and Taylors Road west of rail. • Bridge 4: Gap increase above 30 m. Placement connect remnant linear fragment on eastern side to large tract of bushland to the west.

CROSSING ZONE	IMPORTANCE	CONFIGURATION OF HABITAT LINKAGES	REASONING FOR PROPOSED LOCATION
2: Seymour – Mangalore – Goulburn River to Hume Hwy and railway intersection north of Seymour	High-quality suitable habitat present for focal species forming larger fragments where rail corridor extends outwards rather than usual 5-6m width. i.e. ARTC land • Focal species highly likely to occur. • Canopy gaps exceed 30 m • Habitat disconnected by 4 tracks • Likely smaller populations throughout rail corridor, that can be reconnected and increase population viability within the local area. • These locations are in lieu of where vegetation clearing is happening, as landscape connectivity is lacking within this Zones. • These offer the most appropriate location for linkage structures within the Crossing Zone based on the main concepts of structure placement as mentioned above i.e. landscape basis, gaps, species presence, large tree presence, rather than exact location of clearing, as conditions not suitable for placement of structures.	• One canopy Bridge north of High Street Seymour • Revegetation of under the rail bridge at Whiteheads creek including eucalypts immediately adjacent to rail bridge. • If eucalypts cannot be planted in close proximity to the rail bridge, then a gliding pole series must be installed	• Gliding Pole series 1 and priority revegetation area: Reinstatement of vegetation to provide connectivity of movement along Whiteheads creek as a more feasible option for movement pathway rather than across 4 lanes of railway tracks, where there is increased risk of fauna colliding with trains. This potentially reduced collision risks. Gliding Pole proposed if Eucalyptus species cannot be planted close to the railway. • Bridge 5: Placement considers current number of barriers with 4 distinct railway lines. This location re-connects high quality, high-fragmented areas of suitable fauna habitat. Proposed vegetation removal will increase the gap above 30 m.
3: Mooroopna – Toolambra Road at Mooroopna Station to Goulburn Valley Hwy intersection	• Goulburn River – important area for wildlife • connectivity route for fauna throughout urban environment of Shepparton and Mooroopna • Focal species highly likely to occur.	• Two Canopy Bridges • Revegetation under the rail bridge at the Broken River • Feasibility of Canopy Bridges in this location needs to be verified on ground as large embankment on southern side of rail may prevent adequate height above rail, or canopy connectivity.	• Bridge 6 and 7: Vegetation removal increasing gap size and inability of fauna to cross track. Embankment is an additional barrier to overcome. • Revegetation linkage: Rivers can be viewed as fauna Hwys as the riparian zone is most often retained during urban development. Clearing from existing rail bridge works has created a gap. Habitat reinstatement will combat impacts of proposed vegetation removal and southern embankment. If eucalyptus can't be planted here, Poles should be included (alternative to bridges if they aren't feasible).

Canopy Rope-bridges and Gliding Poles

Rope bridges (Figure P.1) and Gliding poles are relatively simple structures that provide connectivity for wildlife that live in trees (Gliders) and rarely come to the ground (Phascogales). Canopy rope bridges essentially consist of a singular rope or a rope-ladder suspended between two timber poles, usually installed on the outer two verges of the railway. The end of the rope bridge is then connected to adjacent trees, preferably to two or three different trees, with strands of thick rope (i.e. feeder ropes). Gliding poles consist of a series of timber poles that allow gliding species to move throughout the landscape in the absence of large trees for 'launching and landing.'

Important design considerations from a wildlife perspective include:

- Ensuring the rope bridge is located within areas of tree cover and near important 'launch and landing' trees
- Ensuring the end poles are located as close as possible to large, old tees
- Having feeder ropes connecting the end pole to multiple trees (minimum of two, preferably three or four)
- Designing the bridge to reduce sway and/or swivelling of the rope (i.e. – a ladder rope design is better than a single strand of rope, which is prone to twisting).
- The likely gliding path of arboreal fauna and crossing path of semi-arboreal fauna.

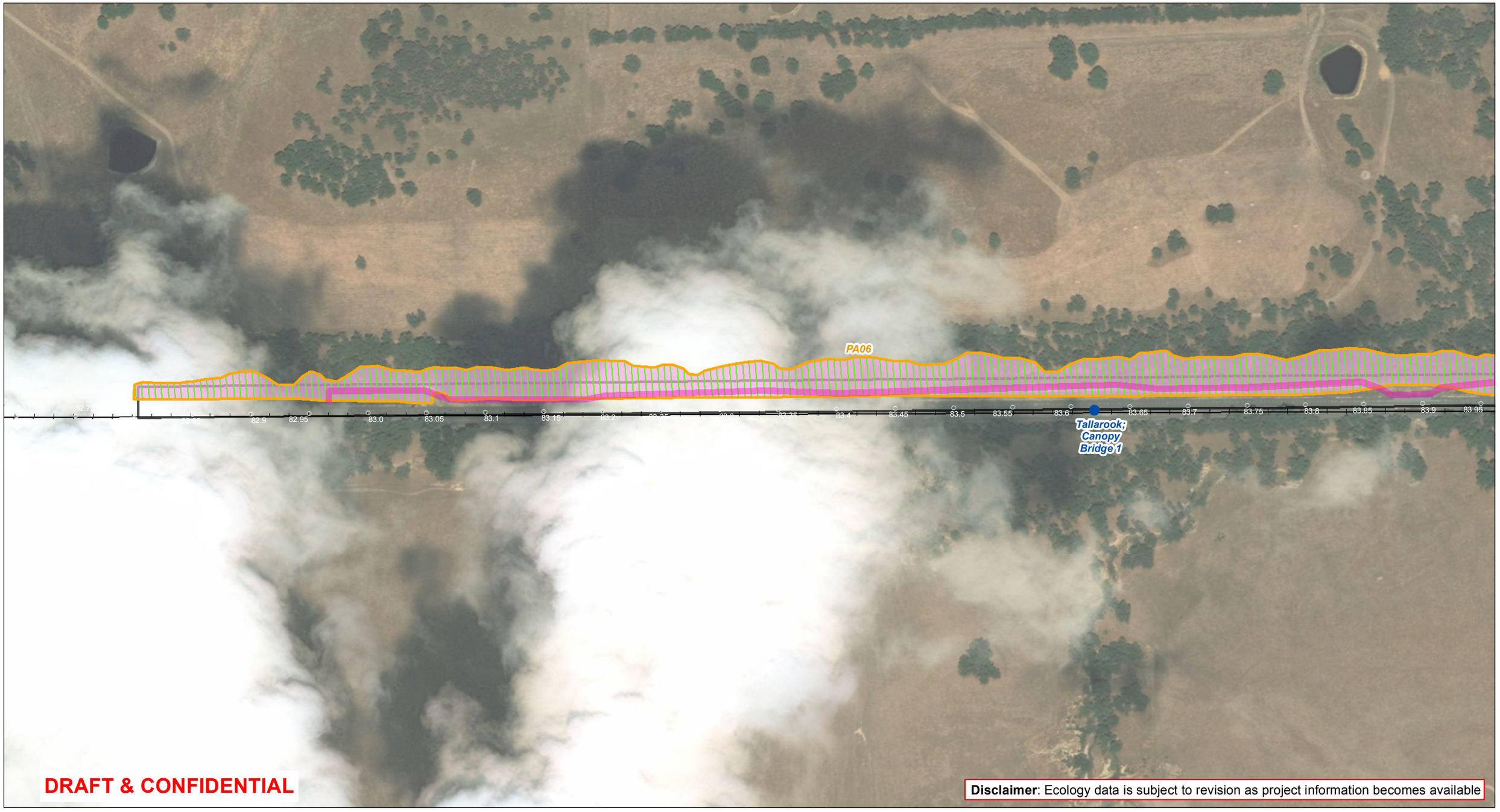
Additionally, the locations of existing powerlines and utility access points (eg. Telstra pits) that could interfere with the installation of bridge support poles and ropes needs to be considered.

FIGURE Q.1: EXAMPLE OF ROPE BRIDGES INSTALLED OVER THE HUME FREEWAY, NORTH-EAST VICTORIA

At ground vegetation links

- Revegetation at the proposed locations should follow standard guidelines and recommendation of the CEMP.
- Locally indigenous species should be prioritised for planting with an array of ground-layer, mid-storey and canopy species utilised.
- Where canopy species cannot be planted (e.g. Eucalyptus for safety purposes) gliding poles should be considered to connect canopy habitat.

These measures are supported by documentation on mitigation for habitat fragmentation (DEWHA 2008), road sector guidelines (VicRoads 2012) as well as linear infrastructure research (van der Ree 2015, Borda-de-Água, Barrientos et al. 2017).



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Disclaimer: Ecology data is subject to revision as project information becomes available

Project area
Bridge and pole locations

Preferred construction footprint
Signalling works area

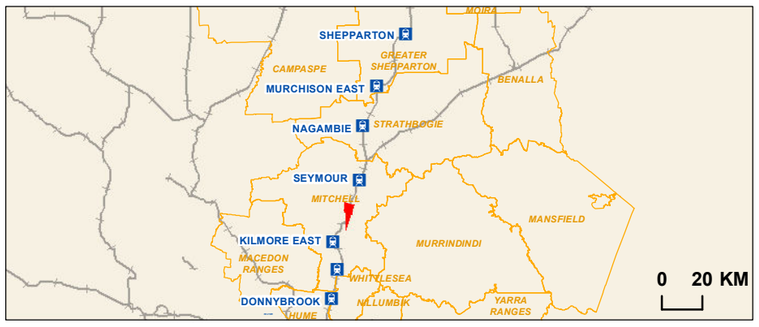
FFG-listed threatened community
Victorian Temperate Woodland Bird Community

Native Vegetation
Plains Grassy Woodland

Management Approach
Priority Avoid
Ecological No Go Zone

Map 1 of 7

Data Sources:
AJM 2018
DELWP 2018
Vicmap 2018
Basemap: ESRI 2018



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aurecon JACOBS MOTT MACDONALD

Regional Rail Revival
North-East & Shepparton

Fauna Dispersal Structures

Drawing Number:			Revision:
NES-AJM-PWD-PWD-MAP-XEV-VIC-0419119			A.1
Drawn By: A. Mattinson	Approved By: M. Timms	Date: 12/09/2019	Map Size: A3

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Metres

Coordinate System: GDA 1994 MGA Zone 55

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Disclaimer: Ecology data is subject to revision as project information becomes available

Project area
Bridge and pole locations

Preferred construction footprint
Signalling works area

FFG-listed threatened community
Victorian Temperate Woodland Bird Community

Native Vegetation
Grassy Woodland
Plains Grassy Woodland
Tree
Tree Protection Zone

Management Approach
Priority Avoid
Ecological No Go Zone

Map 2 of 7

Data Sources:
AJM 2018
DELWP 2018
Vicmap 2018
Basemap: ESRI 2018

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Drawn By:	Approved By:	Date:	Map Size:
A. Mattinson	M. Timms	12/09/2019	A3

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Coordinate System: GDA 1994 MGA Zone 55

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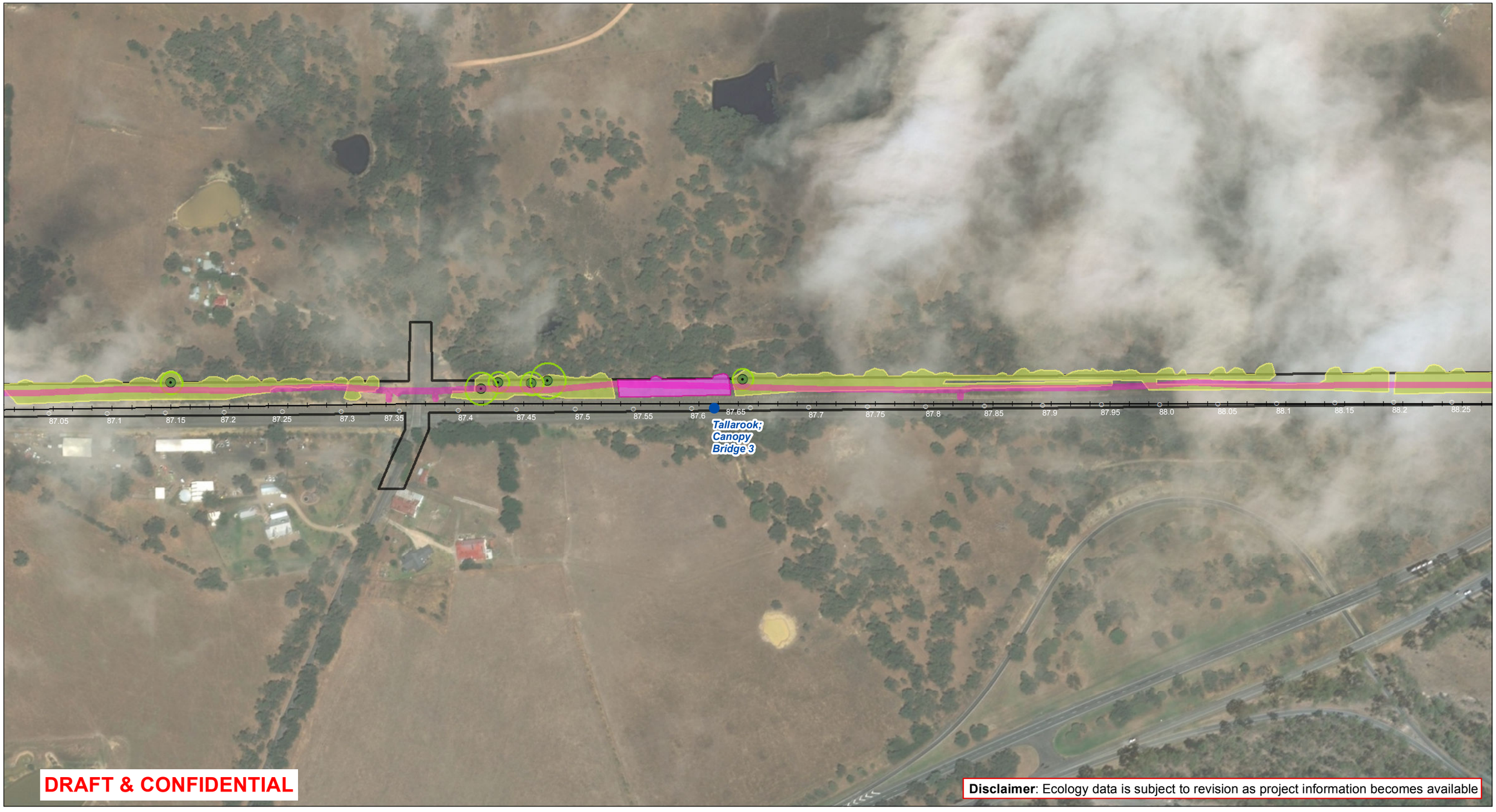

Project area
Bridge and pole locations

Preferred construction footprint

Signalling works area

Native Vegetation

Creekline Grassy Woodland
Grassy Woodland
Tree
Tree Protection Zone

Management Approach

Priority Avoid
Ecological No Go Zone

Map 3 of 7

Data Sources:
AJM 2018
DELWP 2018
Vicmap 2018
Basemap: ESRI 2018

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Drawn By: A. Mattinson	Approved By: M. Timms	Date: 12/09/2019	Map Size: A3

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Metres

Coordinate System: GDA 1994 MGA Zone 55

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Project area

Bridge and pole locations

Preferred construction footprint

Signalling works area

EPBC-listed threatened community

Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

Native Vegetation

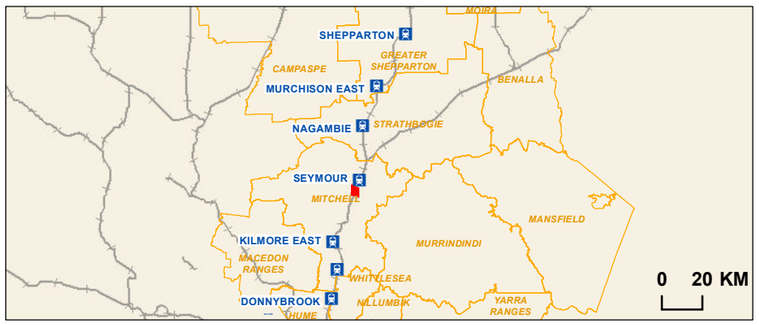
Grassy Woodland

Management Approach

Priority Avoid

Ecological No Go Zone

Map 4 of 7



Data Sources:
AJM 2018
DELWP 2018
Vicmap 2018
Basemap: ESRI 2018

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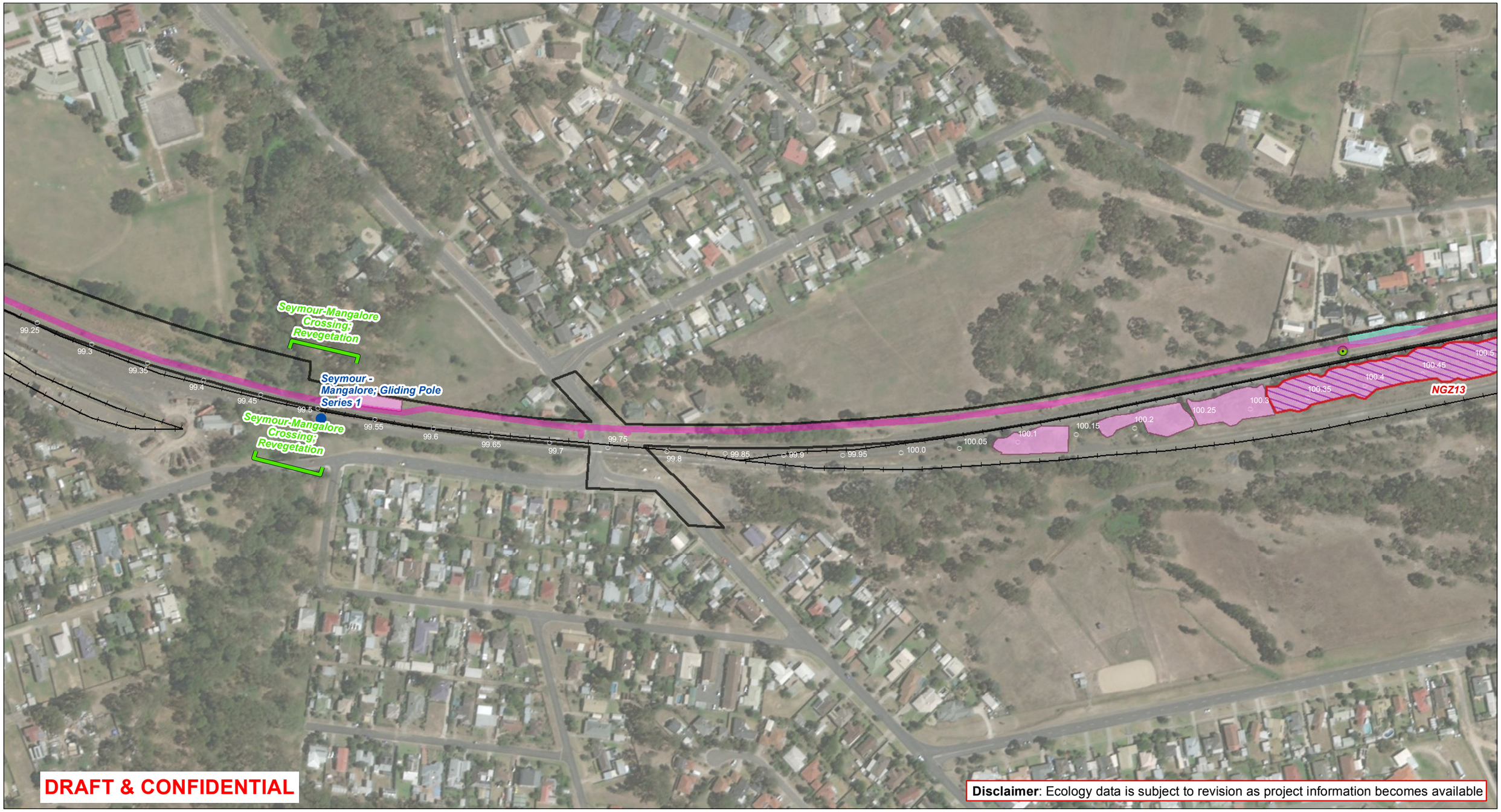

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Disclaimer: Ecology data is subject to revision as project information becomes available

Project area
Bridge and pole locations
Revegetation Crossings

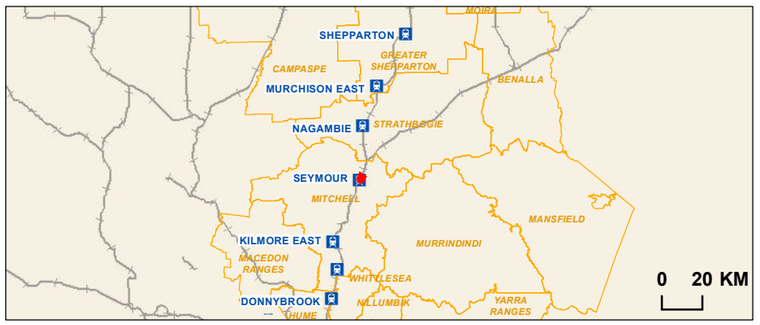
Preferred construction footprint
Signalling works area

EPBC-listed threatened community
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

Native Vegetation
Box Ironbark Forest
Plains Grassy Woodland
Tree
Tree Protection Zone

Management Approach
Priority Avoid
Ecological No Go Zone

Map 5 of 7



Data Sources:
AJM 2018
DELWP 2018
Vicmap 2018
Basemap: ESRI 2018

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Coordinate System: GDA 1994 MGA Zone 55

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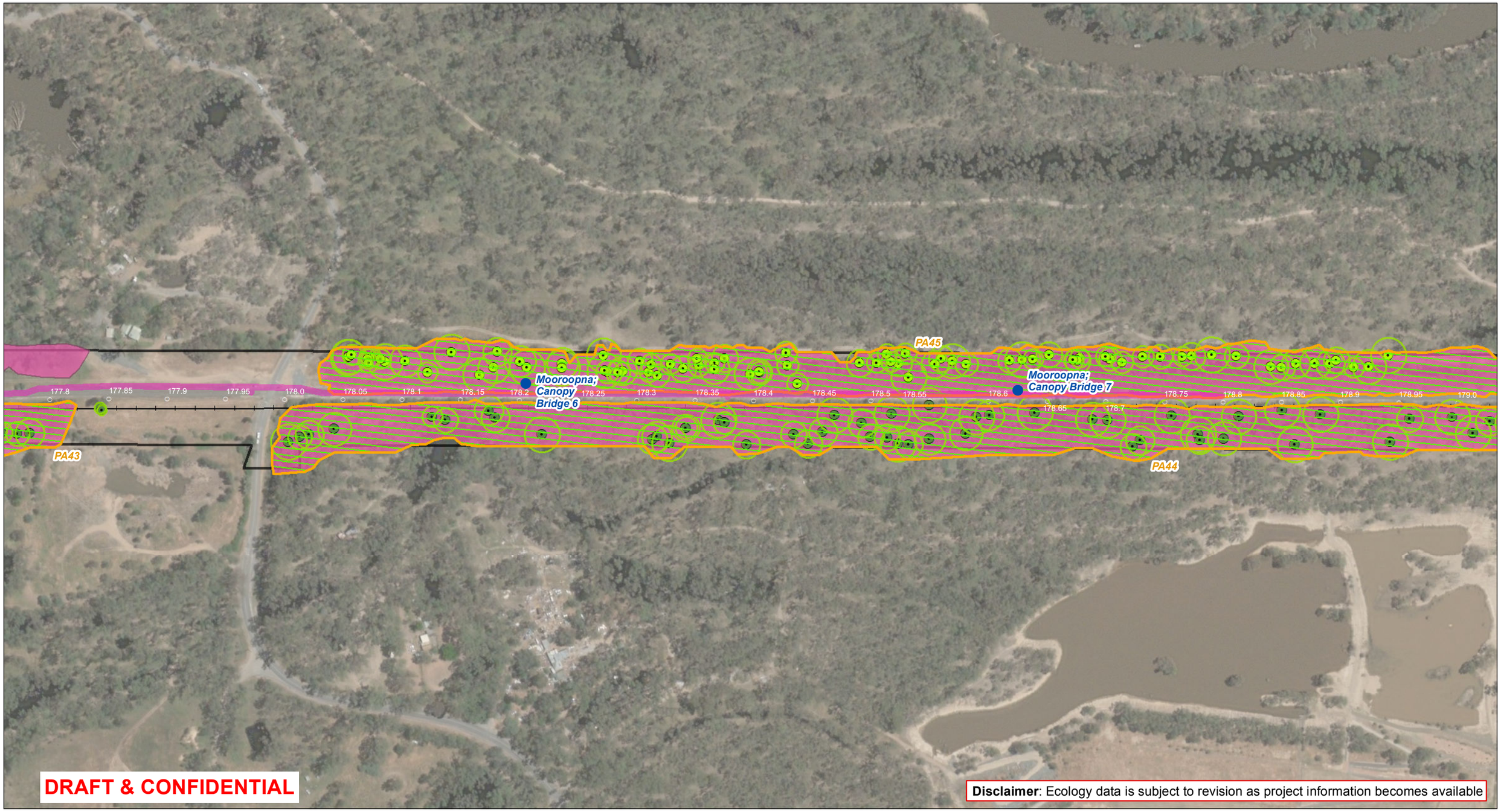

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Project area
Bridge and pole locations

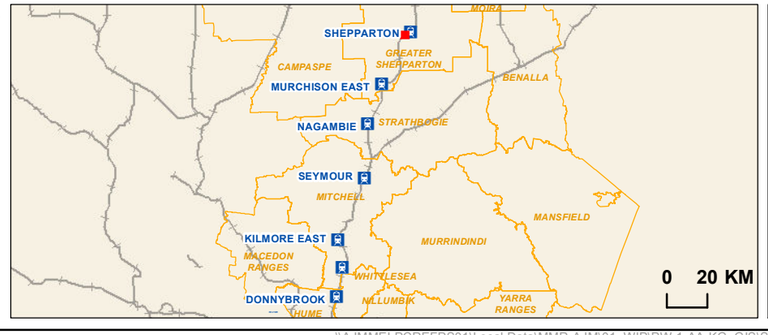
Preferred construction footprint
Signalling works area

FFG-listed threatened community
Victorian Temperate Woodland Bird Community

Native Vegetation
Floodplain Riparian Woodland
Tree
Large Tree
Tree Protection Zone

Management Approach
Priority Avoid
Ecological No Go Zone

Map 6 of 7



Data Sources:
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Vicmap 2018
Basemap: ESRI 2018

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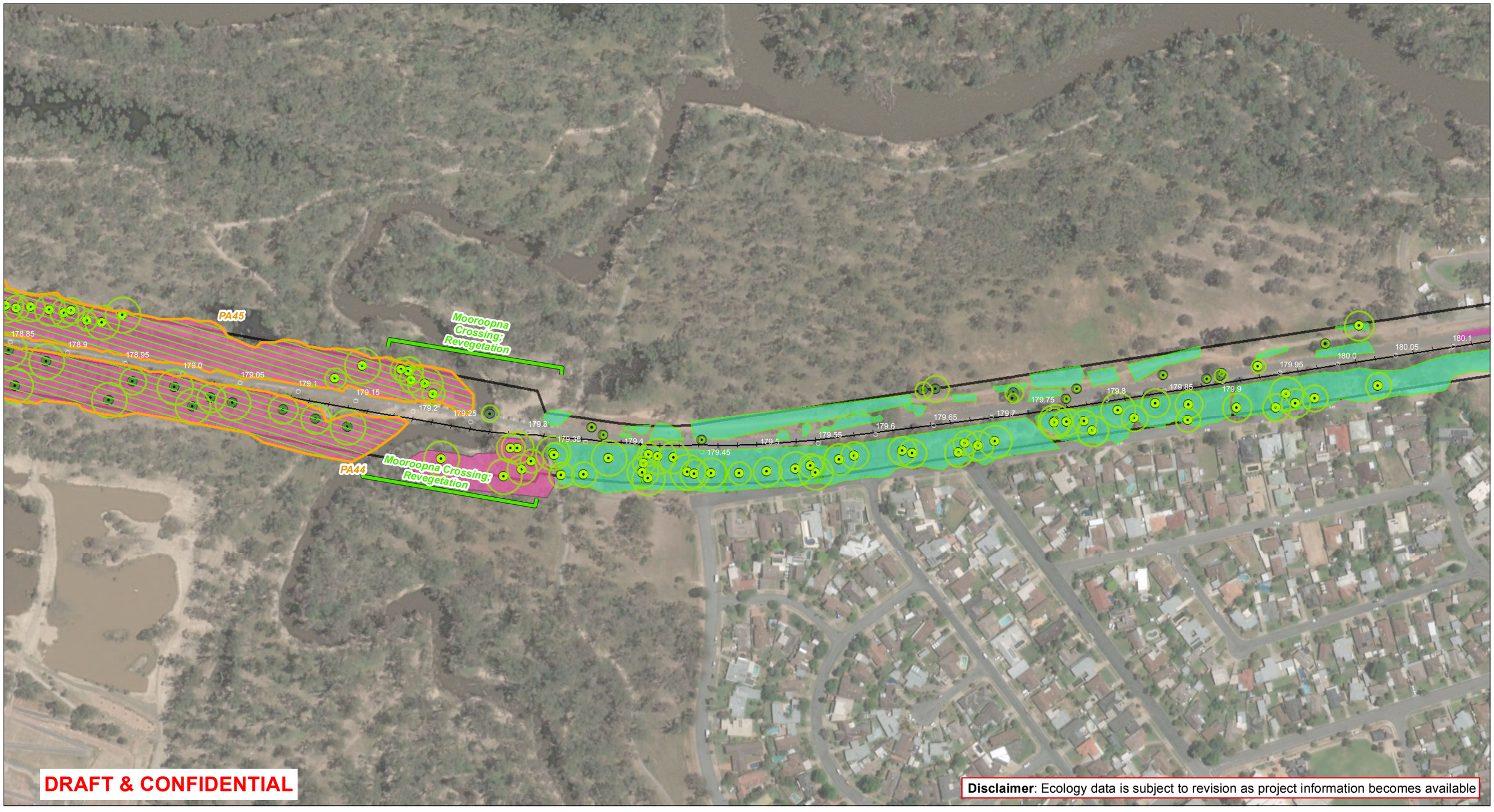

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Project area
Revegetation Crossings

Preferred construction footprint
Signalling works area

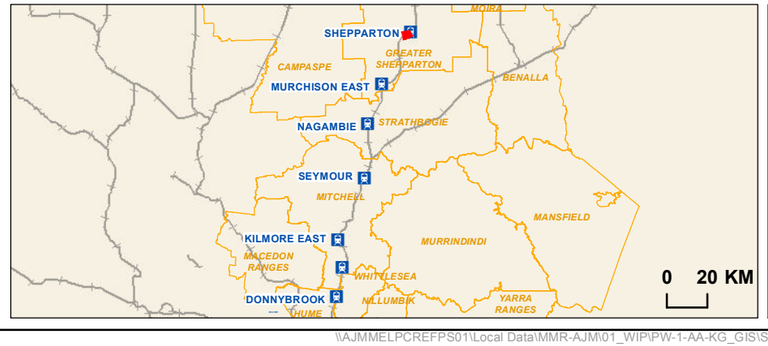
FFG-listed threatened community
Victorian Temperate Woodland Bird Community

Native Vegetation
Floodplain Riparian Woodland
Riverine Grassy Woodland
Tree
Large Tree
Tree Protection Zone

Management Approach
Priority Avoid
Ecological No Go Zone

Map 7 of 7

Data Sources:
AJM 2018
DELWP 2018
Vicmap 2018
Basemap: ESRI 2018



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Appendix R

Native Vegetation Assessment Pathway

Appendix R - Native Vegetation Assessment Pathway

Native vegetation is present within the project area. Vegetation Quality Assessments (VQA; Habitat Hectares) were undertaken as a component of the Field Assessment and the condition was mapped and quantified.

The assessment native vegetation is conducted in accordance with the Guidelines (DELWP 2017a). The Guidelines instruct on how impacts to biodiversity should be considered when assessing an application for a permit to remove, lop or destroy native vegetation. Based on the potential for biodiversity loss, the assessment identifies the level of risk posed by the project to Victoria's biodiversity and requires an appropriately detailed level of assessment to be conducted to inform determining authorities in making approvals decisions. The risk-based level of assessment (basic, intermediate or high) is determined by considering the location category, extent and number of large trees of the proposed native vegetation clearing. The Guidelines specify the resulting assessment pathway (Table R-1).

Where a site occupies a broad area, various location categories may return. In such cases the highest location category is applied to the entire application. Extent includes the area of impact to native vegetation; both patches and scattered trees. The extent of native vegetation removal associated with the project will determine the final location category.

Where the Basic or Intermediate assessment pathway is employed, an online tool is utilised to determine offset requirements and minimal detail is required as to the type of vegetation removed. For vegetation removal under the Detailed assessment pathway, the type and quality of native vegetation must be completed by a DELWP certified ecologist and the resulting spatial information is used to determine offset requirements.

As the project area includes more than 0.5 ha of native vegetation, the project requires a Detailed assessment pathway.

TABLE R.1 NATIVE VEGETATION ASSESSMENT PATHWAY DETERMINATION (DELWP 2017A)

EXTENT OF NATIVE VEGETATION	LOCATION CATEGORY		
	LOCATION 1	LOCATION 2	LOCATION 3
Less than 0.5 ha and not including any large trees	Basic	Intermediate	Detailed
Less than 0.5 ha and including one or more large trees	Intermediate	Intermediate	Detailed
0.5 ha or more	**Detailed**	**Detailed**	**Detailed**

222 EXHIBITION STREET, MELBOURNE VIC 3000
PO BOX 23061 DOCKLANDS VIC 8012 AUSTRALIA